Investigating the Effect of Investment Volatilities Sensitivity to Cash Flow in Listed Firms of Tehran Stock Exchange

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ABSTRACT

Main purpose of this research is to investigate the relationship between cash flow and investment volatility to make a model of investment by research results and help business units' operators to maximize the assets of their shareholders. So, according to the method of systematic deletion, 128 firms were selected from a statistical population in a time period of 2007 to 2011. Then the data were analyzed using a regression model by econometrics method.
The results showed that there is a positive and significant connection between cash flow and investment volatility. In other words, growth of cash flow volatility increases the investment.
KEYWORDS: Cash Flow Sensitivity, Funding, Cash flows, Financial Prediction.

1. INTRODUCTION

One effective factor in decision making is having appropriate information related to the subject of decision. If data is improperly distributed among people, it can lead to different results of a single subject. Symmetric information is created in case managers and market have the same knowledge of the company. But asymmetric information would help managers have more and better market data because they have particular and secret information about the firm. This means that before market information, they have access to information of the company [15]. One important note about stock markets specially the stock exchanges is market efficiency according which available information reflects their effects on the price of shares. From efficient market view, the reason of accounting is information symmetry in which on party has more knowledge than the other one. This issue is the result of internal transactions and information [22].

Supplying financial resources for long term funding is managers' major concern. According to Miller & Modigiliani, in case of a complete capital market, there is no difference between the expenses of financial supply and internal and external funds. In such state, companies can supply the financial resources through capital markets and a determined capital expense [26].

However, in practice, capital market cannot be completely efficient. On one side, firms are controlled through managers who are not the owners and have different benefits comparing to the main owners (representing issue). In such state, investors do not have the same trust as managers and ask for more output to financially supply the investment projects [24]. On the other hand, investors have less knowledge of economic terms of firms and measure investment risk higher than reality [3]. Finally, outsourcing for financial supply would end in high expenses and the cost of financial supply would exceed the nominal output rate. All these factors increasingly encourage companies to use inner sources [18].

One way to take advantage of investment opportunities and preventing from wasting sources is predicting financial distress or bankruptcy. Firstly, by warning against financial distress, firms would plan for appropriate measures. Secondly, investors distinguish good opportunities from risky ones and invest in suitable opportunities. Predicting financial distress has always been an important issue in financial subjects.

Most literature reviews have been focused on investment sensitivity to the cash flows, limitations and financial distress of industrial economies like Canada, France, Germany and Japan [14]. Therefore, the present research studies the effects of financial distress on investment sensitivity-to cash flow in Iran which is an emerging economy- namely, if like industrial countries, the sensitivity rate to cash flow is higher in financially distressed firms in Iran.

The main goal of this research is to create an investment model according to the obtained results to help the operators of business units so that they can maximize their shareholder's wealth and act according to the recognition of their companies' situation and the sensitivity of investment to the cash flow. Thus, the particular purposes of this research in terms of the type and the subject of study are:

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- Identification of specific features of financially distressed companies with respect to cash flows and investments.
- Making clear for companies upon which level they can place their money, how they can avoid loss of investment due to lack of fund and how they can raise the value of shareholders' asset in long term. This item has been studied by considering the volatility of cash flows and investment trend.

RESEARCH LITERATURE

Investment and Cash Flow Sensitivity

There are many literatures which have specified the inefficiency effects of financial market on companies' investment and economic fluctuation. This issue started with Fazzari, et al. (1988) by documenting the effects of asymmetric information about outsourcing financial supply. They showed that the companies with superiority in financial limitations bear higher sensitivity to the availability of internal funds which its proxy is cash money. Sensitivity of financially distressed companies to internal funds is an indicator of a support for validity channel of their monetary policy. Most of these results are based on comparing samples of financially limited and financially unlimited companies in a particular country. Recently, a research has been carried out about the investment sensitivity to cash flow in some countries. For instance, the results of a recent comparative research of Bond, et al. (2003) among Belgium, French, German and British companies showed that British companies are the most sensitive companies to cash fluctuations. Since no similar rate of sensitivity was seen in these countries, the focus is on the reasons of these different responses.

To answer this question that why available credit channel in some countries are stronger than others, we can say that financial systems deal differently with the problem of asymmetric information. In market-oriented financial systems, companies may show more sensitivity to cash flows because lenders and borrowers act more separately than relationship-oriented systems. For instance, Allen & Gale (2003) suggested that Germany and UK, which showed different sensitivity to cash flow in researches of Bond, et al. (2003), had a different financial approach toward each other. In terms of GDP, UK capitalism has a better performance than Germany. In UK, companies are controlled through financial markets than banks. According to the issue of financial system, order is a contributing factor in loan channels in different countries and it would lead to differences in anticipated relationships in investment and cash flow area [25].

Fazzari, et al. (1988) classified companies upon what they were considered financially constrained in terms of size, dividend and capital structure and according this trait that if they are more sensitive to locally supplied capital through liquidity. The most and highest sensitivities were detected from companies which were classified as financially constrained. This disclosed that financially constraints or limitations rely on this issue. Many other authors like Chirinko & Schaller (1995), Hubbard, et al. (1995) and Calomiris & Hubbard (1995) also used this method [12, 8, 19, 7].

Several other factors of this method were reviewed in other research literatures. Kaplan & Zingalas (2000) did not confirm the categorization of Fazzari, et al. (1998). They used more detailed data from financial statements and annual reports of companies to classify identical companies into three groups of Financially Constrained, Possibly Financially Constrained and Not Financially Constrained during a specified period. According to this classification, they found out that company in group of Financially Constrained showed investment sensitivity to cash flow more. Also Cleary (1999) discovered that in a bigger data set, financially constrained companies had lower sensitivity. Recently, Allayannis & Mazumdar (2004) showed that the results explained by Kaplan & Zingalas (1997) can be partially explainable by effective evidence while Cleary's conclusions (1999) can be explained by the evidence of companies with negative liquidity. One of the main massages of Kaplan & Zingalas (1997) and Cleary is that the sensitivity of cash flow should be lowered for financially limited companies and vice versa (Mizen & Vermeulen, 2005). To test their hypothesis, Kaplan & Zingalas (1997) found out that the sensitivity of investment-cash flow for constrained subgroup has not been higher. The same practical results were obtained by Cleary (1999) which showed that financially limited companies are those whose investments are more sensitive to liquidity rate. The research results of Almeida, et al. (2004) can be theoretically interpreted in this fact that financially restricted companies bear a higher rate of sensitivity about cash flows which it justify their reduced investment sensitivity to their liquidity [21, 3, 9].

Another theoretical principle presented by Alti, criticizing the interpretation of Fazzari, et al. (1988) about the sensitivity of cash flow and investment, showed that findings of Fazzari, et al. simply result from a neoclassic model by which younger firms are unreliably confronted with their growth aspects. This unreliability is obviated by the sensitivity of cash flows which indicate the potential value of long term growth. Alti's model rating (2003) revealed that after Tobin's Q control, investment is sensitive to all firms' cash flows. In this model, investment sensitivity-cash flow for smaller and younger firms with high growth rate-is higher while these organizations realize their projects quality through recognizing the cash flow. On the other hand, Gomez (2001) and Abel &

Eberly (2002, 2004) created theoretical frameworks by which there would be a positive relation between cash flow and investment in the absence of an efficient financial market [2, 16].

Investment and Cash Flow

According to primary studies by Miller & Modigiliani (1958), financial and investment decisions can be considered independent in the absence of market inconsistency. Many researches about asymmetric data and inefficiencies of capital market show that market inconsistencies make supplying foreign currency more expensive than provision of local cash [26].

With respect to Miller and Modigiliani, authors such as Fazzari, et al. (1988) pose this subject that investment decisions approximately causing all cheap local cash flows to go out (consequently having low dividend coefficient) are more sensitive to cash flow fluctuations comparing to the organizations paying a high dividend. Keeping capital in cash would produce stable investment opportunities. So a decrease in local cash may cause reduction of capital expenditure by organizations with the help of reducing the cost of information. They believe that if information problems in capital markets lead to financial limitations in investment, these limitations should be clearer to those firms accumulating their incomes. If financial supply from inside and outside the company are a rather suitable alternative for each other. In any case, maintaining activities should slightly present the investment by the company. Firms usually tend to remove any obstacle in the way of investing through outsourcing in the case of a fluctuating local financial supply [4].

Gomez argues that professional creditors merely emphasizing on operational cash flows make mistake about companies' functions and capabilities in fulfilling their commitments. Reported positive operational cash flows may not guarantee a good performance. If there is no sufficient net cash flow for investing and financial needs, the company may be trapped into financial problems. Gomez (2002) suggests that analyzing the whole aspects of cash flows (all classes together) can show some signals of financial distress. Also, Sender states that a whole negative (positive) cash flow is not an indicator of a bad (good) performance. In his analysis, Sender uses Wal-Mark and KMark's notes. Due to major investments in economic activities, the total cash flow of Wal-Mark is negative, though it is a growing and successful company. In contrast, despite of reported positive cash flow, KMark faced financial distress and became bankrupt in 2002 [5].

A company, having a good performance, produces a positive operational cash flow and allocates the extra cash to its financial and investment needs (for example buying equipment, asset, property and settlement of dues).Therefore, a combination of positive cash flow, financial supply and negative investment are all representative of a good financial status. The combination of positive cash flow resulting from negative investment (e.g. buying property) and the cash flow of financial supply (e.g. owing and fund raising) also a symbol of a growing and healthy company. The company faces abundant investment opportunities but having limitations in operation cash flow. So, it uses input financial supplies to achieve the benefits of investment opportunities.

A company presents the signs of financial distress when it is incapable of making sufficient cash flow to satisfy its needs. In case a financially distressed company confronts shortage of operational cash flow, it uses cash flows resulting from financial supply and investment to cover this deficiency. A mix of negative cash flow and positive financial supply and investment represents a grave financial distress a company may face. This combination indicates that the company does not have sufficient cash and is obliged to sell its asset, owe more money to solve economic problems and issue more shares. In such situation, if it continues to make sufficient operational cash, it will face problem in owe settlement and cannot use its input cash flow to cover the shortages [20]. Tobin's Q model predicts that in efficient markets in which foreign and local cash are efficiently replaced by each other, investment decisions depend merely on investment opportunities and they are independent of cash flows. However, in inefficient markets, asymmetry of information expenditure and representativeness create a divider between internal and external fundraising and higher expenses. Companies with lower internal funds may invest less than companies with higher internal funds because outsourcing is more expensive. The relevant literatures suggests that more financial restrictions are in any format of 1) inefficiencies of capital market or 2) access to internal fund, less investment and investment sensitivity-more cash [8].

When companies face market inefficiencies, in addition to internal fund, they have to pay for outsourced funds. Inefficiencies may be as a result of various problems of representativeness and asymmetric information. These problems are less for companies with higher local funds. Based on prevalent sciences, a more financially distressed company would make less investment regarding the conditions of capital market or accessibility of local fund [10].

When local fund is high but the investment scale in financial supply is not enough, the company borrows less money and, hence, suffers from a small cash loss for investment in too smaller scale. Now, consider a partial reduction in local money. To keep the same level of investment, the company has to borrow money and a pay a higher repayment. Then it is expected to be imposed a higher liquid loss. However, the company may avoid such expenses by reducing its investment, whereas, the extent of overlooked income would be small if investment level is close to the best grade. So, for higher level of local fund, Cleary, at al. (2007) anticipated that the decrease of local liquid asset associates with investment level. In lower financial supply, company would invest

less but at the same time it needs more loans and therefore the risk of delayed repayment and higher liquidity is higher. Cleary, et al. (2007) stated that high information asymmetry between company beneficiaries would elevate the sensitivity of investment and liquidity where the association is positive. Without the last limitation (positive relation between investment and liquidity), a clear anticipation is impossible. They claimed that according to their own theory and regarding conclusions of Fazari, et al. (1988), companies with the ratio of ordinary dividend pay to the payment of particular dividend has higher sensitivity to investment-liquidity comparing to the companies with the ratio of ordinary dividend pay to the payment of particular shares [10, 12].

Pervious Researches

Fazzari, et al. (1988) in a research with the title of "Financial Limitations and Company Investment" reviewed the role of financial limitations in determining the investments of listed manufacturing companies in New York Stock Exchange. They classified companies based on the policy of paying dividend and assumed that companies with higher dividend are less exposed to financial limitations. They results showed that liquidity is more effective in companies with fewer dividends than companies with more dividends. These findings support the influence of liquidity over investment due to insufficiencies of capital market. They emphasized that if companies have equal accessibility to capital markets, their responses to the tax-based mobility of capital expenditures and investment incentives would be only due to the investment volatility demands. Financial structure of a company does not depend on investment because outsourced liquidity is an excellent replacement for the local funds. Generally, in a complete market, the investment decisions are independent of financial decisions [12].

Almeida, et al. (2004) in a research with the title of "The Sensitivity of Cash Flow and Liquidity" reviewed the relationship between the operational cash flow and liquid inventories. Their major goal was comparing the sensitivity of cash flow and liquidity with sensitivity of cash flows and investment. They developed Opler Model of Liquidity using data belonging to 29954 companies in New York Stock Exchange from 1971 to 2000. They proved that the latter is a better scale in identifying financial limitations [3].

Fresard and Frochaux (2004) in a research with the title of "Investment, Liquidity Retain, and Financial Limitation" reviewed and tested the effects of financial limitations over the behavior of 747 Japanese companies. They applied two methods to study the association between the efficiencies of capital markets and financial policies of Japanese companies. Relying on the principles of Fazzari, et al. (1988), they tested these limitations with the help of investment sensitivity to local liquidities. The method of research on the basis of cash money, proposed by Almeida, et al. (2004), was also employed. No results were achieved from accurate measuring of financial limitations. Having classified the companies based on five features of financial sensitivity, they concluded that more seriously limited companies did not regularly and systematically show higher sensitivity toward liquidity rate and investment [13].

Arsalan, et al. (2006) studied the relationship between cash flow and investment in Turkish companies after and before a financial crisis. In this study, by an optimum model of cash flow, the companies were divided into two groups. Their findings indicated that in this period, the growth of investment sensitivity to cash flow is significant. Moreover, liquid stock is a proper scale in specification of financial limitations of a company and companies with small liquid stock have higher sensitivity [4].

Hovakimian and Hovakimian (2009) examined the investment policies of companies in the conditions of high and low cash flows. A sample consisted of 7176 companies listed in NYSE during 1985 to 2000 were studied in this research. By analyzing periodic series, they found a positive connection between investment and cash flows. Also, considering an optimum model of investment, this conclusion were attained that in the shortage of liquidity, managers invest less than the real needs of their companies. Conversely, in case of availability of surplus liquidity, funding is done in surplus as well. They stated that investment sensitivity is in connection with both extremely less investment and surplus investment. Reaching to an outsourced fund positively relates to cash flows which determine the sensitivity of cash flows and investments [17].

Kim (2011) reviewed in a research an effect of keeping liquidity and financial limitations of sensitivity of investment and cash flow. He stated that Fazzari, et al. (1988) documented a positive relation between financial limitations and investment sensitivity to cash flow, while Kaplan & Zingalas (1997) and other literatures achieved to reverse evidence. He documented that when limitations are elevated comparing to the past period, companies experience the growth of this sensitivity. Other results also showed that in companies with more limitations, keeping liquidity has more significant effect on the sensitivity than companies without limitation [22].

RESEARCH METHODOLOGY

Hypothesis
In the present research, the original hypothesis to achieve the research goal is as follow:
Original Hypothesis: there is a significant connection between the cash flow volatility and investment upheavals.

Research Model and Variables
To test the original hypothesis, the number 1 regression model is used. This model is:
Model number 1:
I/Ki,t=α+β1(ΔCF/K) i,t+ β2Q+ β3age+ β4(lns)+ β5(D/K)+ β6(S/K)Δ
The above variables are presented in the table 1.

Table 1 Research Variables

I	Investment in property, machine and equipment, capital rents, kept liquidities for construction, reclassified stock inventory, minus volatility of currency rate, stopped operations, reduction in kept liquidity in construction and acquired properties
K	Total amount of assets
CF	An index for cash flows
SPREAD	An index for determining asymmetric information. It is obtained by the difference rage of proposed price in share trade
Control variables are as follows	
D	Total amount of loans
SIZE	Company size. It is obtained from the logarithm of the total sale volume
S	General representative of sale department
AGE	Company age
Q	The applied Tobin-Q model in this regression is calculated by dividing the clerical value of the whole debts plus capital market value by clerical value of the whole assets. It can be an indicator of company value for the shareholders (Namazi, 2009)

To test the hypothesis:
    1. Initially, a range of information relating to model variables is run for all companies.
    2. Statistical tests are employed to determine the connection between cash flows and investment volatility.

Statistical Society and Sample
    1.1.1   Statistical Society
In this research, the companies listed in Tehran Stock Exchange were chosen as statistical society. The reason of this choose is more attending to investors, information accessibility and the transparency of these companies' accounting data.
    1.1.2   Statistical Sample
The sampling was carried out through the method of systematic deletion. The following qualified companies were selected among all listed companies in Tehran Stock Exchange:
    1. The companies which have been listed in Tehran Stock Exchange to the end of March 2011.
    2. Their financial year finishes at the end of March.
    3. The understudied companies should have continuous activities and should not cease their activities during the research periods.
    4. The companies should not change their financial year during research periods.
    5. The companies should have presented their complete financial data during 2008 to 2011.
    6. They should not be investment and financial intermediary companies.
Ultimately, 128 companies were selected for this period.

Data Collection Methodology
In this research, library method is used for collecting data and information. Research data was collected by gathering information from sample companies, referring to their financial statements and explanation records, weekly and monthly reports of stock exchange and using Rahavard Novin Software, Dena Sahm, Sahra and Tadbirpardaz Softwares.

Data Analyzing Methodology
In the present study, we used statistical methods and econometric models. Having gathered information, the next step was calculation of descriptive statistics from applied variables. The statistics included mean, median, standard deviation and other applied data. After reviewing the descriptive statistics, the functions (models) were estimated with the help of econometric models.

Data Analysis
Descriptive Statistics of Research Variables
Descriptive statistics of dependent and independent variables has been presented in table 2.

Table 2 Descriptive Statistics of Dependent and Independent Variables According to the Understudied Years and in the Integrated Format

Year	Statistics	ΔI/K	ΔCF/K	(ΔCF/K)DUM1	(ΔCF/K)DUM2	(ΔCF/K)DUM3	(ΔCF/K)DUM4
Total	Median	-.0363	-.0069	.0009	.0004	.0031	-.0114
	Standard Deviation	.86694	.61280	.04252	.5813	.27479	.54290
	Mean	.0041	.0104	.0000	.0000	.0000	.00000
	Minimum	-.16.04	-13.40	-.45	-.31	-4.35	-13.40
	Maximum	1.04	1.99	.38	.75	1.99	1.58

Results of Testing Original Hypothesis

   To test the original hypothesis, we examined the dependent variable (investment volatility), independent variable (the ratio of cash flow volatility to the total assets) and control variables (company size, Tobin's Q, the ratio of sale volume to the total assets, the ratio of debt to the total assets and company age). In testing the original hypothesis and estimation of model, we initially performed the combinability test to select one of the panel data methods or mixed data. Next, Hausman's test (1978) was carried out to choose one of the panel data methods with fixed or random effects. The results are presented in tables 3 and 4.

Table 3 Results of Combinability Test

Test Type	Test Statistics	Meaningfulness
F Test	89.5934	0.0000

   As table 3 shows, the meaningfulness value of F is smaller than 0.05 which shows the superiority of panel data method against the method of mixed data.

Table 4 Results of Hausman's Test

Squared K-Value	Freedom Degree	Level of Significance
43.4816	6	0.0000

   As table 4 shows, the value of squared K is smaller than 0.05 which indicates the superiority of panel data method against random effects. Hence, for testing the first hypothesis we employed the method of panel data with fixed effects. The results of the estimation of regression model have been presented in tables 5 and 6.

Table 5 Results of General Examination of Model-First Hypothesis

Determination Coefficient	Moderated Determination Coefficient	F-Value	F-Value, Level of Significance	Durbin-Watson
0.6239	0.5251	6.3120	0.0000	1.8460

   In a multivariable regression equation, if there is no relation between dependent, independent and control variables, the coefficients of independent and control variables are required to be zero. Thus, the level of significance of regression equation should be tested by using F-value (Abbasineghad, 2000). As you may see in table 5, F-value and its level of significance show that H hypothesis which is the insignificance of the whole model (zero coefficients) is rejected and the estimated regression model is generally significant.

   Determination coefficient (R^2) is a scale explaining the strength of connection between dependent and independent variables. The value of this coefficient specifies that how much of the percentage of dependent variable volatility is demonstrated by independent and control variables. In this model, determination coefficient is 0.6239. This means that 62.39% of mobility in dependent variable by independent and control variables are explainable. The results of examining the variable coefficients have been presented in table 6.

Table 6 Results of Examining the Partial Coefficients-First Hypothesis

Variables	Coefficients	Standard Error	T-Value	Level of Significance
The volatility ratio of operational cash flows to total assets (CF/KΔ)	0.7924	0.04732	16.7463	0.0000
Company Size	-0.0654	0.0183	-3.5782	0.0004
Tobin's Q Ratio	0.0391	0.0246	1.5869	0.1132
The ratio of sale to total assets	-0.1313	0.0343	-3.8249	0.0001
The ratio of debt to total assets	-0.0544	0.0509	-1.0678	0.2862
Company Age	0.0016	0.0022	0.7445	0.4569
Constants	0.8421	0.2634	3.1967	0.0015

Regarding the above table, the final model is as follow:

ΔI/K=0.8421+0.7924 (ΔCF/K)-0.0654(age)-0.1313(S/K)

As you see, the level of significance of t-value and the coefficient of independent variable show that there is a positive and significant relation between the ratio of volatility in operational cash flows to the total assets (ΔCF/K) and investment volatility. As a result, the first hypothesis is acceptable.

Also, the level of significance of t-value and the coefficients of control variables are indicators of a negative and significant relation between the size of company and the ratio of sale to the total assets (S/K) and investment volatility. Despite, Tobin's Q ratio, the ratio of debt to the total assets (D/K) and the age do not have any effect on investment volatility.

Finally, to study the inequality of variances and the constant correlation we used Arch test and Breusch–Godfrey serial correlation Lagrange multiplier test respectively. The results have been presented in tables 7 and 8.

Table 7 Results of Arch Test-Inequality of Variance

Test Type	Test Statistics	Level of Significance
F Test	6.28E-05	0.9937
Squared K Test	6.30E-05	0.9937

As you see in table 7, the level of significance of Arch Test statistics is bigger than 0.05. It shows that there is no variance inequality among model errors.

Table 8 Results of Breusch–Godfrey LM Test-Constant Correlation

Test Type	Test Statistics	Level of Significance
F Test	0.0151	0.9023
Squared K Test	0.0153	0.9017

As you see in table 8, the level of significance of Breusch–Godfrey LM test statistics is bigger than 0.05. It shows that there is no constant correlation among model errors.

DISCUSSION AND CONCLUSION

The present study attempts to review and documents any relation between mobility in cash flows and in investment. The results showed that there is a significant connection and this conclusion is consistent with research literatures. So, null hypothesis is rejected and the first hypothesis based on existence of relation is acceptable. This is of positive significant relation type. In other words, cash flow volatility associate with changes in investment conditions. This result is an indicator of investment sensitivity to cash flows. Chadheri, et al. (2011) state that in an efficient market where local liquidity and outsourced cashes can be interchangeably used, investment decisions would depend purely on company's performance toward investment opportunities, therefore, the cash flow has no place in here [8]. So, these results may come from the inefficiency of market and the related problems.

Repeating the same issue, Bagat, et al. (2005) mention that companies use different ways and sources to financially supply their investments [5]. In the situation of an inefficient market, companies prefer one way to the other ones. In an efficient market, no regular relation between availability of cash flows and capital expenditure is necessarily anticipated. They suggest that positive valued investments should be fulfilled and there is no connection between them and cash flow level. However, Fazzari, et.al (1985), Degris & Jung (2001) and Lamount (1992) emphasize on a positive relation. So the results of this research conform to theirs [12, 11, 23]. On the other hand, our research results contrasts with the results to which Mizen & Vermeulen (2007) reached. They documented a negative relation. Other researches revealed that in case of control variables, the variables of size and sale ratio to assets positively associates with investment volatility [25]. To put it differently, growth of size and ratio of sale would decrease the changes of investment conditions. But no significant relation with age, ratio of debt to asset and Tobin's Q was observed.

Suggestions based on research results

As resulted showed that there is a significant relationship between investment volatilities sensitivity and cash flow, it is recommended that managers focus on balancing cash flows and investments, since high amounts of investment that are above firm ability can leads to firm's bankruptcy.

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