Effect of intellectual capital disclosure on cost of equity capital: a study on Indian companies

Amitava Mondal

Department of Commerce, Sidho-Kanho-Birsha University, Purulia, India, and

Chiranjit Ghosh

Department of Commerce,
Saheed Anurup Chandra Mahavidyalaya, University of Calcutta, Kolkata, India

Abstract

Purpose – The impact of the intellectual capital disclosure (ICD) on the cost of equity capital (COEC) is not well established in the aspect of the Indian scenario. So the objective of this paper is to examine not only the overall effect of ICD but also the individual effect of human capital disclosure (HCD), relational capital disclosure (RCD) and structural capital disclosure (SCD) on COEC.

Design/methodology/approach – This research work is conducted by regressing COEC, firm size, leverage, industry type and disclosure index. The disclosure index is prepared based on content analysis of disclosure made in the annual reports of a sample of 50 companies listed in the Nifty 50 index for the year 2018–2019. But in this paper 20 companies are eliminated due to their negative COEC and rest 30 companies are used as the sample companies for this study.

Findings – The outcome of this study indicates a negative association between the disclosure of intellectual capital (IC) as a whole and the COEC. But a negative association only for two components (human capital and structural capital) with the COEC is found only when the association of COEC with the categories of ICD is considered.

Originality/value – This is the first study that examines the nexus between the level of ICD and its impact on the COEC in India context.

Keywords Disclosure, IC disclosure, Cost of equity capital, IC disclosure index

Paper type Research paper

1. Introduction

In the globalization era, corporate governance is considered as an important part in analyzing the corporation. To fulfill the improved regulation and responsible corporate governance becomes more complex and dynamic (Glosten and Milgrom, 1985). The practices and quality of public disclosure of corporate governance of a corporation have been provided more importance to the stakeholders to know what is reported and how. To reduce risk and uncertainty associated with their investment, the stakeholders not only demand a large volume of information but also want good corporate governance as well as more corporate transparency through corporate information. So, disclosure is considered as an important element of good corporate governance as well as transparency about the corporate performance, operations, transactions and risk management (Barry and Brown, 1985;

Diamond and Verryecchia, 1991). Here disclosure refers to the publication of information relating to the business unit. According to the American Accounting Association, disclosure is a movement of information from private to public. In his study, Botosan (1997) argued that there is a negative correlation between the disclosure level and the cost of equity capital (COEC). Because it has been unanimously agreed that due to lack of disclosure and improper governance practice the stakeholders especially investors are faced with more risk and low confidence level arising from the information asymmetry and hence demands more return. By disclosing information in its annual report a firm communicates with its stakeholders about market liquidity (Glosten and Milgrom, 1985) as well as non-diversifiable estimation risk (Botosan, 2006).

In a highly competitive economic scenario, knowledge and information are considered as one of the crucial factors in a firm's value-creation process. Firms realize that to compete in such competition they have to be knowledgeable, innovative and full of organizational resources (Edvinsson and Malone, 1997). One of the approaches used in the assessment and measurement of knowledge-based assets is intellectual capital disclosure (ICD) (Guthrie and Petty, 2000). By disclosing such intellectual capital (IC), firms enhance their competitive power. IC may be defined as the intangible assets which create the value of the firm through the strength of internal information system, technological skills, skills of employees, the trust of customers and other such similar assets. By the various school of study IC is regarded as the hidden value which performs as the fuel to competitions (Edvinsson and Malone, 1997; Lev, 2001). According to Sullivan (2000), IC is defined as the knowledge which can be translated into future profit. But the traditional financial statement does not show all the information about the IC. To minimize the information asymmetry regarding this IC, a new form of corporate voluntary disclosure has emerged which is known as ICD (Rahman et al., 2019).

The researchers and practitioners categorize IC into three major heads – human capital, structural capital which is also termed as organizational capital and relational capital (Petty and Guthrie, 2000; Beattie and Thomson, 2007). Human capital may be defined as the knowledge, skill, ability and efficiency of an individual employee which can be developed by giving continuous training and development program (Bontis, 2001). On the other side structural capital is generated by the employees of the organization by their intellectual effort, organizational culture, strategies, processes, working systems and information (Martinez-Torres, 2006). Above mentioned two capitals are related to internally but the last one, i.e. relational capital, is related to the external world. Relational capital is associated with customer loyalty, image, reputations, branding, customer satisfaction and suppliers' relation, relation with other organization or environmental activities. Beattie and Thomson (2007) defined the relational capital as all the resources or assets connected with customers, suppliers, other organization and the external world of the firm.

Researchers opined that in the absence of any explicit measurement method of intangible assets, IC is measured by expanding the disclosure level of IC in the firm's annual reports (Guthrie and Petty, 2000). Madhani (2015) also argued that the new day's managers are conscious of the benefits of well-presented annual reports. The companies that disclose frequently and heavily about the IC information can get a competitive advantage to quit their competitors. However, in the Indian context, research is scarce regarding the impact of non-financial disclosure, specifically IC, as compared to financial disclosure in India.

The present study undertakes the initiative to analyze this unlighted portion. Thus, the primary objective of our study is to test the impact of ICD on the firm's COEC of listed companies under the NSE in the perspective of the Indian scenario. In this study, Nifty 50 companies are considered because the Nifty 50 is a well-diversified 50 companies accounting for 13 sectors of the Indian economy. But out of 50 companies, 30 companies are taken as the sample companies because the calculated COEC of 20 companies is giving negative results. In

the study, the ICD level is measured based on ICD index which is prepared by a disclosure checklist of 45 items (Bukh *et al.*, 2005; Li *et al.*, 2008) through content analysis of disclosure made in the annual report of Nifty 50 companies for the year 2018–19. Although the result of this study shows that there is a lower level of disclosure of IC information by the Indian firms, the COEC is negatively associated with the overall ICD level in general and human capital and structural capital in particular.

The remaining part of this paper is framed as follows.

Section 2 deals with the review of prior studies and the formulation of the research objective. Section 3 indicates about the hypothesis of the present study whereas Section 4 discusses the research methodology. Section 5 shows the research model, Section 6 represents the result of our study and Section 7 concludes the paper by mentioning some limitation of this paper.

2. Literature reviews

From the past few decades, several investigations had taken place by several theoretician and researchers on such relationship between disclosure and cost of equity. The theoretician provided evidence in support of disclosure effect on the cost of equity. They argued that with the extension of disclosure, information asymmetry reduces and therefore the cost of capital of the firm also reduces (Espinosa and Trombetta, 2007). Barry and Brown (1985) and Handa and Linn (1993) argued that more disclosure may decrease the cost of capital by decreasing the estimated non-diversifiable risk. As per agency theory, information asymmetry can be mitigated by disclosing better corporate report (Boubaker *et al.*, 2015).

Researchers like Amihud and Meldenson (1986) argued in their study that informed investor claims comparatively lower return than the uninformed investors to compensate for the risk associated with such information gap and thus reducing equity cost. However, Healy and Palepu (2001) indicated the motives of disclosing corporate information voluntarily to mitigate the estimation risk and eventually to reduce the cost of capital of the companies. The study results of Botosan and Plumlee (2002) argued that the equity cost and disclosure of financial information are negatively associated. Although the study stated that there is no association between the COEC and investors relation activities. In a study, Healy and Palepu (2001) examined the risk, raised from the information inadequacy or low-quality reporting and asserted that risk associated with the information is either diversifiable or taken over by the other risk factors and hence not priced. Easley *et al.* (2002) suggested that information risk is to be treated as a priced factor and different mechanisms for pricing of information risk and Easley and O'Hara (2004) showed that better quality reporting helps the investors to mitigate information risk which is faced by them. Francis *et al.* (2005) investigated on a sample of firms from 34 countries and argued that firms operating in industries and needs greater external finance have a high level of voluntary disclosure and that disclosure policy of the firm's leads to a lower cost of capital. The study results of Espinosa and Trombetta (2007) also provided evidence toward the negative relationship between the cost of equity and voluntary disclosure on the light of financial information for Spanish firm for the period 1999–2002. Lopes and Alencar (2010) also investigated the correlation between voluntary disclosure and the cost of capital for the firms having lower corporate governance. The result showed that firms would have enjoyed more benefits by disclosing additional and reliable information to create a separate identity from the country's norms and the firms easily collect the external sources of funds. However, they found that there is an explicit relation between non-financial disclosure and cost of capital.

Above discussion revealed that disclosure affects the equity costs by reducing information asymmetries and estimation risk. This proposition also supports the findings of Diamond and Verrecchia (1991). However, the above studies mainly explained the impact

of disclosure on the COEC considering traditional financial information. Other than financial information, empirical research also deals with the effects of non-financial information disclosure by the companies. In this line of research, the findings of Dhaliwal et al. (2011) confirm that CSR disclosure by the companies minimizes the equity costs. Plumlee et al. (2015) examined the impact of environmental disclosure and found a negative relationship between environment-related information disclosure and cost of equity. However, Clarkson et al. (2013) found that the relationship between environmental disclosure and cost of equity is statistically insignificant. The impact of carbon footprint disclosure on equity costs is examined by Albarrak et al. (2019) and their findings suggest that carbon footprint disclosure negatively impacts on the cost of equity. Garcia-Sanchez et al. (2017), Zhou et al. (2017), Vitolla et al. (2020) underline about the disclosure through integrated report reduces the cost of equity of different companies.

Researchers also examined the impact of IC related information disclosure and their impact on equity cost. In the knowledge economy, IC plays a vital role in long term value creation of companies. To gain such long term value-creation idea stakeholders are now demanding IC related information from the companies. An early study in this area by Hail (2002) empirically proved that the cost of equity is negatively correlated with the voluntary disclosure of IC information in annual reports of 73 Swiss firms. Orens et al. (2009) stated that the disclosure of IC information minimizes information asymmetries among stakeholders and lowers equity cost of the company. Kristandl and Bontis (2007) reported that forward-oriented information has a negative relationship with the COEC. A similar type of result is reported by Mangena et al. (2010) in a study on 126 British firms. Boujelbene and Affes (2013) examine the impact of information about major three components of IC namely human capital, structural capital and relational capital and their study reveal that information about human and structural capital have negative impact on the cost of equity but in case of relational capital, there has no impact. Mangena et al. (2014) reported that COEC is negative with the ICD of 125 UK firms and IC and financial disclosure interacts together in shaping the effects of COEC. However, the study results of Stropnik et al. (2017) revealed that lenders of Slovenian private organizations do not consider IC information for potential future cash flows.

From the above literature review, it is revealed that there is a direct nexus between non-financial information disclosure and cost of equity as well as firm value. Regarding ICD, which is the core theme in this study, very few studies examined the above nexus and they found a negative relation between ICD and equity costs. Therefore, the main objective of this study is to analyze the effect of ICD on the COEC of highly valued (market value) Indian companies. The study confined to Indian companies because till now no companies examined such relationship through various empirical studies prove that Indian companies are intellectually efficient (Ghosh and Mondal, 2009; Mondal and Ghosh 2012).

3. Hypothesis development

The relation between the disclosure level and the COEC of firms can be explained from the two streams' viewpoint. One stream assumes that firms which publish more information about their operation, activities and financial opportunities reduce information asymmetry among the users and investors. Otherwise, they stay in an environment of information asymmetry which leads to an adverse effect on the demand of shares (Diamond and Verrecchia 1991). Welker (1995) argued that investors avoid investing their money in the uninformed shares due to uncertainty in trading and potential losses arising from such trading. Hence, the liquidity of the shares reduces in the share market (Amihud and Mendelson, 1986). In such a situation investors will pay less forbearing high transaction cost, as a result, firms will also compel to issue its shares at a discount (Botosan, 2006). Whereas

Handa and Linn (1993) suggest that firms can lower the discount rate of issuing shares by minimizing the information asymmetry by improving the disclosure level. Moreover, firms with higher information asymmetry face higher bid-ask spreads due to lower market liquidity, leads to a higher COEC (Amihud and Mendelson, 1986). Similarly, Diamond and Verrecchia (1991) and Easley and O'Hara (2004) contend that by improving disclosure, firms enhance the liquidity of their shares thereby attracting increased demand for the shares, which not only increases share prices but also enhances the liquidity of the firm's shares.

The second stream of literature explains the relation between the disclosure level and the COEC from the viewpoint of the estimation of risk. Botosan (2006) argued that greater disclosure helps investors in reducing the estimation risk associated with investors' assessments of a share's return or payoff distribution. The logic behind it based on available information investors estimates the parameters of return from the firm's shares. This consequently lowers the required rate of return and in turn lower COEC (Barry and Brown, 1985; Handa and Linn, 1993). Barry and Brown (1985) point out that shares for which investors face information asymmetry, they demand an extra premium for taking the extra systematic risk. The lack of information leads to higher investors' risk (Lev, 2001; Healy and Palepu, 2001). The higher risk perception manifests itself in systematic undervaluation of a firm's shares by investors (Francis and Schipper, 1999; Lev, 2001). Hence, firms increasing disclosure reduce the required rate of return demanded by uninformed investors due to their uncertainty about the firm and this reduces the cost of capital.

In a knowledge-based economy, IC is considered as a crucial factor for the value-creation process. IC, which is considered as the total of all intangibles attributes residing in a firm, enhances the competitive advantages of the firm in the market place (Stewart, 1997). By disclosing more information about the IC the organizations represent their future wealth creation capabilities to investors (Botosan, 1997; Edvinsson and Malone, 1997). Beattie and Thomson (2007) argued that there are so many intangible assets such as employee efficiency, skill, knowledge, competencies, customer's relationship and management systems in an organization but they are not adequately reflected in the traditional financial statement. Such intangible assets are very essential for the growth of the organization. Due to such inadequacy of traditional financial statement investments in intangible assets (IC) has given rise to increasing information asymmetry between firms and users (Holland, 2003) which has increased opportunities for moral hazard, adverse selection and other opportunistic behavior by managers (Holland, 2006). Moreover, by reporting IC, firms can enjoy the opportunities to establish the trustworthiness of stakeholders, to mobilize market liquidity, to enhance reputation, to increase operational efficiency, employee motivation, morale and allocation of resources. A further benefit is that ICD reduces the information asymmetry which is faced by the investors in the capital markets and leads to lowers the cost of capital (Aboody and Lev, 2000; Lev, 2001).

Based on the above discussion, the following hypotheses can be concluded:

H1. ICD negatively associated with the COEC.

H2a. Human capital disclosure negatively associated with the COEC.

H2b. Relational capital disclosure negatively associated with the COEC.

H2c. Structural capital disclosure negatively associated with the COEC.

4. Research methodology
4.1 Sample selection and data sources
For this study, we analyzed the annual reports for the year 2018–19 of Indian companies listed in NSE and forming Nifty 50 index. These companies, included in Nifty 50 Index, captured the most significant market capitalization as on 31st March 2019. Out of 50

companies, the calculated COEC of 20 companies came out to be negative and thus we have eliminated those companies from the list. The finally selected sample companies are given in Table 1 below. Our study confined to one year for calculating ICD trend and ICD index. Since the trend of disclosure or information disclosed by the firm remains relatively constant over time (Healy *et al.*, 1995) and to make calculation simple.

The annual report is collected either from the respective company's website or from the website of NSE. In this research, the annual report is considered as the main source of data. The prior studies reported that the annual report is very important from the viewpoint of a firm as well as its users. Through the annual report, firms can provide a signal about their conditions and the users get relevant information for taking appropriate decision regarding their investment (Lang and Lundholm, 1993). FAPC (1992) confirms that annual reports are mostly used by financial analysts while analyzing firms, type of financial statement is only a supplement. For details about the sample companies please click this link https://drive. google.com/drive/folders/1wAlZBMMu5fbit3IIhZwl9vnBjVfJfQJu?usp=sharing.

4.2 Measurement of disclosure level (independent variable)
In this study to measure ICD level, a self-constructed disclosure checklist has been prepared based on the information disclosed in the annual reports. The selections of items, used in the checklist of measuring the level of ICD, are developed by considering prior ICD studies (Botosan, 1997; Bukh *et al.*, 2005). The checklist comprises of 45 items. In calculating the disclosure level index, a score is given based on the nature of disclosure of a specific item. If the item is disclosed descriptively, the item scores 1 whereas if the item is disclosed numerically, the item scores 2 and when the item is disclosed in both, then the item scores 3. Alternatively, if the item is not disclosed, it scores 0.

The disclosure index is prepared by dividing the sum of actual disclosure scores of each item of disclosure by the maximum score of all items of the disclosure. Here the actual disclosure scores are given based on content analysis of disclosure made in the annual reports and the maximum score is also calculated by multiplying total numbers of items in the checklist with the maximum score value.

As per the objectives of this study, ICD items are divided into three components, namely human capital, relational capital and structural capital.

4.3 Measurement of cost of equity capital (dependent variable)
The COEC is the rate of return which equates the present value of expected dividends with the market share price. The COEC is the minimum rate of return that investors expect to earn in future (Botosan, 2006).

In the finance literature, there are many alternative methods of estimating the COEC. The easiest and earliest way of estimating the equity cost is based on average realized returns. Fama and French (1992) indicated that average realized returns are unable to proxy for the

	Mean	Std. deviation	N
COEC	0.1715	0.1964	30
ICD	0.3511	0.0721	30
HCD	0.4083	0.0811	30
RCD	0.3248	0.0729	30
SCD	0.3120	0.1059	30
SIZE	12.0380	0.7661	30
LEV	0.5355	0.9206	30
IND	0.5000	0.5085	30

Table 1.
Descriptive statistics

cost of equity by establishing a significant association between the risk and return. Lakonishok (1993) reported that at least 70 years data would be required to establish a statistically significant correlation with market beta. Hence the approach is not suitable for estimating equity cost specifically for limited samples like this study.

Botosan (2006) classified the second class of approaches of establishing the cost of equity share capital by applying the internal rate of return that equates the present value of future cash flows with the current market price. This class consists of the residual income model (Gebharht et al., 1999); the abnormal earning growth model (Gode and Mohanram, 2003); the price earning growth model (Easton, 2004). All these methods use an extensive level of accounting forecast in estimating the equity cost (Lee et al., 2004).

The choice of useful method not only depends on the application but also the availability of data (Gietzmann and Ireland, 2005; Lee et al., 2004). Cooper (2006) suggested that results should not significantly influence with the use of the method and thus, it is the relative differences in estimating the COEC among firms, rather than the accuracy of the absolute measures of equity cost that matters.

One is to estimate the COEC with the capital assets pricing model (hereafter CAPM) which estimate the equity cost as the sum of risk-free rate (R_f) and the product of market beta (β) and a risk premium ($R_m - R_f$), the excess of market return (R_m) over the risk-free rate. In respect of Indian sample, the CAPM is used to measure the COEC to mitigate the limitation of other methods as well as lack of data. This model has the following form:

$$K_e = R_f + \beta(R_m - R_f)$$

where,

K_e = Cost of equity capital,

R_f = Risk-free rate,

R_m = Market return,

β = Coefficient of non-diversifiable risk

In this study, the average 10 years government securities yields rates, published by RBI, are considered as the risk-free rate of return. The rest, beta coefficient and market return are obtained from the MoneyControl website.

4.4 Control variables

Some control variables are incorporated in this research work to get better results of the correlation between the above mention dependent and independent variables by control their influences on the COEC.

4.4.1 Size of the firm. It is denoted by *Size*. In the present study market capitalization has been used as a measure of size. The size of the firm is considered as a proxy measure of the level of disclosure of information. Larger firms disclose more information than smaller firms (El-Bannany, 2013). Thus more informative investors have a better ability to predict the risk, associated with the firm (Mangena et al., 2010). By staying within the line Inchausti (1997) suggested that large companies trend to disclosure more progressive and innovative information to mitigate agency cost than the smaller companies. Hence a negative correlation exists between the firm size and the COEC (Botosan, 1997; Hail, 2002; Mangena et al., 2010).

4.4.2 Leverage. It is denoted by *Lev*. In this study, leverage is used as a yardstick of disclosure of financial leverage. It is measured by the debt-equity. White et al. (2007) suggested that to take more debts firms will publish more information in regards to global reporting practices. Debt holders, creditors and other external parties demand more

information to mitigate their risk (Arvidsson, 2003). Where, Jensen and Meckling (1976) argued that firms with a higher degree of leverage have higher agency cost, arising from higher financial anxiety. Companies with high leverage are expected to disclose more information voluntary to measure the risk, associated with it. Consequently, it can be said that there is a positive association between the cost of capital and the disclosure of financial leverage (Cheng *et al.*, 2006; Orens *et al.*, 2009).

4.4.3 Industry. It is denoted by *Ind*. Earlier studies conducted by Guthrie and Petty (2000); Oliveira *et al.* (2006) indicated that industry to which the firm belongs to have a great influence on the disclosure level not only to improve competition power but also to eliminate information asymmetry across the industries. The COEC is a positive association with the degree of information asymmetry (Amihud and Meldenson, 1986; Healy and Palepu, 2001; Barry and Brown, 1985).

5. Research model
The present paper uses the following two research models for testing hypotheses postulated above:

$$COEC = \beta_0 + \beta_1 ICD + \beta_2 Size + \beta_3 Lev + \beta_4 Ind + \varepsilon \quad (1)$$

$$COEC = \beta_0 + \beta_1 HCD + \beta_2 RCD + \beta_3 SCD + \beta_4 Size + \beta_5 Lev + \beta_6 Ind + \varepsilon \quad (2)$$

where:

COEC = cost of equity capital, ICD = intellectual capital disclosure, HCD = human capital disclosure, RCD = relational capital disclosure, SCD = structural capital disclosure, *Size* = firm size, *Lev* = leverage, *Ind* = industry type

6. Research findings
The objective of this research work is to analyze the effect of ICD on the COEC in the perspective of Indian companies after considering 50 companies listed in Nifty 50. But 20 companies are eliminated due to their negative results of the calculated COEC and the rest 30 companies are conceded for this present study.

6.1 Descriptive statistics
The information about the descriptive statistics is presented in Table 1 of overall ICD and disclosure of three categories of IC, respectively.

Table 1 shows that Indian firms provide a low level of information about IC in their annual reports because the mean of total ICD is 35.11 %. The result is consistent for the disclosure of relational capital (RC) and structural capital (SC) as per the result of Table 2. But the mean value of human capital (HC) disclosure is 40.83%, indicate that firms seem to disclose significantly high levels of HC disclosure as compare to the other two categories of IC. However, the results are consistent with the findings of Mondal and Ghosh (2013, 2014), Mehrotra *et al.* (2017) where they also reported about the lower level of ICD by the Indian companies. Moreover, this also suggests that firms believe that investors are more interested to know about the human capital than the relational capital and structural capital.

6.2 Colinearity statistics
We conducted different tests for multicollinearity and the results are shown in Table 2 and from the correlation result we can conclude that all the predictors are free from multicollinearity because all the values are below 0.8. Moreover, the value of variance inflation factors (VIFs) lies between the ranges of 1.166–1.448 for model-1 and 1.213 to 2.176 for model-2. Hence we can say that all the predictors are free from multicollinearity because

all the values are below 10. According to Myers (1990), if the VIFs are less than 10 the effect of multicollinearity is insignificant for a regression. Thus, it can be concluded that multicollinearity is insignificant in the interpretation of our results.

6.3 Regression results
Multiple regression results of model 1 and model 2 are presented in Tables 3(a) and (b) respectively. In Table 3(a) multiple regression results taking aggregate ICD as an independent variable and in Table 3(b) three components of IC are taken as independent variables.

With the help of summary of regression results, shown in Tables 3(a) and (b), we examine the fitness or goodness of regression equation. The values of *F*-test, 5.858 and 4.414 for overall ICD and all categories of ICD, respectively, represent 5% significant level. The adjusted R^2 is 0.401 for the total IC and 0.414 for all categories of IC. These results interpret that the model can explain about 40.1 per cent of the variance in the dependent variable for the overall ICD and 41.4 per cent for all forms of ICD.

The results of the multivariate regression of the association between the COEC and the level of ICD of the firms are shown in Table 3(a). In this table beta represents the results of the coefficients of regression of independent variable, using the COEC as the dependent variable. The table also shows that the regression coefficient of total ICD has a negative relationship with the COEC. This result supports the H1 though it is not statistically significant and confirms that IC plays a major role in reducing the COEC. A similar type of result was also observed by Mangena *et al.* (2010) among the UK companies and Boujelbene and Affes (2013) among the French companies.

Whereas, the Table 3(b) shows the results of multiple regression between the COEC and the disclosure of all categories of IC. In this table, the value of beta also represents the same interpretation as mentioned earlier that is, results of the coefficients of regression for all independent variables. The regression coefficients of HC disclosure and SC disclosure are −0.339 and −0.001 respectively which are indicated that there has a negative association of HCD and SCD with the COEC. However, the negative association of HCD is significant. But RC disclosure coefficient is 0.138 that indicate a positive relationship between the RC disclosure and the COEC of sample companies. Hence, these results support hypotheses H2a and H2c but do not support H2b. Our empirical results also show that control variables like size, leverage and industry type are significantly and positively related to the cost of equity.

7. Conclusion
The objective of our study is to analyze the effect of ICD on the COEC in the perspective of selected Indian companies. Alternatively, the present study is undertaken to examine the correlation between IC related information disclosure and the COEC of 30 companies and the only one-year annual report is considered for checking ICD. Simple multiple regression analysis is applied to examine the nexus between the dependent variable and independent variables. Although the

	ICD	HCD	RCD	SCD
COEC	−0.4**	−0.48**	−0.173**	−0.361**
SIZE	−0.08*	−0.089*	−0.017*	−0.098*
LEV	−0.529**	−0.453**	−0.39**	−0.505**
IND	−0.181**	−0.226**	−0.064*	−0.169**
Note(s): Here, "*" indicates significant at 1% level and "**" indicates significant at 5% level respectively				

Table 2.
Correlations of variables

(a) Regression result for model -1			
	Beta	t-statistic	VIF
Intercept		−1.161	
ICD	−0.172	−1.014	1.4
SIZE	0.264	1.69***	1.166
LEV	0.282	1.63***	1.448
IND	0.315	2.01**	1.187
Adj. R^2	0.401		
F-Stat	5.858*		
D/W stat	2.241		

(b) Regression result for model-2			
	Beta	t-statistic	VIF
Intercept		−1.043	
HCD	−0.339	1.692***	1.981
RCD	0.138	0.767	1.612
SCD	−0.001	−0.005	2.176
SIZE	0.263	1.71***	1.68
LEV	0.282	1.64***	1.461
IND	0.278	1.778**	1.213
Adj. R^2	0.414		
F-Stat	4.414*		
D/W stat	2.141		

Note(s): Here, "*" indicates significant at 1% level, "**" indicates significant at 10% level and "***" indicates significant at 1o% level respectively

Table 3.
Regression results

results of this study show that there is a lower level of disclosure of IC information by the Indian companies and the COEC is negatively associated with the overall ICD level. But if we consider the relation of COEC with the categories of ICD, we find that there is a negative association only for two components (human capital and structural capital) with the COEC. However, the statistical relationship between RCD with the COEC is not validated our hypothesis.

This study contributes to the literature by providing evidence of the relationship between the COEC and ICD in the context of Indian companies. The findings of this study are also of considerable importance to both policymakers and firms. From the results of this study, we can be concluded that firms having more disclosure level of IC benefit more from a lower COEC than the firms with a lower level of IC. Moreover, from the increased ICD stakeholders also benefit in terms of availability of more relevant information and therefore minimizing the collection cost of private information. This is very significant to the policymakers because it helps policymakers to evaluate the costs and advantages of disclosure level. Moreover from the findings of this study, managements are also benefited not only with insights into the effects of enhancing disclosure of IC information on their COEC but also have an idea into the ICD categories that are more relevant to investors in valuing firms.

Though the findings of this study facilitate in many ways to the existing literature, there are some limitations in this study. The first limitation relates to the period of the study. In this study, the disclosure level of IC is measured for only one year. The second limitation concerns the calculation of the COEC using the CAPM model. To measure the COEC, we used calculated beta (β). The third limitation concerns the sample size. It is restricted to 30 companies which are relatively very small and restricted within one year only. Another limitation of this study is that the study is only concerned with the COEC which is one component of the overall cost of capital. Because of these limitations of the study care should be taken before generalization of the findings of the study.

Limitations of the study extend the scope of further research by expending the sample size covering a long period with a different model for measuring the COEC. Further research work can also be extended by taking the cost of debt, another part of the overall cost of capital.

References

Aboody, D. and Lev, B. (2000), "Information asymmetry, R&D, and insider gains", *The Journal of Finance*, Vol. 55 No. 6, pp. 2747-2766, doi: 10.1111/0022-1082.00305.

Albarrak, M.S., Elnahass, M. and Salama, A. (2019), "The effect of carbon dissemination on cost of equity", *Business Strategy and the Environment*, Vol. 28 No. 6, pp. 1179-1198.

Amihud, Y. and Mendelson, H. (1986), "Asset pricing and the bid-ask spread", *Journal of Financial Economics*, Vol. 17 No. 2, pp. 223-249, doi: 10.1016/0304-405x(86)90065-6.

Arvidsson, S. (2003), *The Extent of Disclosure on Intangibles in Annual Reports*, Lund University, available at: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.587.3259&rep=rep1&type=pdf.

Barry, C. and Brown, S. (1985), "Differential information and security market equilibrium", *Journal of Financial and Quantitative Analysis*, Vol. 20 No. 4, pp. 407-422, doi: 10.2307/2330758.

Beattie, V. and Thomson, S.J. (2007), "Lifting the lid on the use of content analysis to investigate intellectual capital disclosures", *Accounting Forum*, Vol. 31, pp. 129-163.

Bontis, N. (2001), "Assessing knowledge assets: a review of the models used to measure intellectual capital", *International Journal of Management Reviews*, Vol. 3 No. 1, pp. 41-60.

Botosan, C.A. (1997), "Disclosure level and the cost of equity capital", *Accounting Review*, Vol. 72 No. 3, pp. 323-349.

Botosan, C.A. (2006), "Disclosure and the cost of equity capital: what do we know?", *Accounting and Business Research (International Accounting Policy Forum)*, Vol. 36 Sup 1, pp. 31-40.

Botosan, C.A. and Plumlee, M.A. (2002), "A re-examination of disclosure level and the expected cost of equity capital", *Journal of Accounting Research*, Vol. 40 No. 1, pp. 21-40.

Boubaker, S., Hamrouni, A. and Liang, Q. (2015), "Corporate governance, voluntary disclosure, and firm information environment", *Journal of Applied Business Research*, Vol. 31 No. 1, pp. 89-101.

Boujelbene, M.A. and Affes, H. (2013), "The impact of intellectual capital disclosure on cost of equitycapital: a case of French firms", *Journal of Economics, Finance and Administrative Science*, Vol. 18 No. 34, pp. 45-53.

Bukh, P.N., Nielsen, C., Gormsen, P. and Mouritsen, J. (2005), "Disclosure of information on intellectual capital in Danish IPO prospectuses", *Accounting, Auditing and Accountability Journal*, Vol. 18 No. 6, pp. 713-32.

Cheng, C.S., Collins, D. and Huang, H. (2006), "Shareholder rights, financial disclosure and the cost of equity capital", *Review of Quantitative Finance and Accounting*, Vol. 27 No. 2, pp. 175-204.

Clarkson, P.M., Fang, X., Li, Y. and Richardson, G. (2013), "The relevance of environmental disclosures: are such disclosures incrementally informative?", *Journal of Accounting and Public Policy*, Vol. 32 No. 5, pp. 410-431.

Cooper, S. (2006), "Discussion of disclosure and the cost of capital: what do we know?", *Accounting and Business Research (International Accounting Policy Forum)*, Vol. 36 sup1, pp. 41-42.

Dhaliwal, D.S., Li, O.Z., Tsang, A. and Yang, Y.G. (2011), "Voluntary nonfinancial disclosure and the cost of equity capital: the initiation of corporate social responsibility reporting", *The Accounting Review*, Vol. 86 No. 1, pp. 59-100.

Diamond, D. and Verrecchia, R. (1991), "Disclosure, liquidity and the cost of capital", *Journal of Finance*, Vol. 46 No. 4, pp. 1325-1359.

Easley, D. and O'Hara, M. (2004), "Information and the cost of capital", *Journal of Finance*, Vol. 59 No. 4, pp. 1553-1583, doi: 10.1111/j.1540-6261.2004.00672.x.

Easley, D., Hvidkjaer, S. and O'Hara, M. (2002), "Is information risk a determinant of asset returns?", *Journal of Finance*, Vol. 57 No. 5, pp. 2185-2121, doi: 10.1111/1540-6261.00493.

Easton, P.D. (2004), "PE ratios, PEG ratios, and estimating the implied expected rate of return on equity capital", *The Accounting Review*, Vol. 79 No. 1, pp. 73-95.

Edvinsson, L. and Malone, M. (1997), *Intellectual Capital*, Harper Business, New York, NY.

El-Bannany, M. (2013), "A model to explain intellectual capital disclosure in UAE banks", *International Journal of Learning and Intellectual Capital*, Vol. 10 No. 1, pp. 35-51.

Espinosa, M. and Trombetta, M. (2007), "Disclosure interactions and the cost of equity capital: evidence from the Spanish continuous market", *Journal of Business Finance and Accounting*, Vol. 34 Nos 9 and 10, pp. 1371-1392, doi: 10.1111/j.1468-5957.2007.02064.x.

Fama, E.F. and French, K.R. (1992), "The cross section of expected stock returns", *Journal of Finance*, Vol. 47 No. 2, pp. 427-465, doi: 10.1111/j.15406261.1992.tb04398.x.

Financial Accounting Policy Committee (1992), "Financial reporting in the 1990s and beyond: an executive summary", *Financial Analysts Journal*, Vol. 48 No. 6, pp. 21-23, doi: 10.2469/faj.v48.n6.21.

Francis, J. and Schipper, K. (1999), "Have financial statements lost their relevance?", *Journal of Accounting Research*, Vol. 37 No. 2, pp. 319-353.

Francis, J.R., Khurana, I.K. and Pereira, R. (2005), "Disclosure incentives and effects on cost of capital around the world", *Accounting Review*, Vol. 80 No. 4, pp. 1125-1162, doi: 10.2308/accr.2005.80.4.1125.

García-Sánchez, María, I. and Noguera-Gámez, L. (2017), "Integrated reporting and stakeholder engagement: the effect on information asymmetry", *Corporate Social Responsibility and Environmental Management*, Vol. 24 No. 5, pp. 395-413.

Gebhardt, W., Lee, C. and Swaminathan, B. (1999), "Toward an implied cost of capital", Working Paper, Cornell University, New York. doi: 10.1111/1475-679X.00007.

Ghosh, S.K. and Mondal, A. (2009), "Indian software and pharmaceutical sector IC and financial performance", *Journal of Intellectual Capital*, Vol. 10 No. 3, pp. 369-388, doi: 10.1108/14691930910977798.

Gietzmann, M.B. and Ireland, J. (2005), "Cost of capital, strategic disclosures and accounting choice", *Journal of Business Finance and Accounting*, Vol. 32 Nos 3-4, pp. 599-634, doi: 10.1111/j.0306-686X.2005.00606.x.

Glosten, L. and Milgrom, P. (1985), "Bid, ask and transaction prices in a specialist market with heterogeneously informed traders", *Journal of Financial Economics*, Vol. 14, pp. 71-100, doi: 10.1016/0304-405X(85)90044-3.

Gode, D. and Mohanram, P. (2003), "Inferring the cost of capital using the Ohlson-Juettner model", *Review of Accounting Studies*, Vol. 8, pp. 399-431, doi: 10.1023/A:1027378728141.

Guthrie, J. and Petty, R. (2000), "Intellectual capital: Australian annual reporting practices", *Journal of Intellectual Capital*, Vol. 1 No. 3, pp. 241-251, doi: 10.1108/14691930010350800.

Hail, L. (2002), "The impact of voluntary corporate disclosures on the ex-ante cost of capital for Swiss firms", *European Accounting Review*, Vol. 11 No. 4, pp. 741-773, doi: 10.1080/0963818022000001109.

Handa, P. and Linn, S. (1993), "Arbitrage pricing with estimation risk", *Journal of Financial and Quantitative Analysis*, Vol. 28 No. 1, pp. 81-100, doi: 10.2307/2331152.

Healy, P. and Palepu, K. (2001), "Information asymmetry, corporate disclosure, and the capital markets: a review of the empirical disclosure literature", *Journal of Accounting and Economics*, Vol. 31, pp. 405-440, doi: 10.1016/S0165-4101(01)00018-0.

Healy, P., Palepu, K. and Sweeney, A. (1995), "Do firms benefit from expanded voluntary disclosure?", Working Paper, MIT Sloan School of Management, Cambridge, MA.

Holland, J. (2003), "Intellectual capital and the capital market- organization and competence", *Accounting, Auditing and Accountability Journal*, Vol. 16 No. 1, pp. 39-48, doi: 10.1108/09513570310464264.

Holland, J. (2006), "Fund management, intellectual capital, intangibles and private disclosure", *Managerial Finance*, Vol. 32 No. 4, pp. 277-316, doi: 10.1108/03074350610652242.

Inchausti, B.G. (1997), "The influence of company characteristics and accounting regulation on information disclosed by Spanish firms", *The European Accounting Review*, Vol. 6 No. 1, pp. 45-68, doi: 10.1080/096381897336863.

Jensen, M.C. and Meckling, W.H. (1976), "Theory of the firm: managerial behavior, agency costs and ownership structure", *Journal of Financial Economics*, Vol. 3 No. 4, pp. 305-60, doi: 10.1016/0304-405X(76)90026-X.

Kristandl, G. and Bontis, N. (2007), "The impact of voluntary disclosure on cost of equity capital estimates in a temporal setting", *Journal of Intellectual Capital*, Vol. 8 No. 4, pp. 577-94, doi: 10.1108/14691930710830765.

Lakonishok, J. (1993), "Is beta dead or alive?", *The CAPM Controversy: Policy and Strategy Implications for Investment Management*, AIMR, New York, NY.

Lang, M. and Lundholm, L. (1993), "Cross-sectional determinants of analysts' ratings of corporate disclosures", *Journal of Accounting Research*, Vol. 37 No. 2, pp. 353-383.

Lee, C., Ng, D. and Swaminathan, B. (2004), "International asset pricing: evidence from the cross section of implied cost of capital", Cornell University, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=485762.

Lev, B. (2001), *Intangibles: Management, Measurement and Reporting*, The Brookings Institution Press, Washington, DC.

Li, J., Pike, R. and Haniffa, R. (2008), "Intellectual capital disclosure and corporate governance structure in UK firms", *Accounting and Business Research*, Vol. 38 No. 2, pp. 137-159, doi: 10.1080/00014788.2008.9663326.

Lopes, A.B. and Alencar, R.C. (2010), "Disclosure and cost of equity capital in emerging markets: the Brazilian case", *The International Journal of Accounting*, Vol. 45 No. 4, pp. 443-464, doi: 10.1016/j.intacc.2010.09.003.

Madhani, P.M. (2015), "A study on the corporate governance and disclosure practices of tangible assets and intangible assets-dominated firms and their relationship", *The IUP Journal of Corporate Governance*, Vol. 14 No. 2, pp. 7-29.

Mangena, M., Pike, R.H. and Li, J. (2010), *Intellectual Capital Disclosure Practices and Effects on the Cost of Equity Capital: UK Evidence*, The Institute of Chartered Accountants of Scotland, Edinburgh.

Mangena, M., Li, J. and Tauringana, V. (2014), "Disetangling the effects of corporate disclosure on the cost of equity capital: a study of the role of intellectual capital disclosure", *Journal of Accounting, Auditing and Finance*, Vol. 31 No. 1, pp. 3-27, doi: 10.1177/0148558X14541443.

Martinez-Torres, M.R. (2006), "A procedure to design a structural and measurement model of intellectual capital: an exploratory study", *Information and Management*, Vol. 43 No. 5, pp. 617-626, doi: 10.1016/j.im.2006.03.002.

Mehrotra, V., Malhotra, A.K. and Pant, R. (2017), "Intellectual Capital disclosure by the Indian corporate sector", *Global Business Review*, Vol. 19 No. 2, pp. 1-17, doi: 10.1177/0972150917713562.

Mondal, A. and Ghosh, S.K. (2012), "Intellectual capital and financial performance of Indian Banks", *Journal of Intellectual Capital*, Vol. 13 No. 4, pp. 51-530, doi: 10.1108/14691931211276115.

Mondal, A. and Ghosh, S.K. (2013), "Intellectual capital reporting trends in India: an empirical study on selected companies", *International Journal of Financial Management*, Vol. 3 No. 1, pp. 9-18.

Mondal, A. and Ghosh, S.K. (2014), "Determinants of intellectual capital disclosure practices of Indian companies", *Journal of Commerce and Accounting Research*, Vol. 3 No. 1, pp. 25-35.

Myers, R.H. (1990), *Classical and Modern Regression with Applications*, PWS-Kent Publishing, Boston.

Oliveira, L., Rodrigues, L.L. and Craig, R. (2006), "Firm-specific determinants of intangibles reporting: evidence from the Portuguese stock market", *Journal of Human Resource Costing and Accounting*, Vol. 10 No. 1, pp. 11-33.

Orens, R., Aerts, W. and Lybaert, N. (2009), "Intellectual capital disclosure, cost of finance and firm value", *Management Decision*, Vol. 47 No. 10, pp. 1536-1554, doi: 10.1108/00251740911004673.

Petty, R. and Guthrie, J. (2000), "Intellectual capital literature review: measurement, reporting and management", *Journal of Intellectual Capital*, Vol. 1 No. 2, pp. 155-76, doi: 10.1108/14691930010348731.

Plumlee, M., Brown, D., Hayes, R.M. and Marshall, R.S. (2015), "Voluntary environmental disclosure quality and firm value: further evidence", *Journal of Accounting and Public Policy*, Vol. 34 No. 4, pp. 336-361, doi: 10.1016/j.jaccpubpol.2015.04.004.

Rahman, M.M., Sobhan, R. and Islam, M.S. (2019), "The impact of intellectual capital disclosure on firm performance: empirical evidence from pharmaceutical and chemical industry of Bangladesh", *Journal of Asian Finance, Economics and Business*, Vol. 7 No. 2, pp. 119-129.

Stewart, T.A. (1997), *Intellectual Capital - the New Wealth of Organizations*, Nicholas Brealey, London.

Stropnik, N., Korošec, B. and Tominc, P. (2017), "The relationship between the intellectual capital disclosure and cost of debt capital – a case of slovenian private audited organisations", *Naše gospodarstvo/Our Economy*, Vol. 63 No. 4, pp. 3-16, doi: 10.1515/ngoe-2017-0019.

Sullivan, P.H. (2000), *Value-driven Intellectual Capital: How to Convert Intangible Corporate Assets into Market Value*, Wiley, New York, NY.

Vitolla, F., Salvi, A., Raimo, N., Petruzzella, F. and Rubino, M. (2020), "The impact on the cost of equity capital in the effects of integrated reporting quality", *Business Strategy and the Environment*, Vol. 29 No. 2, pp. 519-529.

Welker, M. (1995), "Disclosure policy, information asymmetry and liquidity in equity markets", *Contemporary Accounting Research*, Vol. 11 No. 2, pp. 801-828.

White, G., Lee, A. and Tower, G. (2007), "Drivers of voluntary intellectual capital disclosure in listed biotechnology firms", *Journal of Intellectual Capital*, Vol. 8 No. 3, pp. 517-537, doi: 10.1108/14691930710774894.

Zhou, S., Simnett, R. and Green, W. (2017), "Does integrated reporting matter to the capital market?", *Abacus*, Vol. 53 No. 1, pp. 94-132, doi: 10.1111/abac.12104.

Further reading

Amir, E. and Lev, B. (1996), "Value-relevance of non-financial information: the wireless communications industry", *Journal of Accounting and Economics*, Vol. 22 Nos 1-3, pp. 3-30, doi: 10.1016/S0165-4101(96)00430-2.

Bontis, N., Keow, C.C.W. and Richardson, S. (2000), "Intellectual capital and business performance in Malaysian industries", *Journal of Intellectual Capital*, Vol. 1 No. 1, pp. 85-100.

Ousama, A.A., Fatima, A.H. and Majdi, A.R.H. (2012), "Determinants of intellectual capital reporting: evidence from annual reports of Malaysian listed companies", *Journal of Accounting in Emerging Economies*, Vol. 2 No. 2, pp. 119-139, doi: 10.1108/20421161211229808.

Pike, S., Rylander, A. and Roos, G. (2000), "Intellectual capital management and disclosure", available at: www.intcap.com/ICS_Article_2000_ intellectual capital_Mgt_&_Discsloure.pdf.

Verrecchia, R.E. (2001), "Essays on disclosure", *Journal of Accounting and Economics*, Vol. 32 Nos 1-3, pp. 97-180, doi: 10.1016/S0165-4101(01)00025-8.

Zeghal, D. and Maaloul, A. (2011), "The accounting treatment of intangibles – a critical review of the literature", *Accounting Forum*, Vol. 35 No. 4, pp. 262-274, doi: 10.1016/j.accfor.2011.04.003.

Appendix

Sr. No	Name of companies
1	RELIANCE INDUSTRIES LTD
2	TATA CONSULTANCY SERV LT
3	HDFC BANK LTD
4	HINDUSTAN UNILEVER LTD.
5	ICICI BANK LTD.
6	KOTAK MAHINDRA BANK LTD
7	INFOSYS LIMITED
8	STATE BANK OF India
9	ITC LTD
10	BAJAJ FINANCE LIMITED
11	AXIS BANK LIMITED
12	LARSEN and TOUBRO LTD.
13	ASIAN PAINTS LIMITED
14	HCL TECHNOLOGIES LTD
15	BAJAJ FINSERV LTD.
16	WIPRO LTD
17	INDIAN OIL CORP LTD
18	NTPC LTD
19	AVENUE SUPERMARTS LIMITED
20	BHARAT PETROLEUM CORP LT
21	TITAN COMPANY LIMITED
22	SUN PHARMACEUTICAL IND L
23	POWER GRID CORP. LTD.
24	DABUR India LTD
25	TECH MAHINDRA LIMITED
26	SHREE CEMENT LIMITED
27	BRITANNIA INDUSTRIES LTD
28	PIDILITE INDUSTRIES LTD
29	GODREJ CONSUMER PRODUCTS
30	ICICI LOMBARD GIC LIMITED

Table A1.
List of sample
companies

Corresponding author
Amitava Mondal can be contacted at: amitavakalna@gmail.com