CORPORATE DISCLOSURE AND THE COST OF CAPITAL: A META-ANALYTIC STUDY

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Abstract

It is worth noting, a thorough examination of the archival studies pertaining to the effect of corporate disclosure on the capital cost shows the prevalence of a serious ambiguity overwhelming this research area. In this respect, the present paper subject matter aims at providing a rigorous synthesis of previous literature pertinent to this topic and explaining the dissimilarities characterizing the different studies results. In this context, the meta-analysis technique has been performed as a proposed alternative. Actually, five criteria have been developed to ensure that the selected papers are exactly fit to the focus of the meta-analysis. In fact, the study’s final sample consists of 49 studies. We consider that this number of studies should provide an ample scope for conducting a meta-analytic study. Using exclusively published studies, we show that there is a negative and significant relationship between the cost of capital and disclosure level. This result corroborates the economic theory predictions. In addition, it has been revealed that the inclusion of unpublished studies does not change the sign of the disclosure-cost of capital effect. Noteworthy, however, the results do confirm the presence of a high heterogeneity across the studies’ results.

On the other hand, the meta-regression analysis shows that the number of items used to quantify the corporate disclosure level and the effect size between capital cost and disclosure level are negatively related. The results indicate also that the empirical studies carried out in the developing or emerging countries (developed countries) indicates the presence of a positive relationship (negative or no relationship) between corporate disclosure and the cost of equity capital. Besides, an interesting result has been showed indicating that the use, as a sample, of firms belonging in the same industry sector results in a more negative disclosure-cost of equity capital effect.

The originality of the paper rests in providing a rigorous synthesis, based on several statistical tools, of an important research topic in accounting and finance. The results of this study can be considered as a starting point to develop a unified methodology.

Keywords: Corporate disclosure, cost of capital, meta-analysis techniques, meta-regression, moderator variables.

1 Acknowledgements: the authors are wholeheartedly grateful to the valuable assistance help and collaboration of Mr. Simon Thompson, MRC Biostatistics Unit, Institute of Public Health, Robinson Way, Cambridge.
1. INTRODUCTION

Corporate disclosure is an important factor that guarantees the good functioning of an efficient capital market. Noteworthy, the increasing demand for accounting and financial disclosure arises, above all, from the information asymmetry and agency conflicts between managers and outside investors\(^2\). Consequently, it is obvious that information disclosure should have certain subsequent effect on such market components as prices, demand, supply, etc. In this paper, however, we are mainly interested in highlighting the effect of corporate disclosure on prices while focusing, in particular, on the cost of capital.

To note, the effect of corporate disclosure on the capital cost continues to be a subject of controversial debate in accounting research area; it still constitutes an unresolved puzzle (Diamond and Verrecchia 1991; Botosan 1997; Richardson and Welker 2001; Botosan and Plumlee 2002; Hail 2002; Easley and O’Hara 2004; Francis et al. 2005 and Kun et al. 2008; etc.). Indeed, until now the relationship between corporate disclosure level/quality and financing resources has so far constituted a crucially important topic of debate and, at the same time, a dilemma.

According to the theoretical framework, there is a negative relationship between corporate disclosure and the capital cost. Nevertheless, empirical research, on the whole, has not corroborated this prevalent point of view. The study of Botosan (1997), for instance, provides no evidence of a negative relationship pertaining to firms with a high analyst following. In addition, Botosan and Plumlee (2002) have found that firms’ cost of capital increases with timely disclosure.

In turn, Lang and Lundholm (1993) have discovered that firms which access the capital markets are more likely to engage in voluntary disclosure. In this respect, Ettredge et al. (2002) assert that managers have obvious incentives to disclose favorable information prior to a security offering. They presume that the amount of information, including required filings and voluntary disclosure for investors disseminated at a firm’s website, is positively associated with the firm’s need for a new external equity capital\(^3\). Actually, using a sample consisting of 220 firms, multivariate regression results indicate that the extent of website disclosure is positively and significantly related to raising equity capital.

In fact, the results obtained by prior researches dealing with such a subject are not always consistent. Consequently, the effect of corporate disclosure on the cost of capital is still a liable subject to discussion. To our mind, this controversial inconsistency might be due to the methodological problems surrounding the estimation of the disclosure level/quality as well as the cost of capital. In fact, both sets of methodological problems have obliged researchers in accounting and finance to examine this relationship by means of two research methodologies. Indeed, the empirical literature related to the association between the disclosure level and the cost of capital has followed two dependent study trends: a direct way and indirect one.

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\(^2\) Helay and Palepu (2001) provide a comprehensive survey of extant corporate disclosure literature.

\(^3\) Ettredge et al. (2002) measure the firm’s need for new external equity capital using a dummy variable which take the value of one if the firm is a net issuer of common equity in 1996 and 1997, and zero otherwise.
For the sake of exploring this relationship, we suggest carrying out a meta-analytic study on the studies pertinent to fields of corporate disclosure and the cost of capital. This methodological choice is motivated by the fact that when the results appear to differ among studies, it might turn out to be difficult to identify the source(s) of the divergence. These differences between studies may stem either from the number of observations, or from the variables measurements, or might even be due to the methodological differences that characterize the discordant studies. With only two studies to compare, it is often possible to determine which of the reasons for the differences behind the variation in outcome. However, when many studies pertaining to the same relationship have been conducted, a meta-analytic method is imposed and seems to be worth applying to sort out the sources of variation in results across studies, thereby, develop a more insightful understanding of the phenomenon.

In accounting and finance research, there are several noticeable cases in which the meta-analysis methods turn out to be successfully applied. In the current paper, the meta-analysis method is useful to understand the prominent relationship between capital-cost and disclosure. Actually, the main motivations and excitement for the use of meta-analysis are mainly: 1) the proliferation of the studies on disclosure and capital cost, and, 2) the need to try and “make sense out of nonsense”. Given the ambiguity surrounding the effect of information disclosure on the cost of capital, we suggest that researchers in accounting and finance should apply efficient statistical tools in order to achieve a meticulous synthesis of the results obtained by previous studies, before examining this relationship. As we reckon, meta-analysis studies dealing with the field of accounting appear to be so scarce that the present study turns out to be innovative.

In the current study, an attempt is made to exploit this technique to synthesize the results of studies pertaining to the relationship between corporate disclosure and the cost of capital. In addition, we try to examine whether the strength of this relationship has been influenced by some characteristic features of the previous studies: the number of items included in the disclosure index and country data, study period, method applied for estimating the cost of equity capital and the composition of study sample.

Noteworthy, the study sample consists of 49 studies appearing in 11 published and unpublished papers. These studies have been selected on the basis of five criteria. We consider that this number of studies should provide an ample scope for conducting a meta-analytic study.

On a first stage, we proceed by running a meta-analysis based only on published studies. The results have shown that there is a negative and significant relationship between the cost of capital and disclosure level, which corroborates the economic theory predictions. Secondly, unpublished studies have been included in the empirical analysis in order to check out whether the sign of the relationship disclosure-cost of capital does changes or not. Actually, as we reveal, the inclusion of unpublished studies does not change the sign of the disclosure-cost of capital effect. Despite the contradictions noticeable in archival studies, one

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4 The level of corporate disclosure, in the annual reports or web sites, is unobservable variable. Consequently, researchers try to measure this variable using a set of items. However, the major problem encountered by researchers is that there is no hard and fast rule to determine the number of items that should be included in the disclosure index. The number of items in the index vary from 17 (Barrett 1976) to 224 (Cooke 1989) (cited by Marston and Shrives 1991, p. 201).
might well conclude that the relationship between corporate disclosure and the cost of capital is still negative. However, the findings confirm the presence of a high heterogeneity across the studies’ results.

Moreover, using meta-regression analysis, it has been discovered that when the number of items used to quantify the corporate disclosure level increases, the relationship between cost of capital and disclosure level tends to be negative. In addition, we include four moderator variables and we run stepwise regression.

In fact, the results indicate that empirical studies carried out in the developing or emerging countries (developed countries) find a positive relationship (negative or no relationship) between corporate disclosure and the cost of equity capital. Above all, an interesting result has been discovered, indicating that the use of a sample of firms belonging to the same industry sector results in a larger negative disclosure-cost of equity capital effect.

This paper is organized into four sections. The next presents the research design. The results obtained from meta-analysis and their discussions are the subject of the third section. The fourth section concludes.

2. RESEARCH METHOD

In this section, our research methodology will be presented. It consists in applying the meta-analysis technique on the studies dealing with the relationship between corporate disclosure and the cost of capital, i.e., cost of equity capital and cost of debt. In what follows, research questions and the method employed to systematically identify, collect, and analyze all relevant empirical studies on this relationship are explained. Subsequently, we present the meta-analytic method employed in the current study.

2.1. Research Questions

The first step in meta-analysis research consists in defining the research problem more thoroughly in such a way it turns into a specific research question. Such question can provide a starting point for the formulation of a specific research problem, whose conclusion should aim at finding an appropriate answer. In fact, we believe that this step requires an enquiring mind, a deep look into the inconsistencies and inadequacies in current theory and empirical evidences and a measure of imagination. According to Juan and Hilda (2006, p.193), the meta-analysis has three main goals:
1. to test whether the studies’ results are homogeneous,
2. to obtain a global index regarding the magnitude effect of the studied relationship, joined to a confidence interval and its statistical significance, and
3. to identify the possible variables or characteristics moderating the results obtained if there is heterogeneity among studies.

In the current paper, an attempt is made to exploit this technique in order to synthesize studies’ results relating to the corporate disclosure-cost of capital relationship. Besides, we examine whether the strength of this relationship might be influenced by a set of covariates. More specially, the research questions are summarized as follows:
Question 1: Is the cost of capital negatively related to the disclosure level in published studies?

Question 2: Does the inclusion of unpublished studies, in the analysis, change the relationship sign between the cost of capital and disclosure level?

Question 3: Does the number of items included in disclosure index moderate the relationship between the cost of capital and disclosure level?

Question 4: What is the consequence of some covariates study-level on the disclosure-cost of equity capital effects?

2.2. Literature Search

In meta-analysis technique, the literature search and sample construction is difficult and time-consuming. To construct our sample, several criteria have been developed to ensure that selected studies are within the focus of the meta-analysis. First, for completeness sake, all researches conducted since 1997 have been considered. Second, the study focus has to consider the relationship between corporate disclosure (both mandatory and voluntary disclosure) and the cost of capital (cost of equity capital and cost of debt). Third, those studies to which meta-analysis calculations could be performed have been included (e.g. Pearson correlations, t-statistic, R-squared, etc.). Fourth, the study in its full text form must be accessible. Lastly, the paper should be written in English.

Hence, two approaches have been taken to satisfy all the above-mentioned criteria. Firstly, computer searches have been conducted on relevant databases: (a) Sciencedirect, (b) SSRN, (c) Proquest, (d) Searchepnet and (e) Google Scholar. The computer searches have been performed using several combinations of such keywords as “disclosure,” “cost of equity capital,” “voluntary,” “cost of debt” and “cost of capital.”

Secondly, we have also consulted the main journals of accounting, finance, and general business where such articles are usually published (Journal of Accounting and Economics, Journal of Corporate Finance, Strategic Management Journal, Journal of Finance, Journal of Business, Finance and Accounting, Corporate Governance: An International Review, Journal of Financial Economics, Review of Financial Studies, etc.). In addition to the automated databases, we have also used backward search procedures, i.e., a search for references cited in the gleaned studies in a bid to find additional relevant studies.

Both search methods have led to gather 11 published and unpublished papers examining the association between corporate disclosure and the cost of capital (see Figure 1). The eleven papers selected led to the identification of 49 studies. We consider that this number of studies should provide an ample scope for conducting a meta-analysis. Table 1 provides the number of studies selected from each paper included in the empirical analysis.

Table 2 presents a classification of selected studies according to their geographical origin and the number of observations used in each paper. The empirical studies selected in the current paper are carried out in several countries. The mostly studied countries are the United States (Botosan 1997; Botosan and Pumlee 2002; Joung and Yaqi 2005) as well as the Asian countries (Kevin et al. 2003; Uchino 2004; Kun et al. 2008). As regards the other studies, two have dealt with Europe (Luzi, 2002; Espinosa and Trombetta 2007) and one with South America (Brazil) (Alexsandro and Roberta 2008). It is worth noting that there is not a sufficient number of international studies in this field of research. To our best knowledge, the
unique study is that elaborated by Francis et al. (2005). As for the number of observations occurring in these studies it ranges from 73 to 4699 ones. The average number of observations is about 966.

2.3. Coding Procedures

As can be noted, the empirical literature dealing with the issue of corporate disclosure and the cost of capital has most often examined such type of relationship by introducing various variables, among which are: firm size, audit quality, systematic risk, leverage, accounting policy choices\(^5\) etc. In the present paper, each study has been coded on four variables: disclosure level/quality, firm size, leverage, and systematic risk.

After completing the preliminary stages of the meta-analysis technique, i.e., literature search and sample construction and studies’ coding, the meta-analysis can be performed and the results can be interpreted.

2.4. Meta-Analytic Method

As the purpose of our study is to ascertain the relationship between two variables, i.e., corporate disclosure and the cost of capital, the t-statistic corresponding to each relationship has been extracted from the selected papers. This statistic has been converted into \( r \) correlation using the following formula derived from Lipsey and Wilson (2001):

\[
ES_r = \frac{t}{\sqrt{t^2 + df}}
\]

The effect size based on correlation is directly taken as the value of the correlation itself based on Fisher’s variance-stabilizing transformation, given by:

\[
ES_z = \frac{1}{2} \ln \left[ \frac{1 + r}{1 - r} \right]
\]

Yet, meta-analysts do not use the correlation coefficient itself as a measure of effect size because the variance strongly depends on the \( r \). For that end, they have to convert this coefficient using Fisher’s variance-stabilizing transformation. After selecting the appropriate effect size measure that will be used in the current study, it is necessary to choose the convenient model under which effect size estimates will be summarized. This choice is based on the evaluation of the heterogeneity among effect sizes.

We, then, turn to verify whether heterogeneity does exist or not and its extent level by means of the Cochran’s \( Q \) test and the I-squared index proposed by Higgins and Thompson (2002) for each cost of capital—outcome variable relationship. Recently, Tania et al. (2006) have compared via a Monte Carlo simulation, the performance of the \( Q \) test and the confidence interval around the I-squared index. They have demonstrated that the I-squared and the \( Q \) test are complementary.

Dickersin (2005) has reviewed several lines of research and found that studies with statistically significant results are more likely to find their way into the published literature than those studies that report non-statistically significant results. Actually, this problem is

\(^5\) Based on the new theoretical research developed by Gietzmann and Trombetta (2003), the unique study to have introduced this variable is that of Gietzmann and Ireland (2005).
called “publication bias.” Unfortunately, in the single meta-analysis study on the empirical literature that examined corporate disclosure issue, Ahmed and Courtis (1999) have provided none analyses of publication bias. In the present meta-analytic study, we reckon to estimate the publication bias by applying the file-drawer test. To note, all computations have been performed using the Comprehensive Meta-Analysis (CMA) software version 2.0.

3. RESULTS AND DISCUSSION

The empirical analysis proceeds through a logical sequence of analyses. In the first step, we conduct a meta-analysis using only 21 published studies. After a discussion of the findings, we include, in the second step, 28 unpublished studies in the analysis.

3.1. Heterogeneity Evaluation

Noteworthy, Table 3 Panel A provides a summary of results for the heterogeneity between the set of published studies. Indeed, for each variable, there are the Q test with its significance, i.e., p-value, the degrees of freedom (df) and the I-squared test. The results show that the Q-statistic is ranging from 58.403 to 80.907 for each relationship. In addition, the Q-statistics is highly significant (p-value = 0.000), indicating the presence of a heterogeneity problem.

Indeed, the I-squared index confirms this result. There is a moderate heterogeneity for the variable disclosure level (I-squared is equal to 71.249%). As for the other variables, i.e., firm size, leverage and systematic risk, the results show that there is a high heterogeneity among effect sizes. The I-squared index is the percentage of the total variability in a set of effect sizes due to true heterogeneity, i.e., owing to the between-studies variability (Tania et al. 2006). In this meta-analytic study, we demonstrate that regarding the 21 published studies examining the relationship between corporate disclosure level/quality and the cost of capital, 71.249% of the total variability among effect sizes is caused by true heterogeneity between studies rather than by sampling error. As regards, the other variables used by these studies, i.e., firm size, leverage and beta, the percentage of variability between correlations coefficients caused by sampling error are, respectively, 24.720%, 18.835% and 22.506%.

Thus, based on 21 published studies on the relationship between corporate disclosure and the cost of capital, we have demonstrated that there is a problem of heterogeneity. Consequently, the random-effects model was employed.

3.2. Effect Size Analysis

Actually, the most important difficulty in understanding meta-analysis results is the nonintuitive nature of the effect size statistics (Lipsey and Wilson 2001, p. 146). In his book on Statistical Power Cohen (1977, 1988) has established a general convention used to appraise the magnitude of effect size estimates. Indeed, Cohen (1977) has provided rough guidelines for small (ES ≤ .20), medium (ES = .50) and large (ES ≥ .80) effect sizes (cited by

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6 Comprehensive Meta-Analysis is a specifically developed program for use in meta-analysis. A free trial of CMA software has been downloaded from the website: www.meta-anlysis.com
Lipsey and Wilson 2001, p. 147). As per Table 4 Panel A, all effect sizes estimates pertaining to the selected variables in the present study are small.

With respect to the statistical significance, we can examine the confidence intervals and p-value, because there is a correspondence between these two statistics. In other words, when the 95% confidence interval does not include the null value, the p-value should be under 0.05. Table 4 Panel A shows that the variable “Beta”, used to measure the systematic risk, has a p-value equal to 0.070, i.e., significant at the 10% level. All the other variables, i.e., disclosure level, firm size, and leverage, are significant at the 1% level.

The meta-analysis results pertinent to the relationship between corporate disclosure level, firm size and the cost of capital, respectively, highlight a summary effect size of -0.055 and -0.121 with a 95% confidence interval of -0.095 to -0.015 and -0.163 to -0.079. The p-values for the summary effect are, respectively, 0.007 and 0.000. One might well conclude that there is a significant negative relationship between both variables and the cost of capital in the published studies. Regarding the other variables‘ results, i.e., leverage and systematic risk, it can be confirmed that a significant positive relationship does prevail.

Owing to the fact that the above-discussed results have been exclusively based on published studies, it is necessary to check out whether a publication bias does exist. According to Rosenthal and Rosnow (1991), the publication bias, also called the “file drawer effect”, occurs when papers with statistically significant positive results are highly more selected for publication than the papers which report negative results.

To estimate the publication bias, several methods have been developed, among which are the: funnel plot (visual tool) the classical fail-safe N, the Orwin's fail-safe, rank correlation, the Egger's regression, and the trim and fill method. However, there is no exclusively perfect means of estimating publication bias (Rosenthal and Rosnow 1991). In what follows, we discuss the results pertaining to the publication bias tests. More specifically, the file-drawer test has been applied.

The file-drawer test, also dubbed failsafe N, has been introduced by Rosenthal (1979). This method is one of the earliest approaches useful to deal with the problem of publication bias in the field of social sciences; it is still one of the most popular procedures. Becker and Morton (2002) have shown that the file-drawer test has been applied to about one-third of a set of 28 meta-analyses published between 1999 and 2002 in two journals dealing with psychology and education.

The main principle on which this method is founded consists in computing the number of missing studies that we would need to retrieve and incorporate in the analysis before the p-value became insignificant (Rosenthal 1979). For that purpose, it is necessary to suppose that the mean effect size in missing studies was null. In our study case, only the published studies have been selected, consequently the missing studies are the ones not published in referred journals that would threaten the validity of significant combined results obtained in the current meta-analysis.

The file-drawer test shows that for the sake of making the meta-analysis results have a trivial effect size, a large number of additional studies appear to be needed (see Table 5). The fail-safe N's ranged from 37 to 484, with an average of 176. The largest number of missing studies has been showed for the relationship between firm size and the cost of capital. Thus,
in order to ‘nullify’ the effect size for this relationship, 484 unpublished studies need to be included. However, the smallest number of missing studies was shown to prevail in the relationship between corporate disclosure level/quality and the cost of capital (only 37 unpublished studies).

Rosenthal (1979) has provided an ad hoc rule that consists in comparing the fail-safe \( N \) to the \( 5k + 10 \) criterion. The results indicate that studies not included in the meta-analysis do not represent serious threats to the validity of the findings except for the relationship between the cost of capital, firm size and leverage. However, for the study cases dealing with the relationship between disclosure level, beta and the cost of capital, the fail-safe \( N \) is less than the criterion proposed by Rosenthal (1979).

Owing to the existence of a publication bias in this first meta-analytic study, we turn to implement the second step, that is, to introduce a set of unpublished studies in the analysis. The goal pursued in this second meta-analysis is to verify whether the inclusion of unpublished studies in the analysis is likely to changes the sign of the relationship between the cost of capital and the selected variables.

First, we proceed by evaluating the heterogeneity among effect sizes. In this respect, Table 3 Panel B, shows that the \( Q \)-statistic is ranging between 93.249 and 303.582. In addition, the \( Q \)-statistics is highly significant with respect to all the variables, indicating the presence of a heterogeneity problem. Moreover, the I-squared ranging from to 79.721% (for beta) to 84.189% (for disclosure level) also confirms this result. As has been the case with the first meta-analysis, heterogeneity among effect sizes appear prevails, which make us resort to apply the random-effects model.

As Table 4 Panel B indicates that the relationship between corporate disclosure level, firm size, leverage, beta and cost of capital has, respectively, a summary effect size of -0.066, -0.154, 0.210 and 0.071. The p-value corresponding to these variables’ summary effect is equal to 0.000. Thus, it can be concluded that there is a significant negative relationship between corporate disclosure level, firm size and the cost of capital relevant to both the published and unpublished studies. Regarding the other variables’ results, i.e., leverage and systematic risk, the findings confirm the existence of a significant positive relationship.

The results of the first and the second meta-analyses do confirm the predictions set by the economic theory. Indeed, there is a negative relationship between the cost of capital and disclosure level. However, our findings indicate that firm size is negatively related to the cost of capital. In what follows, we try to verify whether the association between corporate disclosure level and capital cost is influenced by the number of items included in the disclosure index.

### 3.3. Moderator Variables

It is worth highlighting that the present paper’s reached results do confirm the presence of a substantial heterogeneity between primary studies results in the two previous meta-analytic studies. The aim of this sub-section is to explore the possible reasons of this dissimilarity. Actually, there are two possible ways useful for investigating heterogeneity by means of moderator variables, also called covariates. In fact, these covariates can be drawn selected by researchers either from study-level or from subject-level. Nevertheless, the second approach is only possible when individual data are available. As for our case,
individual data are not accessible, consequently, the first approach turns out to be more appropriate to be used and we propose to explain the heterogeneity through the number of items included in the disclosure index as used by primary studies.

In this stage of analysis, we apply a meta-regression using the composition of disclosure index to predict the correlation between corporate disclosure and the cost of capital. We assert that the meta-regression analysis is a conveniently interesting method and the corporate disclosure-cost of capital literature is a fertile ground for its application. Noteworthy, both published and unpublished studies are used in this meta-regression analysis.

Using a random-effects analysis, the effect size for the relationship between corporate disclosure level and the cost of capital turns is equal to -0.066 with a confidence interval ranging from -0.096 to 0.036. The Z-value is 4.246 (p <0.000), which leads us to reject the null hypothesis of no effect (see Table 4 Panel B). As regards the heterogeneity problem we have concluded, based on the I-squared index, that 84% of the observed variance stems from the differences noticed among studies and, as such, can potentially be explained by study-level covariates.

In Figure 2, each study is represented by a circle showing the actual coordinates (observed effect size by disclosure index) relative to that particular study. The size of each circle is proportional to that study’s weight in the analysis. Since this analysis is based on the random-effects model, the weight is the total variance corresponding to each study. By applying the random-effects model, the weights assigned to each study are more similar to one another.

The results demonstrate that the coefficient for disclosure index is -0.00171 with a standard error of 0.00024, and Z-value equal to -7.12445 (p<0.00000). Hence, one might well conclude that the slope is probably not zero, and the relationship between corporate disclosure and the cost of capital is more negative when researchers use a disclosure index including a large number of items. Table 6 below shows a significant and negative relationship between effect size, based on correlation, and the number of items included in the disclosure index. Therefore, an interaction exists as visualized on Figure 2 by the regression line’s decreasing slope.

The regression coefficient for disclosure index is -0.00171, which indicates that every single item in the disclosure index corresponds to a decrease of 0.00171 units in the effect size. In our case, the effect size is the correlation, which corresponds to a negative relationship between capital cost and disclosure level. Consequently, when the number of items used to estimate corporate disclosure level increases the relationship between the cost of capital and corporate disclosure is bound to be negative.

In the current meta-analytic study, we assume that heterogeneity stems from a single covariate study-level, i.e., the disclosure index, consequently both the Z-test and Q-test yield the same result. Thus, the null hypothesis of these two tests is: none of the p covariates introduced in the model is related to the effect size. The results demonstrate that Q_{Model}=

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50.757 with degrees of freedom equal to 1 and p-value = 0.00000. Accordingly, the null hypothesis is rejected.

Regarding the goodness of fit, it is a test designed to ensure that unexplained variance or heterogeneity is zero. In other words, it serves to examine whether heterogeneity not explained by the disclosure index does exist. Eventually, it has been discovered that $Q_{\text{resid}} = 252.824$ with 47 degrees of freedom and p-value is equal to 0.00000. This means that despite the inclusion of “disclosure index” as a covariate in the model, an important part of the between-studies variance has remained unexplained.

Based on these findings, one can conclude that there is very strong evidence that the rise in the number of items included in the disclosure index relates to more negative correlations. Yet, the association is not necessarily “causal”, since it could relate to other aspects of the studies. Furthermore, there is still quite a lot of heterogeneity between the studies’ results that has not been thoroughly explained by the disclosure index.

Given that the pattern in the results of primary studies is poorly explained by the measurement of disclosure level, we recommend examining other potential explanatory variables. The targeted goal pursued, in this detailed study, is to have a deep insight into the heterogeneity in the results of previous empirical studies dealing with the relationship corporate disclosure-capital cost and identify most of the reasons leading to these differences. The methodology to be adopted to achieve this objective is to establish certain links between the effect size estimates (correlation Fisher’s transformation) and a set of covariates. In this respect, the following explanatory variables are considered here:

1. **Country**: a dummy variable which takes the value of one if the estimates relate to a developing or emerging country data, and zero otherwise.
2. **Industry type**: a dummy variable which takes the value of one if the study uses a sample of firms belonging to the same industrial sector, and zero otherwise.
3. **Measurement of the equity capital cost**: five dummy variables are used in this respect.
4. **Study period**: a dummy variable which takes the value of one if the study is based on observations dating back to one year, and zero otherwise.

Thus, the equation to be estimated is:

$$Y_i = \frac{1}{2} \left[ \ln \left( \frac{1+r}{1-r} \right) \right] = \alpha_0 + \sum_{i=1}^{4} \alpha_i X_i + \epsilon_i$$

Where, $Y_i$ is the correlation between corporate disclosure and the cost of equity capital (Fisher’s transformation), and $X_i$ (1…4) designate the covariates introduced in the model.

In this framework, our analysis is based on nine papers (5 published papers and 4 unpublished ones). All these papers have examined the effect of corporate disclosure on the cost of equity capital. Two papers have been rejected, because they examine the effect of corporate disclosure on the cost of debt (Francis et al. 2005; Kun et al. 2008). Among the selected papers chosen to serve our meta-regression analysis, 37 studies have been collected.

Table 7 below presents the Pearson correlations between the effect size, country, study period and the different methods used by previous studies to estimate the cost of equity capital. The results show that, among five methods used for estimating the cost of equity

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8 The distinction between developed vs. developing or emerging countries is based on the classification provided by the World Bank.
capital, there is a significant (at the 10% level) negative correlation between effect size and the use of the Residual Income Model Finite Horizon Version. We have also found that the effect size and industry type are negatively and significantly correlated.

Actually, we resort to use the stepwise regression\(^9\) in a bid to discover the best combination of explanatory variables, whose are presented in Table 8. To note, this method generates two stages. At this phase, we have to choose the more convenient model to be retained. In terms of the R-squared, we note that both models have an acceptable R\(^2\). However, the use of the R\(^2\) as a selection criterion is not enough sufficient as it poses the problem of internal validity. In this respect, the adjusted R\(^2\) will be applied as a criterion for selecting the more appropriate model. Hence, the best model turns out to be derived from the second stage (adjusted R\(^2\)= 0.399).

The selected model is composed of two independent variables; country and industry. The method for estimating the cost of equity capital and the period of study are not statistically significant, and they have rejected by this method. One might well deduce that the use of any method for estimating the cost of equity capital and the choice of the study period are likely to produce the same disclosure-cost of equity capital effects.

As shown in Table 8, the choice of country subject of study has a significant and positive effect on the measure of effect size between corporate disclosure and the cost of equity capital. As a result, the inclusion of country data as a moderator variable results in a positive effect of corporate disclosure on the cost of equity capital. When researchers use a developing or emerging country’s data, the relationship between the cost of equity capital and disclosure level is positive. In other words, the predictions of economic theory are not valid as regards these markets. Hence, this result can be explained, in our minds, by the lower transparency and the weak or even absence of legal protection of investors in those countries. On the other hand, the use of a developed country’s data lead researchers to find a negative or no relationship between corporate disclosure and the cost of equity capital, as the intercept is not statistically significant in the model.

Additionally, it has been discovered that the composition of the study sample influences significantly and negatively the effect size. The selection of a sample which includes firms operating in the same sector (many sector) lead to a larger (lower) negative disclosure-cost of equity capital effect. This result seems logical, because disclosure practices vary from one sector to another. For instance, financial institutions are highly influenced by specific regulatory requirements.

4. CONCLUSION

The subject matter of this paper has been to provide a rigorous synthesis of previous studies relating to the effect of corporate disclosure on the cost of capital. For this purpose, a well-known technique of quantitative synthesis has been applied, namely, the meta-analysis. Our objectives are to synthesize the results of the previous studies in this research area and

\(^9\) This technique allows us to select the best combination of predictor variables which have, all, significant coefficients.
examine whether the strength of this relationship is influenced by a set of moderator variables involving: the number of items included in the disclosure index, country data, study period, industry sector of the study sample as well as the methods used to estimate the cost of equity capital.

The empirical analysis has been based on 49 primary studies. The effect size has been measured using the correlation coefficient after Fisher’s transformation. Using several tests (Q-statistic and I-squared index) it has been highlighted that a high heterogeneity does prevail among effect sizes estimates. Consequently, a random-effects model has been adopted.

At the first stage of analysis, exclusively published studies have been included. The results confirm the economic theory’s predictions. In fact, there exists a negative and significant relationship between the cost of capital and disclosure level. However, the findings indicate that firm size, leverage, and systematic risk are significantly and, respectively, negatively and positively related with the cost of capital. In a second stage, unpublished studies have been included in the meta-analysis in a bid to demonstrate whether the inclusion of these studies does change or not the sign of the disclosure-cost of capital effect. The relationship has still been negative.

After synthesizing archival studies, we turned to explain the heterogeneity among effect size estimates. Firstly, it has been shown, through meta-regression analysis, that when the number of items used to estimate the corporate disclosure level increases, the relationship between cost of capital and disclosure level tends to be negative. Secondly, four moderator variables have been introduced and a stepwise regression has been implemented. Eventually, the results indicate that the empirical studies carried out in developing or emerging countries (developed countries) find a positive relationship (negative or no relationship) between corporate disclosure and the cost of equity capital. In addition, an interesting result has been discovered highlighting that the use of a sample of firms belonging to the same industrial sector results in a larger negative disclosure-cost of equity capital effect.

In the end of this paper, we have reached the conclusion that the effect of corporate disclosure on the cost of capital has so far been a debatable research question. In this framework, we recommend to examine the effect of disclosure timing, rather than the disclosure level, on the cost of capital. At this junction of research, it is worth mentioning and quoting:

“...having information available to decision makers before it loses its capacity to influence decisions, is an ancillary aspect of relevance. If information is not available when it is needed or becomes available so long after the reported events that it has no value for future action, it lacks relevance and is of little or no use.” (FASB 1980, p. 5).
REFERENCES


Becker, B. and Morton, S. Publication Bias: Methods and Practice in Evidence-Based Medicine and Social Science, Berkeley California: Mathematical Sciences Research Institute, 2002.


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10 Studies that are preceded by an “*” appear in the meta-analysis.


APPENDIX

Figure 1. Studies Selection Process

Table 1. Papers Included in The Meta-Analysis

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year of publication</th>
<th>Journal /Review</th>
<th>Number of studies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Published papers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christine A. Botosan</td>
<td>1997</td>
<td>The Accounting Review</td>
<td>2</td>
</tr>
<tr>
<td>Hail Luzi</td>
<td>2002</td>
<td>European Accounting Review</td>
<td>1</td>
</tr>
<tr>
<td>M. Gietzmann, and J. Ireland</td>
<td>2005</td>
<td>Journal of Business Finance &amp; Accounting</td>
<td>4</td>
</tr>
<tr>
<td>M´onica Espinosa and Marco Trombetta</td>
<td>2007</td>
<td>Journal of Business Finance &amp; Accounting</td>
<td>6</td>
</tr>
<tr>
<td>Kun Wang, Wang O, and M. Cathy Claiborne</td>
<td>2008</td>
<td>Journal of International Accounting, Auditing and Taxation</td>
<td>3</td>
</tr>
<tr>
<td><strong>Unpublished papers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Characteristics of Primary Studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>Number of observations</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christine A. Botosan (1997)</td>
<td>122</td>
<td>US</td>
</tr>
<tr>
<td>Hail Luzi (2002)</td>
<td>73</td>
<td>Swiss</td>
</tr>
<tr>
<td>Satomi Uchino, (2004)</td>
<td>4699</td>
<td>Japan</td>
</tr>
<tr>
<td>M. Gietzmann, and J. Ireland (2005)</td>
<td>301</td>
<td>UK</td>
</tr>
<tr>
<td>Joung W. Kim, and Yaqi N. Shi (2005)</td>
<td>218</td>
<td>US</td>
</tr>
<tr>
<td>M’onica Espinosa and Marco Trombetta (2007)</td>
<td>250</td>
<td>Spain</td>
</tr>
<tr>
<td>Alexsandro Lopes and Roberta de Alencar (2008)</td>
<td>276</td>
<td>Brazil</td>
</tr>
</tbody>
</table>

Table 3. Heterogeneity Evaluation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Q-statistic</th>
<th>df (Q)</th>
<th>P-value</th>
<th>I² statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disclosure level</td>
<td>69.583***</td>
<td>20</td>
<td>0.000</td>
<td>71.249</td>
</tr>
<tr>
<td>Firm size</td>
<td>80.907***</td>
<td>20</td>
<td>0.000</td>
<td>75.280</td>
</tr>
<tr>
<td>Leverage</td>
<td>58.403***</td>
<td>11</td>
<td>0.000</td>
<td>81.165</td>
</tr>
<tr>
<td>Beta</td>
<td>66.649***</td>
<td>15</td>
<td>0.000</td>
<td>77.494</td>
</tr>
</tbody>
</table>

Panel B: heterogeneity between published and unpublished studies

<table>
<thead>
<tr>
<th>Variables</th>
<th>Q-statistic</th>
<th>df (Q)</th>
<th>P-value</th>
<th>I² statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disclosure level</td>
<td>303.582***</td>
<td>48</td>
<td>0.000</td>
<td>84.189</td>
</tr>
<tr>
<td>Firm size</td>
<td>258.327***</td>
<td>48</td>
<td>0.000</td>
<td>83.177</td>
</tr>
<tr>
<td>Leverage</td>
<td>93.249***</td>
<td>18</td>
<td>0.000</td>
<td>80.697</td>
</tr>
<tr>
<td>Beta</td>
<td>212.038***</td>
<td>43</td>
<td>0.000</td>
<td>79.721</td>
</tr>
</tbody>
</table>

*** indicates significance at the 1% level.

Table 4. Random-Effects Model Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Effect size</th>
<th>95% confidence interval</th>
<th>Z-Value</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disclosure level</td>
<td>-0.055***</td>
<td>-0.095 -0.015</td>
<td>-2.710</td>
<td>0.007</td>
</tr>
<tr>
<td>Firm size</td>
<td>-0.121***</td>
<td>-0.163 -0.079</td>
<td>-5.569</td>
<td>0.000</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.148***</td>
<td>0.046 0.246</td>
<td>2.827</td>
<td>0.005</td>
</tr>
<tr>
<td>Beta</td>
<td>0.044</td>
<td>-0.004 0.090</td>
<td>1.809</td>
<td>0.070</td>
</tr>
</tbody>
</table>
Panel B: heterogeneity between published and unpublished studies

<table>
<thead>
<tr>
<th>Variables</th>
<th>Disclosure level</th>
<th>Firm size</th>
<th>Leverage</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.066***</td>
<td>-0.154***</td>
<td>0.210***</td>
<td>0.071***</td>
</tr>
<tr>
<td></td>
<td>-0.096</td>
<td>-0.183</td>
<td>0.131</td>
<td>0.043</td>
</tr>
<tr>
<td></td>
<td>-0.036</td>
<td>-0.125</td>
<td>0.286</td>
<td>0.099</td>
</tr>
<tr>
<td></td>
<td>-4.246</td>
<td>-10.248</td>
<td>5.121</td>
<td>4.938</td>
</tr>
<tr>
<td></td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

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

Table 5. The File-Drawer Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>Classical fail-safe N</th>
<th>Ad hoc rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disclosure level</td>
<td>37</td>
<td>115</td>
</tr>
<tr>
<td>Firm size</td>
<td>484</td>
<td>115</td>
</tr>
<tr>
<td>Leverage</td>
<td>119</td>
<td>70</td>
</tr>
<tr>
<td>Beta</td>
<td>62</td>
<td>90</td>
</tr>
</tbody>
</table>

Table 6. Random-Effects Model – Regression Results

<table>
<thead>
<tr>
<th></th>
<th>Point estimate</th>
<th>Standard error</th>
<th>Confidence interval</th>
<th>Z-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.05152</td>
<td>0.01269</td>
<td>0.02665</td>
<td>0.07639</td>
<td>4.06075</td>
</tr>
<tr>
<td>Disclosure index</td>
<td>-0.00171</td>
<td>0.00024</td>
<td>-0.00217</td>
<td>-0.00124</td>
<td>-7.12445</td>
</tr>
</tbody>
</table>

Test of the model:

$Q_{model} = 50.75779$, df= 1.0000, p-value= 0.00000

Goodness of fit:

$\tau^2 = 0.00575$, $Q_{resid} = 252.82440$, df= 47, p-value= 0.00000

Table 7. Pearson Correlations

<table>
<thead>
<tr>
<th></th>
<th>Effect size</th>
<th>Country</th>
<th>Industry</th>
<th>Period</th>
<th>EBVA</th>
<th>RIMFHV</th>
<th>EPR</th>
<th>PEGR</th>
<th>RIVM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect size</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>0.336 (0.021)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>-0.518 (0.001)</td>
<td>0.126 (0.228)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period</td>
<td>-0.003 (0.494)</td>
<td>0.219 (0.097)</td>
<td>0.232 (0.084)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBVA</td>
<td>0.168 (0.160)</td>
<td>0.219 (0.097)</td>
<td>0.028 (0.436)</td>
<td>0.637 (0.000)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RIMFHV</td>
<td>-0.224 (0.092)</td>
<td>0.291 (0.040)</td>
<td>0.308 (0.032)</td>
<td>0.172 (0.154)</td>
<td>-0.117 (0.244)</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPR</td>
<td>0.081 (0.318)</td>
<td>0.324 (0.025)</td>
<td>0.034 (0.019)</td>
<td>-0.131 (0.220)</td>
<td>-0.131 (0.220)</td>
<td>-0.174 (0.152)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEGR</td>
<td>-0.170 (0.157)</td>
<td>-0.388 (0.009)</td>
<td>0.020 (0.454)</td>
<td>-0.193 (0.126)</td>
<td>-0.193 (0.126)</td>
<td>-0.257 (0.062)</td>
<td>-0.286 (0.043)</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>RIVM</td>
<td>-0.056 (0.370)</td>
<td>0.219 (0.097)</td>
<td>0.232 (0.084)</td>
<td>-0.088 (0.302)</td>
<td>-0.088 (0.302)</td>
<td>-0.117 (0.244)</td>
<td>-0.131 (0.220)</td>
<td>-0.193 (0.126)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Note: Effect size is the correlation coefficient, after Fisher’s transformation, between corporate disclosure and the cost of equity capital from primary studies. Country is a dummy variable which takes the value of one if the estimates relate to developing or emerging country data, and zero otherwise. Industry type is a dummy variable.
which takes the value of one if the study use a sample of firms belonging in the same industrial sector, and zero otherwise. \textit{EBVA, RIMFHV, EPR, PEGR and RIVM} are, respectively, the Earning/Book Value Approach, the Residual Income Model Finite Horizon Version, the Earning to Price Ratio, the Price to Earnings Growth Ratio, and the Residual Income Valuation Model. \textit{Study period} is a dummy variable which takes the value of one if the study is based on observations from one year, and zero otherwise. The sample covers 37 regressions collected from nine published and unpublished papers. In parentheses are the p-values for which the null hypothesis that the correlation coefficient is zero is rejected.

\begin{table}[h]
\centering
\small
\begin{tabular}{|l|c|c|}
\hline
\textbf{Variables included in the model} & \textbf{Stage 1} & \textbf{Stage 2} \\
\hline
Intercept & 0.0029 & -0.0046 \\
Coefficients & 0.429 & 0.259 \\
Significance & & \\
\hline
Country & N.I & 0.131 \\
Coefficients & & 0.004 \\
Significance & & \\
\hline
Industry & -0.165 & -0.182 \\
Coefficients & 0.001 & 0.000 \\
Significance & & \\
\hline
Period & N.I & N.I \\
\hline
EVBA & N.I & N.I \\
\hline
RIMFHV & N.I & N.I \\
\hline
EPR & N.I & N.I \\
\hline
PEGR & N.I & N.I \\
\hline
RIVM & N.I & N.I \\
\hline
F-value & 12.837 & 12.945 \\
Significance & 0.001 & 0.000 \\
Adjusted R-squared & 0.247 & 0.399 \\
\hline
\end{tabular}
\caption{Stepwise Regression’s Results}
\end{table}

N.I.: indicate that the variable is rejected because is the least significant.