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Article

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BANKING & FINANCE | RESEARCH ARTICLE

Do financing constraints hinder corporate fixed investment? Evidence from the Amman stock exchange

Mohammad A. Khataybeh^{1*}

Abstract: This research provides new evidence on financing constraints on corporate fixed investment by emphasizing the role of cash holdings as a precautionary source of funds. Applying GMM estimates to a sample of 106 Jordanian firms, the results suggest that firms follow trade-off theory in financing their investments but are financially constrained. The coefficient of the cash holdings variable appears to be negative in the fixed-investment regression, suggesting that when firms face financing shocks, they draw upon their precautionary cash reserves to smooth the path of their expenditure on fixed assets.

Subjects: Finance; Corporate Finance; Investment & Securities

Keywords: cash holdings; financing constraints; fixed investment

Jel: G11; G30; G32

1. Introduction

For several decades, studies have been shedding light on corporate financing choices and investment decisions (Bond & Meghir, 1994; Fazzari et al., 1988; Hubbard, 1997). The classic work on corporate finance by Modigliani and Miller (1958) and Miller and Modigliani (1961) demonstrates that internal and external capital are perfect substitutes for firms to finance their investment

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Dr. Khataybeh is actively involved in practical work and is a member of the board of directors at DAR AL OMRAN Planning Architecture Engineering, which is a leading company in architecture, urban planning, and engineering. He is also a consultant at AZ International, a leading global professional service company that helps organizations to improve their services by providing and generating funding, mainly for Syrian refugees in Jordan. In addition, Dr. Khataybeh is one of the examiners of local professional certificate exams such as ACPA, ACMA, and the Jordanian Civil Service Bureau qualifying exams in real estate and risk management, and a certified trainer at TAG Academy.

PUBLIC INTEREST STATEMENT

In the last decades, several studies have attempted to shed light on corporate investment and corporate financing choices, providing evidence that financing constraints hinder corporate investment and growth opportunities.

Accordingly, recently conducted research has provided empirical support for how working capital accounts can help firms facing financing frictions to smooth their investments. However, few studies have been conducted on emerging countries, so this research fills this gap by considering the Jordanian case in the context of the literature on financing constraints. Applying GMM estimates to a sample of 106 Jordanian firms, the results suggest that firms follow trade-off theory in financing their investments but are financially constrained. When firms face financing shocks, they draw upon their precautionary cash reserves to smooth the path of their investments.

opportunities, and that the optimality of the levels of investment decisions are totally independent of firms' capital structure.

Since 1961, scholars have concentrated on understanding the effects of market imperfections on firms' investment decisions and financing choices. However, by mitigating the perfect market hypotheses, research in corporate finance has investigated these two types of decision intensively. For instance, Mueller (1967) shows that firms' decision-making is a complex process, in which each departmental decision is likely to be affected by those of other departments. However, internal and external financing limitations may restrict firms' ability to invest efficiently (Fazzari et al., 1988). Under such circumstances, Gatchev et al. (2010) argue that firms need to study their financing choices in parallel with their investment decisions; that is, if any one policy is changed, other policies should also be changed accordingly.

1.1. Investment in fixed assets and cash holdings with finance constraints

In a world with perfect capital markets, working capital assets and liabilities would not be needed. There would be no uncertainty, information asymmetry, transaction costs, or financial limitations. The capital market would reflect all the available information, and firms would lend and borrow at the same interest rate. In such a world, there would be no advantage for firms to finance or invest in the short term. Relaxing the capital market irrelevance assumption, recent research has indicated that a firm's real investment may depend on financial factors. External finance, if accessible, is considered to be more costly than internal finance because of asymmetric information, transaction costs, tax advantages and the cost of financial distress.

Many of the arguments rely on the distinction between insiders or firm managers, who are fully informed regarding existing capital and investment prospects, and outsiders (or investors) who cannot differentiate between the value and quality of firms, forcing them to value individual ones based on the population average. Regarding debt markets, Jaffee and Russell (1976) argue that asymmetric information causes lenders to raise the cost of new debt, or to limit credit rationing. Moreover, they postulate that if lenders cannot differentiate between borrowers, the market interest rate will inevitably rise and loan sizes may be limited. However, increases in interest rates will force marginally good quality firms to leave the market (adverse selection) or force firms to undertake riskier projects (moral hazard), which is bound to increase the probability of lenders' default and reduce expected profits (Myers & Majluf, 1984; Toivanen & Cressy, 2002).

Meanwhile, in the equity market, the information gap exists between insiders and outsiders concerning firms' existing capital and new investment opportunities. Under this argument, Akerlof (1970) explains the process of selling newly issued stocks at a discount. To elaborate, if the issuers of equity (i.e., the insiders) have more information about the quality of the firm than outsiders, the willingness of investors to accept the terms offered by insiders is lower, which forces the sale of newly issued stocks at a discount. However, depending on the availability and cost of external funds, fluctuations in internally generated funds affect firms' investments.

These real-world states of affairs lead to several problems that firms need to deal with. While they have many available strategies in such circumstances, Scherr (1989) indicates that there is a real substantial advantage of ones that involve investment and financing with working capital accounts. He asserts that when firms are faced with uncertainty regarding their expected levels of future cash flows, such uncertainty will incur substantial costs for those with insufficient cash balances to cover their expenses. Different strategies could be devised to deal with this uncertainty and the substantial costs that it may involve. Among these, some firms employ working capital investment or financing, such as holding a reserve of short-term marketable securities or inventories; some hold additional cash balances above the expected needs, while others arrange for the availability of additional use of free capital (trade credit) or additional short-term borrowing capacity.

Scherr (1989) argues that the lowest cost approach to the problem might be to combine these strategies, just use one of them, or to employ cash holding accounts, strategies which are amongst the most crucial ways for firms to respond to financial constraints. Scherr (1989) and Petersen and Rajan (1997) conclude that for handling uncertainty, working capital accounts can be used and that the management of these accounts plays a critical role in maintaining a firm's financial health during the business cycle, in the knowledge that cash flow uncertainty gives rise to several strategies that involve the use of employ such accounts.

In this context, Brown and Petersen (2011) recommend the idea of investment smoothing with cash holdings. The shadow value of finance will rise for firms that are financially constrained when there is a negative shock to cash flow. In response, firms prefer to cut investment in working capital (cash holdings) proportionally more than other investments, so will reduce their rate of asset accumulation. In order to reduce the potential losses and adjustment costs that could arise due to the temporary cutting of those already in progress, firms choose cash accounts to absorb most of the temporary cash flow fluctuation, rather than other investments. However, due to the reversibility of cash accounts, it is argued that they can become a source of funds for firms that choose to reduce their balance, or even have a temporary negative level of cash accounts (Ding et al., 2013; Hidayati Nur & Ardianto, 2020; Kabuye et al., 2019). Therefore, the existence of cash holdings can be considered as an alternative source of funds for firms during short-run financing constraints. A similar argument is applied in response to positive cash-flow shocks.

Several studies provide theoretical models which explain how the stock of cash accounts can benefit firms facing financing constraints. However, since cash holding is a component of working capital accounts, Bigelli and Sánchez-Vidal (2012) provide empirical evidence that firms shape their optimal cash holding based on the trade-off between the costs of holding liquid assets and the benefits of reducing the need for costly external finance to fund their future investment opportunities. However, with regard to transaction costs and the risk of future cash shortfalls, Han and Qiu (2007) found evidence that constrained firms can save such costs by increasing their cash holding, especially when they cannot fully diversify the riskiness of future cash flow, as they can trade-off between future and current investments. Almeida et al. (2004) indicate that the benefit for firms of holding cash can be seen in their ability to finance future projects that might arise. To elaborate further, if future growth opportunities are expected to be greater than current ones, firms will hold more cash. Acharya et al. (2007) provide empirical evidence that tied firms with high hedging needs prefer to have higher cash balances to hedge future investments against future income shortfalls.

Studies also provide theoretical and empirical support for how working capital and related accounts can help firms facing financing frictions to smooth their investments (for example, Fazzari & Petersen, 1993). However, little research has been conducted on emerging countries. To the best of our knowledge, this study is among the first to consider the Jordanian case in the literature on financing constraints.

1.2. Hypothesis development

Considering the sources of financing for fixed investment, in addition to the previous findings of empirical studies, this section presents three testable hypotheses on the effect and role of each financing tool on the level of corporate fixed investment.

Sources of financing at the firm level are generated internally and externally. While external financing is generated through the issuance of equity and debt instruments, internal financing is generated in the form of cash flows. Due to the imperfections of financial markets, externally generated funds are considered to be more expensive than internal ones (Myers & Majluf, 1984). These imperfections are caused by adverse selection (when two parties have different information sets prior to a deal) and moral hazard (asymmetry in information due to the inability to observe behaviour after the deal). Moral hazard is empirically the more dominant of the two (Toivanen &

Cressy, 2002). With a lemon premium for newly issued stock, equity financing generates sizable flotation costs for initial offerings (Myers & Majluf, 1984). On the other hand, debt financing creates interest expenses (financial obligations), and escalates the risk of financial distress (Wang & Thornhill, 2010). Therefore, the generated funds from equity and debt issues are considered to be expensive, especially for young and small firms. Even though firms could depend on external sources of funds if they had the choice, they prefer not to invest marginally if the costs of generating external financing are too high, favouring internal cash flow as a source of financing. As illustrated in the pecking order theory (Myers, 1984; Myers & Majluf, 1984; Oliner & Rudebusch, 1992), the convenience of internal sources of financing makes it easier for firms to undertake desirable investment projects without the need for costly external funds, which enhances their worth by lowering the cost of funds (the availability of internal cash flow allows firms to invest more cheaply) (Bond & Meghir, 1994). Due to the cost preference of internal financing, this paper suggests that internal funding should be considered as the first source of finance for fixed investment (Alkhataybeh, 2018; Fazzari & Petersen, 1993; Himmelberg & Petersen, 1994). It is therefore proposed that:

Hypothesis 1: Corporate fixed investment positively correlates with internally-generated financing through cash flow.

The trade-off theory states that in order to maximise their value, firms will seek to reach optimal debt-to-equity levels by weighing up the costs and benefits of obtaining more debt (Myers, 1984). Firms' optimal debt ratio is determined by the trade-off between the tax saving benefits of additional debt and the costs associated with bankruptcy and financial distress. While interest on debt is considered to be a tax-deductible expense for taxpaying firms, debt can create a tax shield for them, which might increase their value, although additional debt increases their cost of distress (Shakhatreh et al., 2020). Therefore, they should finance their fixed investment through debt, as corporate fixed investment may lead to better financial performance (Cohen & Levinthal, 1989; Fazzari & Petersen, 1993; Khataybeh, 2020), initiating a stream of cash flows that would make financing through debt relatively cheaper, resulting in a reduction in the probability of bankruptcy and financial distress, and an increase in the tax benefits of debt. Based on this argument, a positive relationship between corporate fixed investment and debt financing is expected:

Hypothesis 2: Fixed investment and financing through long-term debt are positively correlated.

In order for firms to minimise their adjustment costs due to the reduction in their rate of asset accumulation, they should maintain a smooth fixed investment path (Fazzari & Petersen, 1993). Smoothing fixed investment for unconstrained firms is straightforward, due to the various sources of financing (such as debt issues) which can be used to recompense for internal finance shocks. On the other hand, for constrained firms, external funding could be extremely costly or unavailable to diminish the shocks of internal financing, especially during periods of negative shocks (Bond & Meghir, 1994). Equity could be the other potential source of funds for smoothing fixed investments, but market timing makes smoothing with equity a thorny issue (Alkhataybeh, 2018).

Financing sources are volatile (Petersen & Rajan, 1997). For constrained firms, the smoothing strategy of fixed investment means they do not rely on external sources of funds, but build and manage a liquidity reserve, for example, through cash holding. The main differences between cash holding and fixed investments are the liquidity and reversibility of the former (Fazzari & Petersen, 1993; Weigand & Audretsch, 1999). During negative shocks to cash flows, firms prefer to reduce their investments in cash holding proportionally, due to its liquidity and reversibility, rather than in other investments (Fazzari & Petersen, 1993). They choose cash holding to soak up most of the non-permanent effects of cash flow fluctuations and to reduce the potential losses and

adjustment costs that could arise because of the non-permanent cutting back on projects in progress (Ding et al., 2013; Petersen & Rajan, 1997). By adjusting cash holding accounts, constrained firms can offset the short-run effect of cash flow fluctuation on fixed investment (Brown et al., 2012). Even though this action may lead to a negative net cash holding position, it will release short-run liquidity, and allow firms to offset cash flow shocks and smooth their fixed investment activities. Based on the above discussion, it is argued that cash holding is the last resort for smoothing fixed investment if firms are facing binding cash flow shocks and financial constraints:

Hypothesis 3: Cash holding acts as the last resort for smoothing fixed investments in financially constrained firms. There is a negative relationship between cash holding and fixed investment.

According to our prognoses, cash holding accounts compete with fixed investments in firms that are facing binding financial constraints for the available pool of finance. In these circumstances, cash holding, as a variable in fixed investment regression, should have a negative coefficient sign (i.e. a reduction in cash holding capital frees liquidity for fixed smoothing). However, for firms not facing binding financial constraints, cash holding plays no role in smoothing fixed investment. Accordingly, the expected sign for the cash holding coefficient in the model should be negative and significant for constrained firms, and positive and insignificant if firms are unconstrained.

2. Data and methodology

To examine the role that corporate cash holdings play in the level of fixed investment, the research data were collected from all active firms listed under the industrial and service sectors on the Amman Stock Exchange over the period 2009–2018. Given the potential endogeneity of these research variables, the adopted methodology is system-GMM estimators, which use the lagged values as instruments. Therefore, firms are required to have at least three consecutive observations over the study period. Excluding firms with fewer than three complete records of the model variables, the final dataset forms an unbalanced panel comprising 106 firms.

The correlation matrix and the descriptive statistics of the core variables are shown in Table 1, which indicates that the main three sources of funds (*CFL*, *LTDbt* and *ΔCH*) are significantly associated with each other. *FI* is significantly correlated with all the predictors, which is line with previous research on the determinants of the corporate fixed investment framework. The results also indicate that *SG* is positively correlated with corporate fixed investment, but negatively with the *HHI* ratio.

Previous studies argue that the GMM estimator is designed for panel data analysis, and is considered to be one of the best methods in econometrics for estimating the dynamism of corporate finance models (Flannery & Hankins, 2013; Roodman, 2009). It is designed to deal with contrasting assumptions about the data generating process, more specifically, the dynamic data generating process; that is, when dependent variables are lagged, the realisation of the current dependent variable will be influenced. In addition, GMM copes with unobserved heterogeneity and controls the unobserved unwavering effects of time. Moreover, as an econometric method, it is designed to deal with the problem of endogeneity that is associated with the explanatory variables. Last but not least, GMM is specifically designed to cope with panels that are distinguished by many individuals and few time periods (large *N* and small *T*), and also to deal with the assumption of the unavailability of instruments outside the immediate dataset. Instead, good instruments are available based on the lags of the instrumented variables (i.e., internally).

This research investigates the connection between all financial variables (mainly internally generated cash flow and net debt issues) and corporate fixed investment. Its scope covers the variations in net cash holdings in order to investigate the role that they play as sources of funds in

Table 1. Correlation matrix and descriptive statistics

Variable	MEAN	S.D.	Obs	RD	SG	HHI	CFL	LTDbt	ΔCH
<i>FI</i>	0.247	0.590	939	1.000					
<i>SG</i>	3.020	12.954	980	0.076**	1.000				
<i>HHI</i>	0.195	0.096	1218	0.250***	-0.224***	1.000			
<i>CFL</i>	0.061	0.497	1075	0.209***	-0.032	-0.020	1.000		
<i>LTDbt</i>	0.152	0.411	843	0.338***	0.077***	0.233***	0.098***	1.000	
	-0.029	0.870	1060	-0.077**	-0.001	0.065**	-0.118***	-0.160***	1.000

*, **, *** reflect significance at levels of 10%, 5% and 1%, respectively.

mitigating the path of corporate finance investment from transitory finance shocks in a standard dynamic investment model (A. Alkhataybeh, 2021; Brown & Floros, 2012; Brown & Petersen, 2011). In addition, the controlled variables for a firm's investment demand (namely the Herfindahl–Hirschman Index and sales growth) are included in the model. The form of our empirical model is as follows:

$$FI_{i,t} = \beta_1 FI_{i,t-1} + \beta_2 SG_{i,t} + \beta_3 HHI_{i,t} + \beta_4 CFL_{i,t} + \beta_5 LTDBt_{i,t} + \beta_6 \Delta CH_{i,t} + d_{sec} + d_t + \varepsilon_{i,t}$$

Taking into consideration the dynamism of the data generating process, the model includes $FI_{i,t-1}$ to estimate the impact of the previous investment level relative to the current level of investment. FI is the annual change in net fixed assets divided by total assets at the beginning of the year; SG is the change in net sales divided by the previous year's net sales; HHI is the Herfindahl–Hirschman Index; CFL is gross internally generated funds divided by total assets at the beginning of the year; $LTDBt$ is the annual change in long-term debt divided by total assets at the beginning of the year; and ΔCH is the change in net cash from total assets at beginning of the year. This model also counts the (d_{sec}), to control for industry-fixed effects, (d_t) to control for year-fixed effects, and $\varepsilon_{i,t}$ to denote the disturbances.¹

Considering the potential endogeneity of the explanatory variables and the dynamic structure of the corporate fixed investment model, our estimation of the empirical model is based on use of the System Generalized Methods of Moments (system-GMM) estimator developed by Arellano and Bond (1991) and Blundell and Bond (1998). This estimator creates a combination of two equations, in which one equation is in differences of the variables, while the other is in levels of

Table 2. One-step and two-step GMM estimations

	One-step GMM	Two-step GMM
	<i>FI</i>	<i>FI</i>
<i>FI</i> _{<i>i,t-1</i>}	0.232*** (0.057)	0.227*** (0.051)
<i>SG</i> _{<i>i,t</i>}	0.000 (0.003)	0.001 (0.004)
<i>HHI</i> _{<i>i,t</i>}	0.658 (0.817)	0.592 (0.806)
<i>CFL</i> _{<i>i,t</i>}	0.034*** (0.010)	0.034*** (0.010)
<i>LTDBt</i> _{<i>i,t-1</i>}	0.243* (0.133)	0.244* (0.136)
ΔCH_{it}	−0.554* (0.293)	−0.537* (0.090)
<i>Industry dummies</i>	Yes	Yes
<i>Year dummies</i>	Yes	Yes
<i># of observations</i>	619	619
<i># of firms</i>	106	106
<i># of instruments</i>	105	105
<i>AR (1)</i>	−3.06 (<i>p</i> = 0.002)	−2.89 (<i>p</i> = 0.004)
<i>AR (2)</i>	2.05 (<i>p</i> = 0.140)	1.93 (<i>p</i> = 0.154)
<i>J-test</i>	97.78 (<i>p</i> = 0.223)	97.57 (<i>p</i> = 0.206)

*, **, *** indicate significance of the coefficient at levels of 10%, 5%, and 1%, respectively.

them, with the lagged differences used as instruments for the equation in levels, and the lagged levels used as instruments for the equation in differences. The use of instruments in the system estimator labels the weak instrument problem and solves the endogeneity problem. In the application of the system-GMM estimators, two choices of one-step or two-step estimation are available. The main difference between the two estimations is that the one-step method assumes homoscedastic errors, while the two-step assumes heteroscedastic errors. Roodman (2009) argues that the one-step estimator is asymptotically less efficient than the two-step but extends his argument by stating that the reported standard errors tend to be downward biased in the two-step estimation, so it is crucial to apply finite-sample corrections to the standard errors in these in order to correct for such bias.

Consequently, we applied the two-step system-GMM with finite sample correction to the standard errors to estimate the dynamic equation of corporate fixed investment. Treating all the financial variables, including ΔCH , as potentially endogenous, we applied the lagged differences dated $t-1$ as instruments for the regression in levels, and the lagged levels dated $t-2$ to $t-3$ for the regression in differences. Taking into consideration that the research expects a causal connection between firm-level investment and the source of financing (internal or external), we have dealt with all the financial variables in our empirical model (including the change in cash holdings) as potentially endogenous ones (Bond & Meghir, 1994; Fazzari et al., 1988; Flannery & Hankins, 2013).

3. Results

Table 2 shows the regression estimates of the dynamic corporate fixed investment model. It can be seen that lagged investment has a significant positive effect on current investment in both regressions. In line with expectations, the sales growth (SG) coefficient is insignificant statistically. These findings are consistent with the those of Mansfield (1964), Lensink and Sterken (2000), and Lensink (2002). The insignificance of SG is explained by the fact that this ratio does not involve all the investment information relevant to the demand for investment, such as capital market constraints and the adjustment of cost. Market concentration HHI, as a controller for corporate investment demand, was found to be positively insignificant, which is in contrast to the research expectations. This insignificance is consistent with the findings of Gayle (2001) and Weiss and Wittkopp (2005), as concentrated markets play no role in stimulating corporate investments if means of finance are not accessible.

In both regressions, the coefficient of cash flow is statistically significant, which indicates that corporate fixed investment is determined by the availability of internal finance. This significance is in line with pecking order theory, in which firms prefer to finance their investments by internally generated funds, instead of using costly external funding, and is consistent with the findings of Bond and Meghir (1994), Carpenter and Petersen (2002), and Brown and Petersen (2011). Taking into consideration external sources of finance, the long-term debt issue coefficient has a significant positive impact on corporate fixed investment in both regressions, which suggests that firms do depend on external sources of financing. These results support the notion that the firms in this investigation follow the trade-off theory in the capital structure and financing menu of their investments, especially when considering the magnitude of the coefficients of both variables CFL & LTDbt, with the second being larger (Ho et al., 2004; Myers, 1984).

Most importantly, the changes in the net cash holdings (ΔCH) coefficients are negative and statistically significant in both regressions, with negative signs indicating that when firms face financing frictions, they depend on cash holdings to finance and smooth their fixed investment. The negative coefficient indicates that firms which are likely to face financing friction are dependent on cash holdings to absorb the shocks of cash flow variations in the short run by drawing down liquidity, which provides evidence that all firms are financially constrained (A. Alkhataybeh, 2021; Brown et al., 2012; Guariglia & Liu, 2014). Finally, as the system-GMM estimator relies on assessment of the validity of the instruments and the autocorrelation of the error terms, the

validity of the instrument was checked and verified by the Hansen J-test of overidentifying restrictions, and Arellano and Bond (1991) test of autocorrelation.

4. Conclusion

In the last decades, several studies have attempted to shed light on corporate investment and corporate financing choices, providing evidence that financing constraints hinder corporate investment and growth opportunities. Accordingly, recently conducted research has provided empirical support for how cash holdings can help firms facing financing frictions to smooth their investments. However, few studies have been conducted on emerging countries, so this research fills this gap by considering the determinants of corporate fixed investments, the role of cash holdings and the presence of financing constraints on the fixed investment smoothing of ASE-listed firms. Including the change in net cash holdings as a financing source, along with other financial variables, the research emphasises the importance of smoothing fixed investments during transitory finance shocks for financially constrained firms. Using the system-GMM estimator to estimate our dynamic model of corporate fixed investment, the results provide strong evidence that the main determinant of corporate fixed investment is the level of previous investment, and that firms depend on funds generated internally and debt issuance as sources of investment financing. In addition, we found strong evidence that when firms are likely to face financing frictions, they rely on cash holdings as an external source of financing, and draw down liquidity to absorb the shocks resulting from cash flow variations in the short run, in order to continue spending smoothly during financial shocks.

The limitation of the study concerns the data availability for corporate seasonal stock issuing. Therefore, future researchers are encouraged to investigate corporate cash holding levels further. Finally, as the findings suggest the presence of financial constraints, the implication for corporate managers is that they need to plan emergency action in the management of cash holding levels in the case of cash flow shortfalls; otherwise, they will face high adjustment costs.

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Note

1. The **SG** and **HHI** variables were added to the regression to control for corporate investment demand, as explained in accelerator theory and market concentration (Gayle, 2001; Sargent, 1989; Shapiro et al., 1986; Weiss & Wittkopp, 2005). **CFL**, **LTDbt** and **ΔCH** are included in the model to represent the corporate financing menu, as explained by the trade-off and pecking order theories (Myers, 1984; Myers & Majluf, 1984; Oliner & Rudebusch, 1992). **ΔCH** is included in the model to test for the presence of corporate financing constraints (Brown & Floros, 2012; Brown & Petersen, 2011). Note that stock issuing as an external means of finance is not included in the model, as no related records are available for the period of investigation.

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