

Cost of Capital and Investment Efficiency: A Critical Review of Empirical Literature
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Abstract

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This paper reviewed relevant empirical research works on the association between cost of capital and corporate investment efficiency by adopting critical review approach. Data for the review are sourced from relevant journal articles published over fourteen (14) years (2010 -2023). The data generated was analyzed using percentages and chart counts. Based on the analysis and discussion of results from the reviewed works, the findings of the paper are that both cost of equity and overall cost of capital exert positive influence on underinvestment. The effect of cost of equity on underinvestment is significant in non-state-owned firms. Regarding influence of cost of capital on Overinvestment, the paper found that cost of equity exerts negative effect on overinvestment and that the effect is significant in state-owned firms. However, the paper found that positive relationship exists between overall cost of capital and overinvestment. Consistent with the summary of findings, the paper concluded that Issue-Invest Decision theory best suits and explain the relationship between cost of capital and investment efficiency, and so an increase in the overall cost of capital or in any of its components (that is, cost of equity and cost of debt) will result in more failure to undertake viable investment projects by both state-owned and non-state-owned firms. In line with the conclusions drawn, this paper recommended that corporate firms should be reviewing and analyzing key factors determining their cost of capital. They should be giving special attention to the compelling need for minimizing the level of asymmetric information between them and their capital providers. Thus, apart from modest contribution to extant literature on COC and IE, this paper provides critical analysis and examination of the literature. It also influences the way in which corporate firms view COC and its effect on investment efficiency thereby impacting on their decision regarding COC and its determinants.

Keywords: Cost of Equity, Cost of Debt, Overall Cost of Capital, Underinvestment, Overinvestment

1. Introduction

The general rules for accepting and undertaking capital projects, capital investments or investment projects are that the projects must have acceptable investment risk and that they are to be efficient (that is, profitable or yielding a suitable financial return). Thus, Efficiency in investments or investment efficiency (IE) means accepting and undertaking only profitable investment projects that provides a suitable financial return. It refers to an undertaking of capital investments that yield positive or profitable net present value (Ren, 2016).

Inefficiency in firms' investments is the opposite of investment efficiency, and usually denotes either underinvestment or overinvestment. Underinvestment means forgoing investment projects that are expected to yield positive net present value, while overinvestment refers to undertaking of projects that have been projected to provide negative net present value.

Inefficiencies in corporate investment projects are issues in capital investment evaluation that have been linked to changes in cost of capital (COC) been utilized in funding the proposed projects (see Myers & Majluf, 1984; Jingeng, 2002 as cited in Lin et al. 2015). COC affects expected profit from investment projects and further worsens financing constraints of a company (see Myers & Majluf, 1984). COC is the minimum return expected by capital providers (Wilkinson, 2013). It is a return that a corporate firm is to earn on its capital investments in order to pay the return expected by fund providers. Issue-Invest-Decision Theory premised that increase in COC could force a corporate firm to underinvest (that is, forgo profitable investments). Consistent with this premise, Xie (2013), Rahman et al. (2013) Firth et al. (2016), and Rymar (2016) argued that higher cost of equity (COE) emanating from higher information asymmetry could give rise to underinvestment problem or higher reliance on internal fund that is not sufficient for corporate investment projects.

Moreover, on COC and Overinvestment, researchers like Jingeng (2002) are of the view that overinvestment problem is the result of a decrease or fall in COC. Jingeng (2002) argued that when COE is low, corporate managers could expand capital projects through huge amount of equity financing that might result in overinvestment. In other words, Jingeng (2002) is of the opinion that reduction in COE and hence, appreciation in share price could be used by corporate managers to generate free cash flow that might be invested in unprofitable investment projects. Wang et al. (2015) strengthened this argument by suggesting that overinvestment problem might emerge when there is a fall in COC especially with poor monitoring of managers' project selection.

Therefore, the argument advanced by Issue-Invest Decision theory regarding COC and underinvestment, and Jingeng (2002) view concerning COC and overinvestment suggest that increase or decrease in COC could have implications on corporate IE. Thus, the expectation of this paper is that on one hand, an increase in COC may amount to an increase in underinvestment, and on the other, an increase in COC may result in a decrease in overinvestment problems in corporate organizations.

Corporate investment efficiency has been and will continue to be of interest to owners/shareholders, policy makers and management as long as corporate firms will continue to embark on capital investments (see Lööf & Heshmat, 2008; Banerjee, 2009; Geamănu, 2011; Salehi et al. 2022). It will continue to be of interest to shareholders because of its possible effect on profitability, dividend and shareholders wealth. To managers, efficient investments play key roles in helping them to meet up with long term financial performance targets. Also, government would like to see that corporate investments are efficient because of their effects on aggregate investments in an economy. Thus, research studies have for long been attempting to assess the efficiency of corporate investments. Earlier works that assessed corporate IE in different parts of the world include: Verdi (2006), Richardson (2006), Biddle and Hilary (2006), Beatty et al. (2007), Biddle et al. (2009) and Jamhuri (2009).

Also, up to this time, studies have been making efforts to assess the corporate IE in different parts of the world. For instance, Tiamiu and Lukman (2017) assessed IE of 19 firms listed on the Nigerian Exchange Group over six years (2010-2015). Using generalized method of moment (GMM), Assad et al. (2023) examined the level of IE in publicly listed US companies. Also, Gaio et al. (2023) covered corporate IE in Europe. Similar efforts have been made by many research works (see Shahzad et al., 2019; Ayagi & Kurawa, 2019; Ardianto et al., 2020; Iqbal & Khan, 2020; Huang et al., 2023; Imelda et al., 2022).

Furthermore, As the Myers and Majluf (1984) argument suggests, COC is one of the factors that could directly affect corporate IE. For this reason, some research works focused their attention on assessing the effect of COC on corporate IE in different industries using different methodologies. Therefore, this paper aimed at reviewing published empirical studies that specifically examined the influence of COC on corporate IE over 14 years (2010-2023). Other sections of the paper covered literature review, methodology, results and discussion and finally conclusion and recommendations.

2.0 Literature Review

2.1 Cost of Capital

COC can be defined as the cost of a corporate firm's financing instruments that is, equity, debt and preference shares. Thus, COC can vary with the source or mode of financing employed by a particular company. It may refer to the cost of debt, equity and preference shares, where a company is financed through equity, debt or preference shares respectively. The term may also mean weighted average cost of

capital (WACC), that is, where a company combines equity, debt and preference shares or at least two of the sources of fund for financing its operations. Hence, in line with the definition given by *Wilkinson (2013)*, WACC denotes total or overall COC for all financing sources of a corporate firm or the minimum return a company must earn for it to reward finance providers. *COC is used in evaluating the viability of new investment projects of a company. For that, it has been considered as the minimum return that investors expect from a company for providing it with capital used in financing new capital projects, and hence setting a benchmark which the new project must meet.*

A firm's cost of equity, cost of debt and WACC can be measured through many models. For instance, the WACC of a company financed through combination of equity, debt and preferred stock can be determined as follows:

$$\text{WACC} = r_e * [E/(E+D+P)] + r_d * [D/(E+D+P)] * (1-t) + r_p * [P/(E+D+P)]$$

Where:

r_e = cost of equity

r_d = cost of debt

r_p = cost of preference shares

E = market value of equity

D = market value of debt

P = market value of preference shares

t = tax rate

Source: *Wilkinson, (2013)*

Other models of computing COC include Easton's (2004), Price/Earnings to Growth (PEG) Ratio Method as used in Barron et al. (2012) and Kazemi and Rahmani (2013) model as used in Kazemi and Rahmani (2013).

2.2 Investment Efficiency

The term investment may be seen as an activity that involves committing money or acquiring property for the purpose of earning income in the future. Investment includes money committed in bonds, fixed deposits, preference shares, equities, real tangible assets such as, machines, motor vehicles and factories. In line with the current trends, Richardson (2006) and Bidel et al. (2009) broadened the definition of the term to include investment in human capital i.e. expenditures on research and developments. The broadest definition was given by Daniel et al. (2016); in which apart from research and development expenditures meant for

human capital development, other items such as selling and general administrative expenditure, investment in joint ventures, subsidiaries, and business acquisitions were covered.

On the other hand, IE has been defined by Zhu et al. (2014) and Ren (2016) as undertaking or embarking on investments that have positive NPV. Thus, by implication, a company is said to be overinvesting when it executes investments proven to have negative NPV. It is also said to be underinvesting when it rejects investment projects with positive NPV. Both overinvestment and underinvestment are regarded as inefficiencies in corporate investment. Biddle et al. (2009) argued that in an ideal capital market characterized with the absence of market frictions, corporate firms invest efficiently. However, where the capital market is imperfect, the same corporate firms' investment projects may diverge from optimum level, due to asymmetric information problems (that is, adverse selections and moral hazards) that distort the existing cost of funding investment projects.

Different research works have used different methods in quantifying the efficiency of corporate capital investments. For instance, Chen et al. (2010) Parsimonious Model of Expected Investment is as follows:

$$\text{Invest}_{it} = \alpha_0 + \alpha_1 \text{NEG}_{it-1} + \alpha_2 \% \text{RevGrowth}_{it-1} + \alpha_3 \text{NEG} * \% \text{RevGrowth}_{it-1} + \varepsilon_{it}$$

Where:

Invest_{it} = The sum of new investment in machinery, equipment, vehicles, land, buildings, and research and development expenditures, less the sale of fixed assets, and scaled by lagged total assets for firm i in year t . This is in line with Biddle et al. (2009) model.

NEG_{it-1} = Indicator variable which takes the value of one for negative revenue growth, and zero otherwise.

$\% \text{RevGrowth}_{it-1}$ = Revenue growth rate for firm i in year $t-1$

The model considered expected investment to be dependent on revenue growth. And since the association between investment and revenue growth varies with decrease or increase in revenue, the model permits differential predictability for revenue increases and decreases by using piecewise linear regression model. Chen et al. (2010) considered residuals from this model as deviations from expected investment that would be used as proxies for inefficiencies in firms' investment.

Thus, positive and negative deviations represent overinvestment and underinvestment respectively. Chen et al. (2011) and AbdulJalil (2014) employed this model in their research. Other models that have been employed in previous studies include Fazzari et al. (1988) Investment-Cash Flow Sensitivity Model as reported in Daniel et al. (2016), Richardson (2006) Investment Expectation Model, Bidet et al. (2009) model of Investment Efficiency and Zhu et al. (2014) model of Investment Efficiency.

2.3 Empirical Review

On the effect of COC on IE of Chinese state-owned and non-state-owned companies, Jianhui and Yunyun (2010) established that COE is negatively associated with overinvestment. The study further confirmed that the negative relationship is significant in the state-owned firms and then attributed the difference in the level of significance to the quality and level of corporate governance. For, according to the study, Chinese state-owned firms' corporate governance is lower than that of privately-owned entities.

Kim (2016) attempts to assess the effect of adjustment costs on IE of business groups popularly known as Chaebol in South Korea. However, the contents of the work specifically focused on the volume of capital investments rather than IE of the business groups. The results found by Majeed et al. (2018) showed that COE is inversely related with IE (and so positively related with Unders investment) of both government-owned and privately-owned companies in China. Moreover, the results reaffirmed that the relationship is significant in privately-owned firms. Majeed et al. (2018) used Price Earnings Growth Ratio model for measurement of COE. And to quantify IE, the study employed two different models used in Biddle et al. (2009) and Chen et al. (2013).

Nasir et al. (2018) examined the IE of 235 Pakistani listed non-financial firms over sixteen years (2005 -2015). The study used Biddle and Hilary (2006) model for computing COE. And for IE, the study employed Bidet et al, (2009) model. The data analysis techniques used were descriptive statistics, correlation and multiple regression. However, major methodological fault and weakness of Nasir et al. (2018) work was its failure to use correct variables of the study based on the argument of theories explaining the relationship between COC and IE. Right from the topic and the study models, the study contradicted the theories (e.g. Issue-Invest Decision model) underpinning the relationship. The study variables were wrongly swapped in a way that IE appeared as the independent variable, while the

COE appeared as the dependent. And so, this fault affected the whole results found by the research work.

In the study of listed Deposit Money Banks in Nigeria, Ayagi and Kurawa (2019) confirmed that COC has a positive and significant effect on Underinvestment in the Underinvesting banks. Also, in the Overinvesting banks, Ayagi and Kurawa (2019) confirmed that COC has a positive and significant impact on Overinvestment. Therefore, the results obtained by the work in the Underinvesting banks can be said to support the findings of Majeed et al. (2018) regarding Underinvestment. However, the result found in the Overinvesting banks is in disagreement with Jianhui and Yunyun (2010) that established a negative association between COE and Overinvestment.

It should be noted that Ayagi and Kurawa (2019) work was based on weighted average COC measured using Kazemi and Rahmani (2013) model. The model used for computing IE was developed by Zhu et al. (2014). Besides, the Ayagi and Kurawa (2019) work covered different industry in a different country. So, these and other methodological differences could be responsible for the differences in the results found by Jianhui and Yunyun (2010) and Ayagi and Kurawa (2019) with respect to COC and Overinvestment.

2.4 Theoretical Framework

This paper adopted Issue-Invest Decision theory as developed by Myers and Majluf (1984) in order to underpin the relationship between COC and IE. Issue-Invest Decision theory can be considered as a modification to Pecking Order Theory. It predicts an inverse relationship between COE and IE based on an argument that where a firm lacks financial slack (that is, sufficient internal fund, marketable securities or an ability to sell risk-free debt), it could rationally prefer to forego profitable investments rather than issuing shares at a price less than their actual market value in order to finance its proposed investments. This view has been supported by scholars such as Xie (2013) who confirmed that higher COE resulting from IA would result in either underinvestment or higher dependence on internally generated funds. Consistent with this proposition, Adelegan and Ariyo (2008), Rahman et al. (2013) and Rymar (2016) also extensively explained that the exorbitant COE (i.e. liquidity constraint) would force the borrower (listed firm) to either recourse to internal finance (i.e. internal cash flow) or pass up profitable investment projects thereby underinvesting. Xie (2013) further explained that where the capital market is imperfect with high level of asymmetric information, both shareholders and debt holders react in the same way by rationally raising the respective finance costs. Thus, the only resort is the internal

cash flow, and since internal and external finance cease to be a perfect substitute in the presence of IA, a firm might end up underinvesting even if it relies heavily on internally generated funds.

3. Methodology

Consistent with the aim of this paper, critical/integrative review approach was adopted. The approach enables critical analysis and examination of relevant literature that result in an advancement of knowledge. Data for the review are relevant published journal articles. The inclusion criteria for the articles are that their titles must include COC and IE or that they must have assessed the effect of COC on IE or relationship between COC and IE. Thus, published journal articles that examined the impact of COC on either underinvestment or overinvestment were included.

Research efforts aiming at assessing the effect of COC on IE can be linked the emergence of Issue-Invest Decision theory developed by Myers and Majluf (1984). However, the earliest relevant work found by this paper was published in 2010 and so, the review period covered 14 years (2010-2023). Summary of findings and other information from the reviewed articles were presented using table. The analysis and discussion of the findings were done using simple percentage with the help of pie chart counts. The choice of simple percentage was informed by the need to draw a comparative analysis of various results found by the reviewed articles and to show the extent to which the reviewed studies corroborate the argument of Issue-Invest Decision theory regarding COC and IE.

4. Discussion of Results

Table 1.0 Summary of Empirical Results

SN	Author	Country	Industry	Method	Findings
1	Jianhui and Yunyun (2010)	China	State-owned and non-state-owned companies	Quantitative	COE has negative effect on overinvestment
2	Kim (2016)	South Korea	Chaebol business Groups	Quantitative	adjustment cost has negative effect on investment
3	Majeed et al (2018)	China	State-owned and non-state-owned companies	Quantitative	COE has positive effect on underinvestment
4	Nasir et al. (2018)	Pakistan	Shariah and Non Shariah Compliance Firms	Quantitative	IE has negative effect on COE

5	Ayagi and Kurawa (2019)	Nigeria	Listed Deposit Money Banks	Quantitative	COC has positive effect on both underinvestment and overinvestment
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Source: Reviewed Journal Articles (2010 - 2023)

Figure 1: COC and Underinvestment

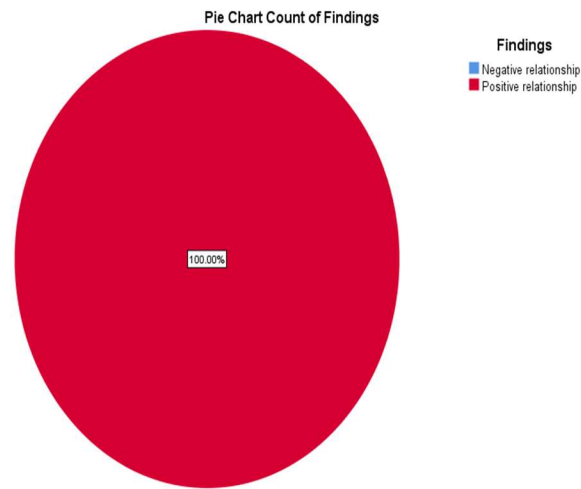
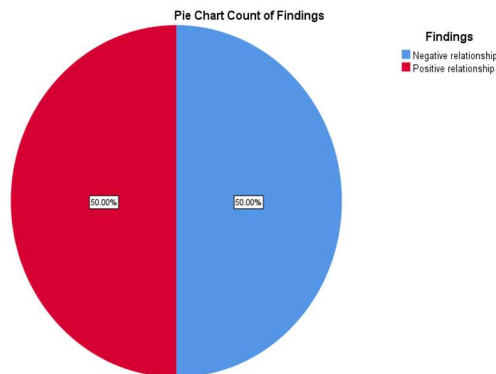


Figure 1: COC and Overinvestment



Source: SPSS 26 outputs in line with empirical findings' scores presented on

Table 1.0

Table 1.0 presents the summary of findings from the relevant studies conducted on the relationship between COC and IE or effect of COC on IE. It should be noted that Kim (2016) and Nasir et al. (2018) were dropped from the analysis as a

result of the issues identified by this paper right from the empirical review. Therefore, the analysis of findings is based on the remaining relevant works, that is, Jianhui and Yunyun (2010), Majeed et al. (2018) and Ayagi and Kurawa (2019). It should also be noted that Ayagi and Kurawa (2019) examined the relationship in both Underinvesting and Overinvesting banks and so, the work will appear on both sides of the analysis.

It can be observed from Table 1.0 that most of the related and relevant studies were carried out in Asian countries (China, South Korea and Pakistan), and this might be connected to the cases and prevalence of widespread overinvestments and shortages of investments as pointed out by Zhou et al. (2011) in Lin et al. (2015). Also, the relevant studies carried out in China made attempt to assess and compare the cases of inefficiencies in investments of both government-owned and privately-owned firms, and their positions corroborate. Since, they both established that the effect of COE on IE is significant in non-state-owned enterprises. Ayagi and Kurawa (2019) is the only relevant study found to have been carried out and published outside Asia, and its focus was on listed Deposit Money Banks in Nigeria.

Findings from both Majeed et al (2018) and Ayagi and Kurawa (2019) as presented in Table 1.0 revealed that COC/COE exerts positive influence on underinvestment. This is shown as 100% on Figure 1, and which suggests that there is 100% agreement between the two studies that the relationship between COC and Underinvestment is positive. Thus, the results are consistent with the argument put forward by Issue-Invest Decision Model, which suggested that cases of underinvestment will be increasing as long as there is an increase in the COC. Therefore, based on the results found, our deduction is that a rise in COC will give rise to more underinvestment problems in both governmental and private institutions.

Regarding overinvestment, the summary of findings on Table 1.0 shows that the results found by Jianhui and Yunyun (2010) and Ayagi and Kurawa (2019) are in disagreement. This is also reaffirmed by figure 2 which depicts that the result is 50% positive and 50% negative. Thus, the findings from Jianhui and Yunyun (2010) can be said to have strengthened our expectation of negative relationship between COE and overinvestment. It also supported the argument of Jingeng (2002) as cited in Lin et al. (2015) which suggests that COE should be negatively associated with corporate overinvestment. Because, if the COE (that is, the discount rate of capital projects in the equity financed companies) is low, the

firms could expand capital projects through huge amount of equity financing that might result in excessive investment. On the other hand, the findings of Ayagi and Kurawa (2019) can be said to contradict our expectation of negative relationship between COC and overinvestment, and also the argument put forward by Jingeng (2002).

5. Conclusion and Recommendations

On the basis of analysis and discussion of the results obtained by the reviewed empirical works, this paper found that both COE and WACC exert positive influence on underinvestment. The effect of COE on underinvestment is significant in non-state-owned firms. Thus, the findings of this paper regarding the impact of both COE and COC on underinvestment is in agreement with the argument of Issue-Invest Decision theory. Concerning the influence of COC on overinvestment, the paper found that COE exerts negative effect on overinvestment and that the effect is significant in state-owned firms. However, the paper found that positive relationship exists between overall COC and overinvestment. Consistent with the summary of findings, this paper concluded that Issue-Invest Decision theory best suits and explain the relationship between COC and IE, and so an increase in the overall COC or in any of its components (that is, COE and COD) will result in failure by government-owned and privately-owned firms to undertake viable investment projects. Regarding, COC and overinvestment, the conclusion of this paper is that a decrease in the COE will give rise to investments in unprofitable projects that will not maximize the shareholders' value.

In line with the conclusions reached, this paper recommended that corporate firms should from time to time be reviewing and analyzing key factors determining their COC. They should be giving special attention to the need for minimizing the level of asymmetric information between them and their capital providers.

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