Relationship between Financial Limitations and Investment Efficiency in Companies Listed on Tehran Stock Exchange

*Shirin Khorshidzadeh Haghighi
MA in Accounting, Bandar Abbas branch, Islamic Azad University, Bandar Abbas, Iran
*Corresponding author: Shirin66khorshid@yahoo.com

Hassan Madrakian
Assistant Professor, Department of Accounting and Management, South Tehran Branch, Islamic Azad University, Tehran, Iran

Abstract

In this study, the relationship between financial limitations based on Kaplan-Zingales model (KZ) and investment efficiency is considered. Companies do not have the stability required for financing, having financial limitations due to various economic reasons. Therefore, given the mentioned limitations, it is necessary that investment behaviors and their efficiency be studied. Thus, this study aims to consider the relationship between financial limitations and investment efficiency in companies listed on Tehran Stock Exchange. The sample, consists of 79 companies listed on Tehran Stock Exchange between the years 2009 and 2013. Hypotheses were developed based on polyserial correlation, Durbin-Watson and F (Fisher) tests and multivariate linear regression. Independent variable of this study is financial limitations and dependent variable is investment efficiency (underinvestment, overinvestment). Results obtained from this study suggest a significant negative relationship between financial limitations and too low and overinvestment.

Keywords: financial limitations, investment efficiency, underinvestment, overinvestment.
Introduction

Given the ongoing developments in today's world, especially in developing countries and various threats they face, to solve their economic issues, these countries need appropriate solutions to better use their God-given advantages and wealth. In this regard, one of the important approaches is expansion and development of investment (Tehrani & Noorbakhsh, 2006).

The topic of financial limitations is an important and crucial subject facing all companies. Investment in various affairs by companies has always been considered as one of the important ways of development for companies and preventing depression and underdevelopment. In this regard, limitation in resources has had the result that besides investment development, increase in investment efficiency, has become very important. Generally speaking, investment efficiency refers to accepting projects with positive net present value, and investment inefficiency refers to selecting projects with negative net present value (overinvestment) or not selecting investment opportunities (underinvestment). In determining investment efficiency, at least two theoretical criteria exist: the first suggests that to finance investment opportunities, resources are needed to be collected. In an efficient market, all projects with positive net present value should be financed. However, a great deal of studies in finance domain has shown that financial limitations restrict managers' ability in financing (Hubbard, 1998). One of the things that can be inferred is that companies facing financing limitation might waiver accepting and conducting projects with positive net present value due to high costs of financing, which results in underinvestment. The second criterion suggests that if the company decides to to financing, no guarantee exists that proper investment is done. For instance, managers might embark on inefficient investment by selecting improper projects to their own advantage or even abusing existing resources. Most literature in this area predict that selecting weak projects leads to overinvestment (Stein, 2003). Conceptually, investment efficiency is obtained when the company invests in all projects with positive net present value. Of course, this scenario is effective only when market is perfect and none of the issues of imperfect market such as improper selection and agency costs are present (Verdi, 2006, & Biddle et al, 2009). Furthermore, investment efficiency or optimal investment requires that on the one hand, resource consumption in activities with less-than-optimal investment be prevented and on the other hand, resources be directed to activities that demand more investment (Modarres and Hesarzadeh, 2008). Typically, the policy for investment efficiency is defined in such a way that all investment projects with positive net present value bring prospective cash into the business unit and thus should be accepted. All projects with negative recyclable net present value lead to emission of prospective cash and should be rejected (Garcia et al, 2009). Thus, the aim of this study is to consider that financial limitations caused by the criteria of company size, dividend ratio, financial leverage, cash-holdings level, and company life have significant relationship with investment efficiency and we expect the result of the study that the once we reduce financial limitations in the company and managers can easily access external financial resources, investment efficiency increases.
Goals
Theoretically, goals of this study are as follows:
Main Goal:
To identify the relationship between financial limitations and investment efficiency of companies listed on Tehran Stock Exchange.
Specific Goals:
1- To determine the relationship between financial limitations and underinvestment
2- To determine the relationship between financial limitations and overinvestment

1-5- Questions
In this study the relationship between financial limitations and investment efficiency of companies listed on Tehran Stock Exchange is considered and during the study, answers are given to the following two questions.
1- Is there a relationship between financial limitations and underinvestment?
2- Is there a significant relationship between financial limitations and overinvestment?

1-6- Hypotheses
To achieve the study's goal, we test the following two hypotheses:
First hypothesis: Financial limitations have a significant relationship with underinvestment.
Second hypothesis: Financial limitations have significant relationship with overinvestment.

Literature Review
Investment Efficiency:
Increase in levels of finance allocation to sections with higher growth opportunities or increase of cash flow from sections with lower growth opportunity to those with higher growth opportunity (Hovakimian, 2009).
A business unit is defined as efficient in investment once it chooses all projects with positive net present value. Ignoring investment opportunities with positive net present value is underinvestment and selecting projects with negative net present value means overinvestment, both of which show investment inefficiency. Investment inefficiency is measured as deviation from expected investment in an investment model, which predicts expected investment as a function of growth opportunities (Tobin, 1982). Thus, both underinvestment (negative deviations from expected investment) and overinvestment (positive deviations from expected investment) are considered investment inefficiency.
In investment efficiency, the model used in the work of Verdi (Verdi, 2006) based on difference of assets sales price and investment costs (including assets acquisition costs, basic repairs, …) is used with the following description to predict corporate investment level (equation 1).
\[ \text{Investment} = \text{Capital Expenditure} + \text{Sale of property} \] (1)
Then, based on study of Verdi (2006), sale is used as an index to estimate expected investment opportunities. Based on this approach, investment is a function of growth opportunities measured
by sales. This model is based on the logic that company sale value shows company investment expectation in an efficient market.  
Investment\(=\beta_0 + \beta_1 Sales + E_i\)

By substituting the figure calculated for investment according to equation 1 in the above regression equation (equation 2), residues of this equation are calculated. Positive residues (positive deviation from expected investment) suggests selection of projects with negative net present value i.e. overinvestment and negative residue (negative deviation from expected investment) suggests waiver of investment opportunities with positive net present value i.e. underinvestment.

In an investment model, if \(E_i\) is less than zero, it is underinvestment.  
In an investment model, if \(E_i\) is greater than zero, it is overinvestment.

One of the most important factors for solving economic issues of countries is to expand and develop investment, but this per se is not sufficient and considering financial resources limitations, increase in investment efficiency is among important subjects as well as investment development (Modarres and Hesarzadeh, 2008). Conceptually, investment efficiency is obtained once the company invests in all projects with positive net present value. Of course, this scenario is effective when the market is perfect and none of the issues of imperfect market including improper selection and agency costs are present (Verdi, 2006; Biddle et al, 2009). Further, investment efficiency or optimal investment require that on the one hand, using resources in overinvested activities be prevented and on the other hand, resources be directed to activities needing more investment (Modarres & Hesarzadeh, 2008; Verdi, 2006). Investment efficiency is obtained when the company invests only in all projects with positive net present value, hence resulting in efficiency, because the lesser the value of deviation, the more efficient the investment is considered (Mahmoud Abadi & Mehtari, 2011).

Financial Limitations

Financing from extra-corporate resources (share distribution, bonds) has great costs, causing financing cost to exceed announced nominal output rate. These factors encourage companies to increasingly use internal resources to finance their investments (Hovakimian, 2009). A company facing further issues in accessing external resources of investment market, will finance a bigger portion of their required finance from resources inside the company. Such a company is said to be suffering from financial limitation.

KZ is financial limitation criterion proposed by Kaplan and Zingales in 1997, and can be calculated as follows. From the above criterion formula for each company a number was calculated. Then, median for all companies is calculated and companies over the median of each criteria are considered financially limited and companies below the above criteria indexes are considered without financial limitation.

\[ KZ = -1.002 \left( \frac{Cash Flow}{Total Assets} - \frac{Div}{Total Assets} \right) + 0.283 \left( \frac{M/B}{Total Assets} \right) - 3.139 \left( \frac{Debt}{Total Assets} \right) - 39.368 \left( \frac{Cash Holding}{Total Assets} \right) - 1.315 \]

Whited and Wu Index: Whited and Wu (2006) studying Kaplan and Zingales study (1997) proposed an index based upon which companies with financing limitations can be identified (Jahankhahi &
Kan'ani, 2006). Considering this study's need for using a criterion to distinguish limited companies in financing, Whited and Wu Index (2006) has been used. Low operating cash flows have the result that creditors feel worry with regard to receiving principal and interest of their credits. Also, failure in payment or reduction of dividends, communicates negative signs about liquidity condition of the company (Wang, 2007). Lower sales growth and high debt ratio in the company are among reasons that lead to increased risk of failing to meet commitments (Whited & Wu, 2006), thus, companies that on the one hand have lower operating cash flows, dividend, size and growth, and on the other hand have higher debt ratio, have the highest Whited-Wu value and therefore, biggest limitation in financing (Dongmei, 2006).

\[
WW_{IR} = \frac{80}{04} - \frac{5}{182} \cdot CFO + \frac{5}{112} \cdot Div + \frac{5}{662} \cdot Lev - \frac{5}{662} \cdot LogTA
\]

Ra'i and Hesarzadeh (2009) presented Kaplan-Zingales model according to Iran coordinates, as follows:

**Literature Review**

**Table 2-4: Summary of national literature**

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Subject</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kashanipour &amp; Naghinezhad</td>
<td>2010</td>
<td>Studying financial limitations and sensitivity of investment to cash flows in Tehran Stock Exchange</td>
<td>Results suggest that companies with financial limitations are more susceptible to investment than cash flows and when making decisions, investment has more preference to internal cash flow.</td>
</tr>
<tr>
<td>Tehrani &amp; Hesarzadeh</td>
<td>2011</td>
<td>Effect of free cash flows and financial limitations on investment levels</td>
<td>Results suggest that the relationship between free cash flows and high investment levels, is direct and statistically significant. There is no significant relationship between financing limitation and low investment levels in companies listed on Tehran Stock Exchange.</td>
</tr>
<tr>
<td>Thaghafi &amp; Arab &amp;Mazar Yazdi</td>
<td>2010</td>
<td>Considering the quality of financial reporting and investment inefficiency</td>
<td>Practically, there is no significant correlation between the mentioned variables.</td>
</tr>
<tr>
<td>Arab Salehi &amp; Ashrafi</td>
<td>2011</td>
<td>Relationship between financial limitations and investment-cash flow sensitivity.</td>
<td>Findings of the study suggest positive role of cash reservoirs in reducing investment-cash flow</td>
</tr>
</tbody>
</table>
sensitivity of companies.

If companies with big investment facilities use higher quality auditors, they will experience a higher level of investment efficiency. However, a higher audit quality, as opposed to expectation, has no impact on reducing manipulation in discretionary accruals.

Results suggest that transparency of accounting information has no effect on investment efficiency. This implies absence of an active role of accounting information in equal distribution of information between beneficiary groups and monitoring them in proper directing of resources by management to investment in optimal studies.

Table 2-5- Summary of foreign literature

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Subject</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thaghafi &amp; Motamedi Fazel</td>
<td>2011</td>
<td>Relationship between audit quality and investment efficiency</td>
<td>If companies with big investment facilities use higher quality auditors, they will experience a higher level of investment efficiency. However, a higher audit quality, as opposed to expectation, has no impact on reducing manipulation in discretionary accruals.</td>
</tr>
<tr>
<td>Badavarna handi et al</td>
<td>2013</td>
<td>Effect of transparency of accounting information on investment inefficiency</td>
<td>Results suggest that transparency of accounting information has no effect on investment efficiency. This implies absence of an active role of accounting information in equal distribution of information between beneficiary groups and monitoring them in proper directing of resources by management to investment in optimal studies.</td>
</tr>
<tr>
<td>Verdi</td>
<td>2006</td>
<td>Relationship between financial reporting quality and investment efficiency</td>
<td>Financial reporting quality has a negative relationship with both underinvestment and overinvestment.</td>
</tr>
<tr>
<td>Bitty et al</td>
<td>2007</td>
<td>Role of quality of accounting information in reducing investment inefficiency on the condition of specific information being present</td>
<td>While extra-organizational loaners reduce the importance of quality of accounting information by holding limiting contracts and accessing specific information, basically investment limitation increases investment efficiency and reduces the effect of accounting information on investment efficiency.</td>
</tr>
<tr>
<td>George et al</td>
<td>2008</td>
<td>Effect of growth opportunities on sensitivity of investment</td>
<td>Financial limitations include business groups, possession structure, financial leverage, company size, and</td>
</tr>
<tr>
<td>Company</td>
<td>Year</td>
<td>Relationship</td>
<td>Findings</td>
</tr>
<tr>
<td>------------------</td>
<td>------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Biddle et al</td>
<td>2009</td>
<td>Relationship between financial reporting and investment efficiency of capital assets</td>
<td>Negative relationship between quality of financial reporting and investment of overinvesting companies</td>
</tr>
<tr>
<td>Garcia et al</td>
<td>2009</td>
<td>Relationship between conservatism and investment efficiency</td>
<td>So, companies with more conservative reports have more efficient investment and more profitable projects.</td>
</tr>
<tr>
<td>George et al</td>
<td>2010</td>
<td>Sensitivity of investment to cash flow as a measuring criterion of financial limitation in companies affiliated with Indian economic group</td>
<td>Results suggested that there is a strong sensitivity of investment-cash flow in both Holly Company Group and independent groups.</td>
</tr>
<tr>
<td>Meijeng et al</td>
<td>2013</td>
<td>Whether investment efficiency after disclosure of weaknesses of local controls after financial reporting.</td>
<td>They found that after disclosure of internal controls the company become underinvested, when they are financially limited (unlimited), more importantly, they found that after disclosure, investment efficiency improves considerably.</td>
</tr>
</tbody>
</table>

### Statistical Population and Sample

Statistical population for this study consists of all active companies listed on Tehran Stock Exchange over 2009-2013. The statistical sample selected in this study consist of companies listed on Tehran Stock Exchange, which have the following conditions:

1. End of fiscal year for the companies is Esfand 29 (March 20).
2. Companies have not changed their fiscal year in the intended period.
3. Companies have not stopped activity during intended periods.
4. Financial statements and accompanying notes of companies in the period of 2008 to 2012 are fully available in Tehran Stock Exchange.

### Methodology and Data Collection

This study is practical. Its study plan is semi-experimental using a post-event approach (using past information). In this study, data collection includes obtaining list of companies and their financial and non-financial information such as key financial and economic indexes and profitability, and was
conducted via library method by studying financial statements published by companies listed on Tehran Stock Exchange, reports issued by Stock Exchange, Journal of Bourse, and the software of Tadbir Pardaz version 2 and Sahra.

**Hypothesis one: financial limitations have significant relationship with underinvestment.**

To calculate correlation between financial limitation and overinvestment, polyserial correlation is used. Polyserial correlation introduced by Olsun et al (1982) is used when we want to investigate correlation between a interval variable and a two-state or sequential variable (assumed to reflect an essentially continuous variable). Since the investment variable is less than a interval variable and financial limitation is a two-state variable, polyserial correlation coefficient was used. This correlation coefficient can to a great extent be interpreted as Pearson's correlation coefficient.

To calculate correlation coefficient, software LISREL 8.80 was used. This software using correlation and covariances between calculated variables, can estimate or infer values of factor loadings, variances, and errors of latent variables, and can be used to perform exploratory factor analysis, second degree factor analysis, confirmatory factor analysis, as well as path analysis (causative modeling with latent variables).

**Table 4-2- polyserial correlation coefficient between financial limitation and overinvestment**

<table>
<thead>
<tr>
<th>Variable one</th>
<th>Variable two</th>
<th>Polyserial correlation coefficient</th>
<th>Chi-square statistic</th>
<th>Degree of freedom</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial limitation</td>
<td>Underinvestment</td>
<td>-0.192</td>
<td>92.377</td>
<td>1</td>
<td>0.000</td>
</tr>
</tbody>
</table>

As table 4-6 shows, polyserial correlation coefficient between financial limitation and overinvestment is -0.192, which is significant in the 0.001 level ($P < 0.001$). Therefore, there is a negative significant relationship between financial limitation and underinvestment.

**Hypothesis 2: There is a significant relationship between financial limitation and overinvestment.**

Since financial limitation is a two-value variable and overinvestment is an interval variable, to test the second hypothesis also polyserial correlation coefficient is used.

**Table 4-6- Polyserial correlation coefficient between financial limitation and overinvestment**

<table>
<thead>
<tr>
<th>Variable 1</th>
<th>Variable 2</th>
<th>Polyserial correlation coefficient</th>
<th>Chi-square statistic</th>
<th>Degree of freedom</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial limitation</td>
<td>Overinvestment</td>
<td>-0.283</td>
<td>32.847</td>
<td>1</td>
<td>0.000</td>
</tr>
</tbody>
</table>

As table 4-6 shows, polyserial correlation coefficient between financial limitation and overinvestment is -0.283 which is significant in the 0.001 level ($P<0.001$). Thus, there is a negative
significant relationship between financial limitation and overinvestment.

Summary-Conclusion

Investing in different fields by companies has always been considered as one of the important ways of developing companies and preventing recession and underdevelopment. In this regard, resource limitations have made increased investment efficiency as important as investment development. One of the things that can be inferred is that companies facing financing limitation might forgo accepting and conducting projects with positive net present value due to high financing costs, which leads to reduced investment (Hubbard, 1988). In this study, financial limitation was investigated based on Kaplan-Zingales (KZ) model and investment efficiency based on the work of Hovakimian (2011), theoretical basics and literature were collected from different resources and after collecting data and analyzing them with statistical software, results of analysis have been interpreted in this chapter, compared with findings of former literature and finally, limitations and suggestions are given.

Results of testing hypotheses using data pertinent to companies listed on Tehran Stock Exchange over 2008-2012 show that:

Hypothesis 1: Financial limitation has significant relationship with underinvestment.

To calculate correlation between financial limitation and overinvestment, polyserial correlation coefficient is used. Results suggest that polyserial correlation coefficient is -0.192 between financial limitation and underinvestment, which is significant in the 0.001 level (P<0.001). Therefore, there is a negative significant relationship between financial limitation and underinvestment. Also, regression results show that standardized coefficient of underinvestment is -0.291, which is significant in the 0.001 level (P<0.05). However, standardized beta coefficient of the variable of company development and return on assets is not significant in the 0.05 level (P>0.05). Thus, the presented model is weak. Result of this hypothesis is in line with Hovakimian (2011) and Bernanke and Blinder (1988), Bernanke and Gertler (1995), Bernanke et al (1996), in that the higher financial limitation becomes in companies, the more conservative investments are made in projects.

Hypothesis 2: Financial limitation has a significant relationship with overinvestment.

Results of polyserial correlation show that polyserial correlation coefficient between financial limitation and overinvestment is -0.283, which is significant in the 0.001 level (P<0.001). Thus, there is a negative significant relationship between financial limitation and overinvestment, and regression results show that standardized coefficient of overinvestment is -0.151, which is significant in the 0.05 level (P<0.05). The above table shows that introducing the variables of company development control and return on assets led to reduced predictability and correlation between overinvestment and financial limitation. Results of the table show that standardized beta coefficient of the variable of company development and return on assets is not significant in 0.05 level (P>0.05). Result of this hypothesis is in line with the works of Hovakimian (2011) and Bernanke and Blinder (1988), Bernanke and Gertler (1995), and Bernanke et al (1996), in that the higher financial limitation in companies, the more conservatively investments are made in projects.
Suggestions

According to obtained results, as financial limitation increases, managers tend to invest from free cash flows, thus, with financial limitation, overinvestment decreases with regard to foreign financial resources. On the one hand, it is suggested that banks and financial institutes provide facilities to reduce financial limitation for financing proper investments of companies, which are required for economic development of the country. On the other hand, company managers should acquire due knowledge regarding pros and cons of financial limitation in the company and how to use financial resources in profitable investments, thus properly dealing with financial limitation and investment efficiency. Also, it is recommended that managers establish a balance between financial limitation and investment efficiency by understanding the factors affecting investment levels, so that they do not miss profitable and efficient investment opportunities and also seek the satisfaction of their shareholders. Generally speaking, financial limitations are one of the most important issues for young and small companies, and they need financing to invest in other companies, and to achieve these financial resources, managers should make the best decision to meet organizational goals of the company. This depends on risk taking ability of company managers and how they get financial resources to invest in profitable projects.
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