The Role of Firms’ Life Cycle Stages on Voluntary Disclosure and Cost of Equity Capital in Brazilian Public Companies*

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ABSTRACT

We examine the effects of firms’ life cycle stages on voluntary disclosure and the cost of equity capital and also the relationship between the interaction of life cycle stages and voluntary disclosures measures on cost of equity capital. Our sample consists of non-financial Brazilian public companies covered by analysts between 2008 and 2014 collected from I/B/E/S and Comdinheiro databases. We find that voluntary disclosure level is higher for firms in maturity and growth stages. We also find that introduction and decline firms show higher implied cost of capital, however decline firms that increase voluntary disclosure reduce their cost of capital. Moreover, mature firms significantly reduce such inherent risk by reporting social and environmental voluntary information. Our results are useful for investors, practitioners and regulators to the understanding the incentives of voluntary disclosure practices.

Keywords: Voluntary disclosure, Cost of equity capital, Implied cost of capital, Life cycle stages, Emerging Market.

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1. INTRODUCTION

Voluntary disclosure is a firm’s communication channel to reduce information asymmetry in addition to the mandatory financial reporting. Empirical and analytical studies on voluntary disclosure show a negative relationship between voluntary disclosure and cost of equity capital (Botosan, 1997; Dhaliwal, Li, Tsang, and Yang, 2011; Diamond and Verrecchia, 1991; Francis, Nanda, and Olsson, 2008). Botosan (2006) argues that great disclosure reduces cost of capital, however she argues that it is still a controversial issue in both practical and academic areas.

The literature has documented that the risk assumed by capital suppliers is a function of different structures and strategies observed within the firm (Al-Hadi, Hasan, & Habib, 2016; Anthony & Ramesh, 1992; Hasan & Habib, 2017) and recent life cycle literature helps to explain the association between firms’ life cycle and cost of capital. For instance, the cost of capital is higher for introduction and decline firms and lower for growth and mature firms (Hasan et al., 2015). In such case, life cycle stages capture the perceived risk of firms that is reflected in the estimated cost of capital.

We examine the economic function on the relationship between voluntary disclosure and cost of equity capital over firms’ life cycle stages in Brazilian public companies covered by analysts. We also examine three measures of voluntary disclosure to capture different properties of disclosure on cost of capital.

We hypothesize that on equilibrium the cost of capital is lower because investors are better informed and consequently, liquidity is higher and the cost to obtain private information is lower. Then, in this scenario, there is no need for additional information (voluntary disclosure). On the other hand, managers have incentives to withhold and/or delay the disclose of bad news (Kothari, Li, & Short, 2009; Skinner, 1994), by increasing information asymmetry in the market, consequently increasing the cost to obtain private information.

The information environment plays an important role on asset pricing and its quality shapes the cost and benefits of disclosure as well as market participants decisions (Beyer, Cohen, Lys, & Walther, 2010; Kothari & Verdi, 2016). We argue that life cycle stages change firms information environment since there are different incentives to disclose voluntary information and, at the same time, each life cycle stage affects cost of equity capital (Dickinson, 2011; Hasan, Hossain, Cheung, & Habib, 2015; Jovanovic, 1982; Jovanovic & MacDonald, 1994).

Our research design addresses firms’ life cycle stages as a factor that drives the relation between voluntary disclosure and cost of equity capital on each firm differently. We posit that firms’
voluntary disclosure shifts the cost of capital over life cycle stages comparing to mature firms, whose the cash flow generation is expected to be more predictable and consequently there is stable information environment with high level of scrutiny from investors and analysts (Kothari and Verdi, 2016).

We use three measures of voluntary disclosure to capture different properties of disclosure ((i) full disclosure that considers the (ii) economic and financial disclosure and (iii) social and environmental disclosure) following Botosan (1997), Dhaliwal et al. (2011), Eng and Mak (2003) Francis et al. (2008) and Almeida and Rodrigues (2016). The underlying idea to explore different properties of voluntary disclosure is related to life cycle stages incentives to disclose private information aiming to reduce cost of equity capital. For instance, firms in mature stage have lower uncertainty about cash flow generation (Hamman & Steyn Bruwer, 2005; Singh & Faircloth, 2005), then market participants could be more interested in social and environmental issues than in economic and financial voluntary information. At the same time, introduction or decline firms could address more effort to disclose economic and financial information than social and environmental as a way to reduce cost of equity capital.

We examine the Brazilian setting due to its relevance in the group of BRICS countries, strong government intervention, poor institutional environment and low level of transparency (Almeida and Dalmácio, 2015; Beiruth, Fávero, Murcia, Almeida, and Brugni, 2017; Lopes and Alencar, 2010). Zhao & Xiao (2018) believe that this scenario of different agency problems presented in developing countries contribute even more to raise the financial constraint, but the way the information is shared shapes the relationship among market participants. Aerts, Cormier & Magnan (2007) and Chauhan & Kumar (2018) show that both market analysts and investors of emerging markets consider nonfinancial information on valuation functions.

We examine the Brazilian setting using only public companies with analysts coverage for two main reasons: firstly, to control the information environment and to make the analysis comparable between firms with high and low analysts coverage and, secondly, to estimate the implied cost of capital using analysts forecasts (Gebhardt, Lee, & Swaminathan, 2001; Hail & Leuz, 2006; Verdi, 2005).

This paper contributes to the literature by showing that introduction and decline firms have higher cost of capital, however, while the full voluntary disclosure index and economic and financial voluntary disclosure reduce the cost of capital of decline firms, mature firms reduce the cost of capital by increasing the voluntary disclosure of social and environmental actions.
In other words, decline firms reduce information asymmetry by increasing voluntary disclosure about their fundamentals and mature firms increase social and environmental voluntary disclosure in addition, since analysts are more capable to assess their fundamentals. We also expand previous study by Hasan et al. (2015) by adding the moderate effect of voluntary disclosure on the relationship between life cycle and cost of capital.

The remainder of this paper is organized as follows: Section 2 present the hypotheses development; Section 3 discusses the research design; Section 4 presents our empirical results; and Section 5 concludes.

2. HYPOTHESES DEVELOPMENT

Literature documents that companies must have positive reasons to voluntarily disclose their private information. Such disclosure practices must outweigh its costs (Gray, Radebaugh, & Roberts, 1990; Grossman & Hart, 1980; Skinner, 1994). Prior evidence support the subjacent premise that voluntary disclosure reduces cost of equity capital and increases both liquidity and firm value in different perspectives (Balakrishnan, Billings, Kelly, and Ljungqvist, 2014; Botosan, 1997; Dhaliwal et al., 2011).

In emerging countries, some evidence support the idea that in a low-level disclosure environment, an increase in the disclosure level reduces the inherent risk (Lima, 2009; Lopes and Alencar, 2010). However, previous studies (Clarkson, Fang, Li, & Richardson, 2010; Jiang, Jiang, & Kim, 2017; Lee & Chou, 2017; Mendes-Da-Silva, Onusic, & Bergmann, 2014; Shattarat, K, Haddad, & Al-Hares, 2013) show that this relation between voluntary disclosure and cost of capital is still an open question to identify new factors to affect this linkage.

There is a growing literature in accounting and finance analyzing the impact of the firm life cycle on firms’ fundamentals. Dickinson (2011) argues that the life of a firm is influenced by internal (as strategy choices and financial resources) and external environments (as macroeconomic factors) not only by firms’ age.

Moreover, Dickinson (2011) shows that firms fundamentals measured by earnings per share, return on assets, growth in sales, size, market-to-book and other ratios are different across life cycle stages. This could be associated with the analysts’ decisions to cover a firm (Beyer et al., 2010; Kothari & Verdi, 2016), conveying more scrutiny on corporate information environment.

Huang & Li (2014) based on proprietary cost literature, show that firms in growth industries tend to disclose more voluntary information (proxied by management earnings forecast) to the
market. Al-Hadi, Hasan, and Habib (2016) find that, on average, firms in growth stage, with separate risk committee, tend to present greater market risk disclosures, suggesting a path to reduce informational asymmetry by a specific voluntary disclosure.

Firms in introduction and growth stages are characterized by the need of capital expenditure and then, these firms focus on sales growth (Dickinson, 2011; Jenkins & Kane, 2004). During the first stages of intensive growth, in the extent of the initial uncertainty are mitigated, the cost of equity capital decreases significantly, attracting new investors, among other resources, via voluntary disclosure (Armstrong, Core, Taylor, & Verrecchia, 2011; Hasan et al., 2015; Mueller, 1972).

Mature firms, in turn, generate positive cash flows from their sales and focus, instead, on profitability (Jenkins & Kane, 2004), with high levels of voluntary information (Al-Hadi, Hasan, & Habib, 2015) which leads to greater analyst coverage (Derrien & Kecskés, 2013; Eng & Mak, 2003) to pursue lower cost of capital (Al-Hadi, Hasan, et al., 2015; Bowen, Chen, & Cheng, 2008). In such case, there is lower uncertainty on mature firms than firms in other stages (Chay & Suh, 2009).

Introduction and decline firms are similar on limited resources, which leads to lower level of voluntary disclosure compared to growth and mature firms. The expected pattern of business’ fundamentals over life cycle stages reflect the uncertainty captured by higher levels cost of capital in these stages (Dickinson, 2011; Hasan et al., 2015). Shake-out stage appears to be unclear about firms’ fundamentals (Dickinson, 2011). Then, we present our first hypothesis:

\( H_1: \) The voluntary disclosure (cost of capital) is expected to be higher (lower) in mature stage than in other stages, compared to shake-out.

To expand related literature, we analyze the relationship between voluntary disclosure and cost of capital taking into account an existing behavior patterns of voluntary disclosure across the firm life cycle stages. Thus, the interactions between life cycle stages and voluntary disclosure are expected to affect differently the cost of equity capital of firms.

For instance, firms in early stage (introduction) or in decline stage have lower growth rate and these firms could fail in the market. Then, to differentiate themselves from other firms, they increase voluntary disclosure in an attempt to reduce the cost of capital, whilst mature and growth firms are not much affected, once the generation of positive cash flow is expected to mitigate the market uncertainty. Then, firms in introduction and decline stages could use
voluntary disclosure as an instrument to surpass financial constraints (Hyytinen & Pajarinen, 2005), which is a the consequences of life cycle (Chay & Suh, 2009).

General uncertainties derived from the lack of general information might be mitigated via an increasing of voluntary general disclosure, such as information about sales forecast, executive compensation or the board of directors composition. On the other hand, there are uncertainties derived from the life cycle stage the firm is expected (or classified) to be, and these uncertainties are mitigated via an increasing of specific voluntary information, such as environmental policies, employee relations, training, and corporate social responsibility disclosure (Al-Hadi et al., 2016; El Ghoul, Guedhami, Kwok, & Mishra, 2011; Hasan et al., 2015; Jenkins & Kane, 2004; Villiers & van Staden, 2011; Zhao & Xiao, 2018).

However, since it is expected that mature firms disclose more voluntary information, then the uncertainty is reduced and only firms in stages with high uncertainty disclose more voluntary information that could reduce cost of equity capital. Therefore, our second hypothesis is:

\[ H_2: \text{The higher the level of voluntary disclosure of firms in life cycle stages with high uncertainty, the lower the cost of equity capital.} \]

3. RESEARCH DESIGN

3.1. Sample Selection and Data

The sample of Brazilian public firms with analyst coverage is extracted from the population of public companies listed on the Brazilian Stock Exchange - [B]³, between 2008 and 2014. We use the Comdinheiro® database for financial data of Brazilian non-financial public companies that collects these information directly from Brazilian SEC and [B]³ systems and I/B/E/S database for analysts’ information. Table 1 shows the sample selection as follow:

[INSERT TABLE 1 HERE]

Our analysis starts from 2008 due to the mandatory disclose of Cash Flow Statement for public companies required by IFRS (International Financial Reporting Standards) adoption in Brazil (Almeida & Rodrigues, 2016; Beiruth et al., 2017). This period enables to proxy the life cycle stages by the Cash Flows patterns (signals of operating, investing and financing cash flows) according to Dickinson (2011).

We develop two samples: one for voluntary disclosure, totaling 597 firm-year observation, and another one for the Implied Cost of Capital (ICC), totaling 536 firm-year observation, due to
missing values of market information needed such as current stock price, payout ratio, book value of share and other information to implement the estimation of Gebhardt et al. (2001)’s model of ICC. Our final sample after merge the two samples has 515 observations, among 10 industries, which is shown in Table 2.

[INSERT TABLE 2 HERE]

As additional analysis, we develop a matched sample to reduce possible bias in our results. For each life cycle stage, we consider firms with stock liquidity (ratio between firm average trade volume and firm market value at the year t) higher or equal to 0.001 and total assets between minimum and maximum values shown in descriptive statistics of the sample. Moreover, we also use alternatively Beta instead of CAPM as a substitute of ICC, because the firms comprised the matched sample are not covered by analysts. Preliminary results have evidenced a negative market-risk premium at the period of analysis, which is considered a specific characteristics of the Brazilian capital market. Between 2008 and 2014, Brazilian Central Bank kept the basic interest rates at a relative high level, which discourages the risk taking by investors. Then, we use only Beta (of CAPM) once we intend to capture the volatility and not the magnitude of it to test the results robustness.

3.2. Life Cycle Stage Measure

We use the approach developed by Dickinson (2011) to classify firms’ life cycle stages (Introduction, Growth, Maturity, Shake-Out and Decline) through Cash Flow patterns (combination of operating, investing and financing cash flow activities).

[INSERT PANEL 1 HERE]

Furthermore, previous studies show the advantages of cash flow patterns model (Dickinson, 2011; Hasan et al., 2015). We consider that this model better fits on small samples, avoiding sample reduction or to avoid portfolios with selection bias as well.

3.3. Implied Cost of Capital (ICC)

We follow Gebhardt et al. (2001) to estimate the implied cost of capital, as an alternative approach to estimate the cost of equity capital. The understanding relies on an assignment of a discount rate assumption by the market, which denotes the need for a derivation of a firm valuation model using analysts’ forecasts (Hail & Leuz, 2006; Hou, van Dijk, & Zhang, 2012).

We use a three-stage approach to calculate the intrinsic value in a finite horizon of twelve years plus the terminal value (Gebhardt et al., 2001; Hail & Leuz, 2006; Verdi, 2005) as it follows:
The first step is to use explicit earnings forecast for the next three years; the second one derives earnings forecasts by linearly fading year t+3 return on equity (ROE) to the median market (industry) ROE by year t+3; The third one calculates the intrinsic value of the firm by assuming the latest residual income as a perpetuity (terminal value). This leads to Equation 1:

\[ P_t = bv_t + \sum_{t=1}^{n} \left( \frac{\hat{x}_{t+\tau-1} + bv_{t+\tau}}{1+r_{\tau}} - d_{t+\tau} \right) + \sum_{t=n+1}^{\infty} \left( \frac{\hat{x}_{t+\tau+1} + bv_{t+\tau+1}}{1+r_{\tau}} - d_{t+\tau} \right) \]

Where \( P_t \) is the current stock price of the firm four months after fiscal year-end \( t \); \( \hat{x}_{t+\tau} \) is the expected future accounting earnings for period \( (t+\tau-1, t+\tau) \), either explicitly forecasted, generated by a linear fading rate or assumed to be constant; \( r_{\tau} \) represents the estimate of the ex-ante cost of capital calculated as the internal rate of return to solve the equation; and expected future accounting book value of equity at date \( t+\tau \), where \( bv_{t+\tau} = bv_{t+\tau+1} + \hat{x}_{t+\tau} - d_{t+\tau} \) and \( d_{t+\tau} \) corresponds to the expected future net dividends for period \( (t+\tau-1, t+\tau) \), derived from the dividend payout ratio \( k \) times the earnings forecast \( \hat{x}_{t+\tau} \).

We use the forecasted three year ahead (FY3) to avoid the database reduction, different from Hail and Leuz (2006) which use forecasted earnings of two year ahead (FY1 and FY2) and the long term growth rate (LTG) to calculate the third year. "We considered the forecasts average EPS values (analysts’ consensus) one year before the announcement".

This model presents limitation and the literature provide an alternative method (Hou et al., 2012). However, we anticipate that it does not fit in our sample data. Such alternative would require a large data panel to firstly build a robust forecasting regression model to then estimate the earnings in explicit horizon.

### 3.4. Voluntary Disclosure Index

Voluntary disclosure is measured by the amount of detail of voluntary information contained in the management report based on previous studies (Botosan, 1997; Eng and Mak, 2003; Gisbert and Navallas, 2013; Hail and Leuz, 2006) and adjusted to the Brazilian reality by Almeida and Rodrigues (2016), who has kindly provided to be updated. We use 38 attributes hand-collected information in an amount of 1,406 annual reports (both management’ report and footnotes) from 2008 to 2014.

The full voluntary disclosure index \( (\text{Discl}) \) consists of 38 binary information, divided into Economic and Financial Voluntary Disclosure \( (\text{EFDiscl}) \) - comprised of 25 items, and Social and Environmental Voluntary Disclosure \( (\text{SEDiscl}) \), comprised of the 13 remaining items. The
calculation is based on the frequency scaled by the total of the corresponding group or the full index (Discl).

3.5. Econometric procedures

Before discussing regression issues for these variables, we find statistical differences (t-tests) across all life cycle stages for the voluntary disclosure indexes and also for the implied cost of capital (ICC). All tables are available upon request.

In order to assess the differences among the disclosure indexes across life cycle stages, we run the following regression model, including some control variables:

\[
\text{Discl}_it = \beta_0 + \beta_1\text{intro}_it + \beta_2\text{grow}_it + \beta_3\text{mat}_it + \beta_4\text{decl}_it + \beta_5\text{size}_it + \\
+ \beta_6\text{mtb}_it + \beta_7\text{lev}_it + \epsilon_it
\]  

(2)

Where discl$_it$ is the full voluntary; for the three ($j$) measures of voluntary disclosure as mentioned previously; intro$_it$ is the introduction stage; mat$_it$ represents firms in maturity stage; and decl$_it$ for those companies into the decline stage according to Dickinson (2011). All dummy variables have to be interpreted in relation to the shake-out stage. Implicitly, it is also expected that the other stages present lower levels of voluntary disclosure compared to mature stage.

We include in the model several control variables to reduce problems caused by omitted variables to isolate their effects of interest independent variable on dependent variables according to the literature: size, measured by the natural logarithm of total assets in the year-end; mtb, which means the Market-to-Book ratio, indicating the growth opportunity measured by the firms’ market value divided by book value; lev is the firm’ leverage measured by short and long term debt divided by total assets; beta is the alternative proxy for ICC on robustness tests and it represents the inherent risk of the company, measured by the covariance between company and market 36 (and 60) months realized returns divided by the market return variance.

All dummy variables have to be interpreted in relation to the shake-out stage. We expect growth and maturity stage to have significant and positive (negative) coefficient of voluntary disclosure (implied cost of capital), in comparison with shake-out stage. Implicitly, we expected the other stages to present higher (lower) levels of voluntary disclosure (implied cost of capital).

Finally, to assess the main hypothesis of this study ($H_2$), the implied cost of capital is regressed against the interaction between voluntary disclosure indexes and firms’ life cycle stages:
To the best of our knowledge there is no previous study explicitly guiding the impact of life cycle stages \( LCS_{it} \) on the relation between voluntary disclosure level and cost of capital. The arguments presented convey the idea that \( \beta_6 \) and \( \beta_{10} \) are expected to be the most negative and significant coefficient, which means that firms have more benefits by disclosing voluntary information when they are in stages with high level of uncertainty to mitigate.

4. RESULTS

We begin our analyses by showing the trend of ICC and voluntary disclosure over years and life cycles. We observe in Figure 1 an “U-shape” trend on mean values of ICC across life cycle stages while we observe an “inverted U-shape” for mean and median values of voluntary disclosure measures (chart A). Figure 1 shows the ICC and Voluntary Disclosure measures across life cycle stages (chart A) and over years (chart B). The mean values of ICC are lower than the Brazilian average that Hail & Leuz (2006) estimated on the period 1992-2001 (20.85%), in a cross-country study.

![INSERT FIGURE 1 HERE]

The descriptive statistics are shown on Table 3 for the sample by each life cycle stage and the full sample as well.

![INSERT TABLE 3 HERE]

We compare the mean with the median and we observe, in the full sample, the inexistence of expressive differences for the Implied Cost of Capital and the Disclosure Indexes, even when it is divided into the stages, which indicates a symmetric distribution. The control variable Market-to-Book presents such differences across the stages, but in shake-out stage, it shows a mean value (10.05) much higher than the median value (1.56).

It is also observable that the Leverage (LEV) mean value decreases from Introduction to Mature stage and then it increases in Shake-Out and Decline stages. In addition, in total, a high standard deviation for the variable Market-to-Book (11.43), and this apparently denotes a presence of outliers, which can disturb the coefficient significance into the regressions.
The correlation matrix for the numeric variables used in the models (available upon request) show the three variables of disclosure to be highly correlated (Mingoti, 2005), as expected. However, for the pair EFDiscI and SEDiscl, the coefficient is 0.718. Also, the spearman correlations between ICC with DISCI, EFDiscI and SEDiscl and ICC and EFDiscI are 0.096, 0.124 and 0.051, respectively.

Table 4 shows the results of regressions for the impact of the life cycle stages on both the voluntary disclosure indexes and the implied cost of capital controlling by size, market-to-book, leverage and year and industry dummy variables.

We use an unbalanced panel data, because of some missing values for both ICC and control variables, we use a dummy variable to enable a comparison among the estimators coefficients and respective variances. Then, during the period of analysis (2008-2014), the sample consists of 74, 78, 77, 79, 79, 78 and 50 firms, respectively. Moreover, we present models with and without control variables (1 and 2, respectively), to provide the evidence that the explanatory variables are not substituting the classical relation between the control variables and dependent one. On the voluntary disclosure indexes models, the coefficients of growth and mature stages are significantly positive, compared with shake-out stage, but in general the coefficients of mature stage are greater than growth stage, as expected. We verified such comparison by the F test for coefficients differences, finding a prob>F of 0.0901 for the Discl and 0.3512 for EFDiscI. Then, considering an alfa of 5%, the results suggest that mature firms present an average disclosure level significantly higher than growth firms.

However, both stages have no significant coefficients when they are related to ICC, in model (2). In such case, only introduction and decline stage show positive and significant coefficients on ICC (0.0343* and 0.0580*, respectively). In other words, when we observe the model without the control variables, firms on introduction and decline stage have a greater cost of equity capital, relative to firms in shake-out stage.

These results are aligned with the prediction of higher voluntary information level for firms with positive cash flow (Al-Hadi, Hasan, et al., 2015), characteristic of growing and mature firms. Moreover, results confirm the expectation of lower uncertainty on mature firms compared with firms in other stages (Chay & Suh, 2009).

Moreover, we ran the “Ramsay test” for specification error of the models with voluntary disclosure indexes as dependent variables did not reject the null hypotheses of correct
specification, at a 1% alfa (Prob > F 0.0954 and 0.2320, respectively to Discl and SEdiscl), which means there is no problem of omitted variables, except for EFDiscl (Prob > F 0.0011). Meanwhile, the rejection of null hypothesis for models of ICC enables the investigation to be done in subsequent models presented on this paper.

Our results expand prior studies and theoretical arguments (Mueller, 1972; Hasan et al., 2015) by showing that, even in a developing country, the higher uncertainty of firms in introduction and decline stages face higher cost of capital, possibly due to the lack of significance of voluntary disclosure of introduction and decline firms.

Therefore, the results confirm the hypothesis H1, since the results show that firms in initial and final stages present lower (higher) levels of voluntary disclosure (implied cost of capital) than the others, compared to shake-out.

To test the second hypothesis of this study, we regress the implied cost of capital on the three measures of voluntary disclosure interacted with the dummy variables of corporate life cycle stages. The results presented in Table 5 include the interactions between life cycle stages and voluntary disclosure measures.

\[\text{[INSERT TABLE 5 HERE]}\]

The results show that only in Discl*Decl (-0.652** and -0.633**) and EFDiscl*Decl (-0.979*** and -0.971***) are statically significant suggesting that the voluntary disclosure can be helpful for firms to mitigate uncertainty. Also, this negative coefficients strengthen the relevance of voluntary disclosure mainly of economic and financial information to reduce cost of capital, due to the fundamentals conditions of decline firms.

Uncertainty in mature firms are seen to be lower than in other stages. In this case, economic and financial information are incorporated by market participants, however the complementary information of mature firms could be related to social and environmental voluntary information, once the coefficient of SEDiscl*Mat is significantly negative (-0.121**).

Robustness Tests

We also examine as robustness tests the impact of firm life cycle stages on the indexes of voluntary disclosure for non-covered companies comparing them with the covered ones. To do this, we substitute ICC that requires analysts’ forecasts to the beta as a proxy of firms’ risk. The results presented in Table 6 confirm the life cycle stages impact on the voluntary reporting of information also for non-covered companies.

\[\text{[INSERT TABLE 6 HERE]}\]
Note that we did not control the number of observations, once these estimates compares different samples. Then, we observe for the full disclosure index (Discl), the results show that firms in growth and mature stages disclose more voluntary information in both groups (columns 1 and 2). However, for the group of non-covered firms, the introduction firms also show positive coefficient, but lower than growth and mature firms.

For economic and financial voluntary disclosure index (EFDiscl), we find no significant coefficient for firms covered by analysts. A possible explanation is that analysts use public financial information on financial statements reported by firms. On the other hand, the non-covered firms show an inverted “U-shape pattern” across life cycle stages, lower in the earlier and later stages and higher in growth and mature firms. For social and environmental voluntary disclosure (SEDisc1), the results are quite similar to the full disclosure. A possible explanation is that firms try to differentiate themselves through social and environmental disclosure since financial information is publicly available on financial statements.

We also use quantile regressions in unreported tables to check if our results are affected by outliers and the results are weaker for the full disclosure, but similar to the other measures of voluntary disclosure. Yet, we estimate the models with a single dummy for mature firms, interacted with the disclosure indexes. Again, the model for the full index did not show a statistical significance for such variable. However, we observe for both EFDiscl (-.13048**) and SEDisc1 (-0.1115*) that mature firms are significantly benefitted by the reduction in ICC when they disclose more specific voluntary information. Results are available under request.

The results in Table 6 show no statistical significance for life cycle stages on Beta. We use Beta instead of ICC to allow the comparison between non-covered and covered firms by analysts. However, the results are weak, because only introduction firms in the non-covered sample show negative significant coefficient (at 10%). For the treatment group (covered companies - column 1), there are no differences across the life cycle stages. These results are contrary to the expectation of lower risk (proxied by beta) for mature companies.

5. CONCLUSION

We examine the effects of firms’ life cycle stages on voluntary disclosure and the cost of equity capital and also on the relationship between them. We show that Brazilian public companies in the growth and mature stages are more transparent through voluntary disclosure practices. However, only firms in decline stage are benefitted by the reduction of the cost of capital when
they improve the disclosure of voluntary information. The findings expand evidence of previous studies (Ali Boujelbene & Affes, 2013; Botosan, 1997; Dhaliwal et al., 2011; Petrova et al., 2012; Villiers & van Staden, 2010).

This paper shows that the level of the three voluntary disclosure indexes are different among the life cycle stages. As expected (Al-Hadi, Hasan, et al., 2015; Chay & Suh, 2009), the voluntary disclosure (implied cost of capital) level is greater (lower) in growth and mature stages, compared with the firms in shake-out stage. Although, since firms in decline stage show relatively higher uncertainty (information asymmetry) in their fundamentals, they should reduce them by increasing voluntary disclosure. Then, the results confirm the findings of Hyytinen & Pajarinen (2005), which argue that firms in introduction and decline stages could improve the transparency to surpass financial constraints.

Additionally, we provide evidence that mature firms reduce the uncertainty by disclosing social and environmental voluntary information. This evidence enhance the findings of Villiers & van Staden (2011), which show that despite North American firms more exposed to environmental crises and low environmental reputation tend to disclose more specific voluntary disclosure, they find no evidence of different levels of environmental disclosure under different conditions.

According to Villiers & van Staden (2010), shareholders from Australia, US and UK demands for such information to account for environmental impacts. However, our results stand for the use of such mechanism to rescue the confidence, in terms of cost of capital, at the Brazilian capital market.

Aligned with the theoretical expectation (Al-Hadi et al., 2016; El Ghoul, Guedhami, Kwok, & Mishra, 2011; Hasan et al., 2015; Jenkins & Kane, 2004; Villiers & van Staden, 2011; Zhao & Xiao, 2018), our findings enhance the notion that in imperfect market conditions, the information plays a significant role of separating the assessment of risk (Armstrong et al., 2011). This shows that firm life cycle stage is a relevant conditioning variable when examining the relationship between voluntary disclosure and implied cost of capital.

Growing and mature firms have better prospects, then market analysts are more safe about the financial drivers. Then, the managers provide more social and environmental information, while the firms in other stages need to emphasis the financial indicators to enhance the transparency of their future prospectus.
We apply several robustness checks to improve our results partially converged to the main sample, except for cost of equity capital because the matched sample has only firms non-covered by analysts, which is a limitation of this study as well.

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## APPENDIXES

| Cash Flow               | Intro | Growth | Mature | Shake-out | Decline |
|-------------------------|-------|--------|--------|-----------|---------|
| From *Operating* Activities | -     | +      | +      | -         | +       | -       |
| From *Investing* Activities | -     | -      | -      | -         | +       | +       |
| From *Financing* Activities | +     | +      | -      | -         | +       | -       |

Panel 1 - Combination of Cash Flows Signals
Source: Dickinson (2011)

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Figure 1 – ICC and Voluntary Disclosure Measures across Life Cycle Stages and over Years
Table 1 - Sample Selection

| STEPS OF DATA SELECTION                                                                 | Firm-year Observations |
|----------------------------------------------------------------------------------------|------------------------|
| Companies with shares traded in Sao Paulo Stock Exchange (Bovespa)                      | 2,751                  |
| (-) Exclusion of observations without information from Cash Flow Statement              | (150)                  |
| (-) Exclusion of observations of non-covered firms                                      | (2,004)                |
| **Final sample for Disclosure analysis (First hypothesis)**                            | 597                    |
| (-) Observations excluded due to missing values for Implied Cost of Capital Model       | (61)                   |
| **Final sample for Cost of Capital analysis (First and Second hypotheses)**             | 536                    |
| (=) Final sample merging disclosure measures and implied cost of capital samples        | 515                    |
Table 2 – Industries across time

| Industry                      | Year | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
|-------------------------------|------|------|------|------|------|------|------|------|-------|
| Industrial goods              |      | 12   | 13   | 13   | 13   | 13   | 13   | 9    | 86    |
| Cyclical consumer             |      | 18   | 19   | 20   | 20   | 20   | 19   | 11   | 127   |
| Non-cyclical consumer         |      | 10   | 10   | 10   | 10   | 10   | 10   | 5    | 65    |
| Finance¹                     |      | 3    | 3    | 2    | 2    | 2    | 2    | 1    | 15    |
| Basic materials               |      | 9    | 11   | 11   | 11   | 11   | 11   | 7    | 71    |
| Oil, gas and biofuel          |      | 1    | 1    | 1    | 1    | 1    | 1    | 0    | 6     |
| Health                        |      | 3    | 3    | 3    | 3    | 3    | 3    | 2    | 20    |
| Information technology        |      | 2    | 2    | 2    | 2    | 2    | 2    | 2    | 14    |
| Telecommunication             |      | 2    | 2    | 2    | 3    | 3    | 3    | 1    | 16    |
| Utilities                     |      | 14   | 14   | 13   | 14   | 14   | 14   | 12   | 95    |
| **Total**                     |      | 74   | 78   | 77   | 79   | 79   | 78   | 50   | 515   |

¹ - Firms that explore real estate activities
Table 3 - Descriptive statistics of variables by life cycle stages

| Stage | Stats | ICC | Disc | Efdisc | Sedisc | Size | MTB | Liquidity | Lev | Beta |
|-------|-------|-----|------|--------|--------|------|-----|-----------|-----|------|
|       | N. Obs |     |      |        |        |      |     |           |     |      |
| Introduction |     | 76  | 84  | 84  | 84  | 84  | 83  | 83       | 79  | 84  |
|         | Mean  |     | 0.141 | 0.204 | 0.210 | 0.182 | 15.064 | 1.702 | 0.673 | 0.349 | 0.543 |
|         | SD    |     | 0.140 | 0.097 | 0.075 | 0.193 | 1.211 | 1.392 | 1.356 | 0.144 | 0.666 |
|         | Min   |     | 0.028 | 0.041 | 0.056 | 0.000 | 11.560 | 0.000 | 0.000 | 0.059 | 0.000 |
|         | Q1    |     | 0.073 | 0.123 | 0.167 | 0.000 | 14.375 | 0.860 | 0.040 | 0.264 | 0.000 |
|         | Med   |     | 0.110 | 0.175 | 0.194 | 0.154 | 15.040 | 1.370 | 0.200 | 0.329 | 0.035 |
|         | Q3    |     | 0.157 | 0.288 | 0.250 | 0.308 | 15.850 | 2.030 | 0.830 | 0.427 | 1.110 |
|         | Max   |     | 1.079 | 0.432 | 0.389 | 0.692 | 19.430 | 8.400 | 8.400 | 0.734 | 1.940 |
| Growth | N. Obs | 184 | 202 | 202 | 202 | 200 | 200 | 190 | 200 | 190 | 200 |
|         | Mean  |     | 0.104 | 0.285 | 0.272 | 0.314 | 15.702 | 2.655 | 0.917 | 0.369 | 0.655 |
|         | SD    |     | 0.063 | 0.124 | 0.102 | 0.218 | 1.563 | 3.039 | 1.819 | 0.147 | 0.523 |
|         | Min   |     | 0.017 | 0.103 | 0.111 | 0.000 | 12.260 | 0.000 | 0.000 | 0.051 | 0.000 |
|         | Q1    |     | 0.067 | 0.185 | 0.194 | 0.154 | 14.580 | 1.025 | 0.090 | 0.252 | 0.020 |
|         | Med   |     | 0.093 | 0.267 | 0.264 | 0.308 | 15.415 | 1.730 | 0.355 | 0.377 | 0.640 |
|         | Q3    |     | 0.132 | 0.370 | 0.333 | 0.462 | 16.170 | 2.870 | 0.755 | 0.476 | 1.090 |
|         | Max   |     | 0.581 | 0.617 | 0.583 | 0.769 | 20.440 | 21.180 | 15.170 | 0.737 | 2.060 |
| Maturity | N. Obs | 243 | 262 | 262 | 262 | 262 | 262 | 256 | 256 | 256 | 256 |
|         | Mean  |     | 0.109 | 0.298 | 0.280 | 0.341 | 15.348 | 3.943 | 1.110 | 0.293 | 0.589 |
|         | SD    |     | 0.077 | 0.119 | 0.093 | 0.221 | 1.548 | 7.016 | 3.310 | 0.151 | 0.677 |
|         | Min   |     | 0.009 | 0.082 | 0.111 | 0.000 | 7.170 | 0.000 | 0.000 | 0.000 | -0.010 |
|         | Q1    |     | 0.056 | 0.206 | 0.194 | 0.154 | 14.170 | 1.145 | 0.115 | 0.185 | 0.090 |
|         | Med   |     | 0.099 | 0.308 | 0.278 | 0.385 | 15.245 | 1.880 | 0.430 | 0.269 | 0.495 |
|         | Q3    |     | 0.145 | 0.391 | 0.333 | 0.462 | 16.440 | 4.040 | 0.810 | 0.390 | 0.850 |
|         | Max   |     | 0.648 | 0.617 | 0.583 | 0.769 | 19.490 | 85.340 | 42.880 | 0.689 | 7.590 |
| Shake-out | N. Obs | 21  | 31  | 31  | 31  | 31  | 31  | 30  | 30  | 28  | 31  |
|         | Mean  |     | 0.110 | 0.229 | 0.280 | 0.341 | 15.347 | 10.059 | 0.835 | 0.260 | 0.556 |
|         | SD    |     | 0.053 | 0.097 | 0.077 | 0.192 | 2.088 | 45.455 | 0.837 | 0.153 | 0.568 |
|         | Min   |     | 0.000 | 0.062 | 0.083 | 0.000 | 12.380 | 0.180 | 0.000 | 0.000 | 0.000 |
|         | Q1    |     | 0.063 | 0.144 | 0.194 | 0.077 | 13.950 | 1.060 | 0.090 | 0.126 | 0.000 |
|         | Med   |     | 0.122 | 0.206 | 0.222 | 0.154 | 14.520 | 1.565 | 0.605 | 0.309 | 0.410 |
|         | Q3    |     | 0.144 | 0.308 | 0.278 | 0.462 | 16.480 | 2.760 | 1.400 | 0.362 | 0.940 |
|         | Max   |     | 0.223 | 0.452 | 0.417 | 0.615 | 20.270 | 250.660 | 2.890 | 0.494 | 1.960 |
| Decline | N. Obs | 12  | 16  | 16  | 16  | 16  | 16  | 16  | 16  | 13  | 16  |
|         | Mean  |     | 0.164 | 0.204 | 0.210 | 0.183 | 15.551 | 1.446 | 1.068 | 0.332 | 0.978 |
|         | SD    |     | 0.116 | 0.085 | 0.058 | 0.212 | 0.908 | 0.905 | 0.917 | 0.087 | 0.872 |
|         | Min   |     | 0.036 | 0.103 | 0.139 | 0.000 | 12.690 | 0.300 | 0.240 | 0.204 | 0.000 |
|         | Q1    |     | 0.074 | 0.134 | 0.153 | 0.000 | 15.260 | 0.695 | 0.340 | 0.249 | 0.000 |
|         | Med   |     | 0.120 | 0.185 | 0.222 | 0.115 | 15.930 | 1.395 | 0.790 | 0.345 | 1.470 |
|         | Q3    |     | 0.236 | 0.278 | 0.250 | 0.385 | 16.050 | 1.965 | 1.445 | 0.402 | 1.690 |
|         | Max   |     | 0.375 | 0.349 | 0.333 | 0.692 | 16.550 | 3.530 | 3.530 | 0.483 | 2.230 |
| Total | N. Obs | 536 | 595 | 595 | 595 | 595 | 585 | 585 | 553 | 595 |
|-------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|       | Mean   | 0.113 | 0.274 | 0.263 | 0.299 | 15.434 | 3.430 | 0.967 | 0.326 | 0.613 |
|       | SD     | 0.086 | 0.121 | 0.096 | 0.222 | 1.540 | 11.430 | 2.500 | 0.152 | 0.630 |
|       | Min    | 0.000 | 0.041 | 0.056 | 0.000 | 7.170 | 0.000 | 0.000 | 0.000 | -0.010 |
|       | Q1     | 0.063 | 0.164 | 0.194 | 0.077 | 14.410 | 1.040 | 0.090 | 0.225 | 0.000 |
|       | Med    | 0.101 | 0.267 | 0.250 | 0.308 | 15.280 | 1.700 | 0.370 | 0.310 | 0.520 |
|       | Q3     | 0.141 | 0.370 | 0.333 | 0.462 | 16.400 | 2.930 | 0.830 | 0.425 | 1.010 |
|       | Max    | 1.079 | 0.617 | 0.583 | 0.769 | 20.440 | 250.660 | 42.880 | 0.737 | 7.590 |

Notes: (i) **Size** is measured by the natural logarithm of total assets in the year-end; (ii) **MTB** is the Market-to-Book ratio; (iii) **Liquidity** is the liquidity of the share in the year-end; (iv) **Lev** is the leverage measured by total liabilities divided by total assets of the firm in the year-end; and (v) **Beta** represents the inherent risk of the company.
Table 4 - Results of the Life Cycle Stages on Disclosure Indexes and ICC

| Variables | Pred. Signal | Discl | EFDisc | SEDisc | Pred. Signal | ICC |
|-----------|--------------|-------|--------|--------|--------------|-----|
| intro     | +/-          | 0.0138| 0.0124 | 0.00635| 0.00919      | 0.0343* | 0.0208 |
|           |              | (0.750)| (0.705)| (0.415)| (0.617)      | (0.908) | (0.581) |
| grow      | +            | 0.0471***| 0.0344**| 0.0323**| 0.0265*      | 0.0868**| 0.0554 |
|           |              | (2.634)| (2.072)| (2.104)| (1.783)      | (2.404) | (1.640) |
| mat       | +            | 0.0494***| 0.0478***| 0.0317**| 0.0324**      | 0.0971***| 0.0894***|
|           |              | (2.773)| (2.926)| (2.074)| (2.191)      | (2.691) | (2.710) |
| decl      | -            | 0.0285| 0.00592| 0.0239| 0.0109       | 0.0404 | -0.00813 |
|           |              | (1.080)| (0.249)| (1.148)| (0.580)      | (0.712) | (-0.151) |
| size      | +            | 0.0367***| 0.0268***| 0.0630***| -            | -0.00356| |
|           |              | (9.433)| (8.103)| (8.146)| |
| mtb       | +/-          | 0.00072***| 0.00065***| 0.000892**| +/-          | -0.000497| |
|           |              | (3.192)| (4.102)| (1.974)| |
| lev       | +            | 0.0253| -0.00212| 0.101* | +            | 0.0727**| |
|           |              | (0.912)| (-0.0911)| (1.873)| |
| Constant  |              | 0.147***| -0.377***| 0.212***| -0.162***    | -0.965***| 0.0532***|
|           |              | (6.459)| (-6.277)| (11.90)| (-3.153)    | (-7.796)| (2.810) |

Observations: 515
Adjusted R²: 0.533
Year/Industry Control: Yes/Yes
F-Stat: 84.57***

Notes: (i) We use control all models by year and industry fixed effects. (ii) Discl – Voluntary Disclosure; EFDisc – Economic and Financial Voluntary Disclosure; SEDisc – Social and Environmental Voluntary Disclosure; (iii) ICC is the implied cost of capital (iv) Introᵢ means the ith-company belonging to the Introduction stage; (v) Growᵢ for Growing companies; (vi) Shakeᵢ for the stage of Shake-out; (vii) Declᵢ for those companies into the Decline phase; (viii) Sizeᵢ represents the size, measured by the natural logarithm of total asset in the year-end; (ix) MTBᵢ means the Market-to-Book ratio; (x) Levᵢ represents the leverage of the firm i the year-end; and (xi) t-stat in parentheses; and (xiii) * significant at 10% level; ** significant at 5% level; and *** significant at 1% level.

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Table 5- Results of ICC on voluntary disclosure indexes controlled by firm life cycle stages

\[ ICC_{it} = \beta_0 + \beta_k \sum_{k=1}^{L} LCS_{kt} + \beta_{Discl_{int}} + \beta_{Discl_{grow}} + \beta_{Discl_{mat}} + \beta_{Discl_{decl}} + \beta_{Discl_{sh}} + \beta_{Discl_{size}} + \beta_{Discl_{M/TB}} + \beta_{Discl_{lev}} + \epsilon_{it} \]

| Variables | Pred. Signal | ICC | Discl | EFDisc | SEDisc |
|-----------|--------------|-----|-------|--------|--------|
| intro     | +            | 0.0892 | 0.0736 | 0.116 | 0.106 | **0.0525** | 0.0355 |
|           |              | (1.538) | (1.366) | (1.432) | (1.378) | (1.762) | (1.347) |
| grow      | -            | -0.0162 | -0.0366 | -0.0325 | -0.0496 | -0.000635 | -0.0184 |
|           |              | (-1.303) | (-1.007) | (-1.511) | (-0.0353) | (-0.908) |
| mat       | -            | 0.0411 | 0.0292 | 0.0283 | 0.0205 | 0.0304 | 0.0196 |
|           |              | (1.328) | (0.950) | (0.764) | (0.570) | (1.499) | (0.907) |
| decl      | +            | 0.189** | 0.173** | **0.267** | **0.253** | **0.090** | 0.0743 |
|           |              | (2.544) | (2.344) | (3.074) | (2.942) | (1.774) | (1.463) |
| discl     | -            | -0.0323 | -0.0589 | -0.0748 | -0.0651 | 0.0220 | -0.00440 |
|           |              | (-0.304) | (-0.553) | (-0.570) | (-0.478) | (0.403) | (-0.0759) |
| discl*intro | -          | -0.266 | -0.261 | -0.388 | -0.410 | -0.0943 | -0.0794 |
|           |              | (-1.236) | (-1.203) | (-1.214) | (-1.265) | (-1.154) | (-0.958) |
| discl*grow | -            | 0.0342 | 0.0675 | 0.103 | 0.122 | -0.0264 | -0.00105 |
|           |              | (0.320) | (0.643) | (0.772) | (0.907) | (-0.479) | (-0.0178) |
| discl*mat  | -            | -0.167 | -0.141 | -0.125 | -0.120 | **-0.121** | -0.0980 |
|           |              | (-1.431) | (-1.248) | (-0.849) | (-0.823) | (-2.046) | (-1.571) |
| discl*decl | -            | **-0.652** | **-0.633** | **-0.979** | **-0.971** | -0.186 | -0.170 |
|           |              | (-2.340) | (-2.311) | (-2.787) | (-2.801) | (-1.102) | (-1.017) |
| size      | -            | -0.000372 | -0.00234 | -0.000279 | -0.000279 | -0.000279 |
|           |              | (-0.0846) | (-0.526) | (-0.0688) |
| mtb       | +/-          | -0.000432 | -0.000452 | -0.000442 | -0.000442 | -0.000442 |
|           |              | (-0.908) | (-0.936) | (-0.934) |
| lev       | +            | **0.0819** | **0.0803** | **0.0800** | **0.0800** | **0.0800** |
|           |              | (2.180) | (2.143) | (2.175) |
| Constant  |              | **0.0614** | 0.0546 | **0.0746** | **0.0452** | 0.0326 |
|           |              | (2.112) | (0.816) | (2.207) | (1.402) | (2.025) | (0.513) |
| Observations |            | 515 | 515 | 515 | 515 | 515 | 515 |
| Adjusted R² |             | 0.215 | 0.230 | 0.221 | 0.236 | 0.199 | 0.213 |
| Year/Industry Control |         | Yes/Yes | Yes/Yes | Yes/Yes | Yes/Yes | Yes/Yes | Yes/Yes |
| F-Stat |             | 13.17*** | 10.68*** | 14.99*** | 12.21*** | 13.84*** | 11.12*** |

**Notes:** (i) We control all models by year and industry fixed effects. (ii) ICC is the implied cost of capital; (iii) Voluntary disclosure is divided into full (discl), economic and financial (efdiscl) and social and environmental (sediscl) indexes; (iv) Discl Intro is the index of voluntary disclosure for ith-company belonging to the Introduction stage; (v) Discl Grow is the index of Growing companies; (vi) Discl Shake is the index of Shake-out; (vii) Discl Decl for those companies into the Decline phase; (viii) Size represents the size, measured by the natural logarithm of total asset in the year-end; (ix) M/TB means the Market-to-Book ratio; and (x) Lev represents the leverage of the firm i the year-end; and (xi) * significant at 10% level; ** significant at 5% level; and *** significant at 1% level.
Table 6 – Results of Voluntary Disclosure on life cycle stages for matched sample

| Variables | discl | efdiscl | sediscl | beta |
|-----------|-------|---------|---------|------|
|           | (1)   | (2)     | (1)     | (2)  |
| Intro     |       |         |         |      |
|           | 0.0110| 0.0503**| 0.00388| 0.0468*|
|           | (0.644)| (2.072)| (1.865)| (0.845) |
| Grow      | 0.0297*| 0.0777***| 0.0195| 0.0685***|
|           | (1.857)| (3.616)| (3.168)| (1.702) |
| Mat       | 0.0372**| 0.0923***| 0.0231| 0.0820***|
|           | (2.336)| (4.407)| (3.944)| (2.264) |
| Decl      | 0.00119| -0.0379| 0.00318| -0.0526**|
|           | (0.0490)| (-1.437)| (1.163)| (-1.966) |
| Size      | 0.0346***| 0.0346***| 0.0249***| 0.0308***|
|           | (8.840)| (6.331)| (7.391)| (5.929) |
| MTB       | 0.00501***| 0.000989| 0.00310***| 0.000981|
|           | (5.105)| (0.353)| (3.378)| (0.363) |
| Beta      | 0.0138*| 0.00102| 0.0110*| -0.00252|
|           | (1.764)| (0.0765)| (1.862)| (-0.200) |
| Constant  | -0.358***| -0.206**| -0.148***| -0.0266|
|           | (-6.119)| (-2.054)| (-2.931)| (-0.279) |
| Observations | 515 | 566 | 515 | 566 |
| Adjusted R² | 0.623 | 0.337 | 0.597 | 0.221 |
| Year/Industry Control | Yes/Yes | Yes/Yes | Yes/Yes | Yes/Yes |
| F stat | 51.43***| 16.87***| 62.66***| 14.07***|

Notes: (i) Column (1) represents the covered sample and (2) non-covered companies. (ii) Discl is the full index of voluntary disclosure; EFDiscl is the index of economic and financial voluntary disclosure; SEDiscl is the social and environmental voluntary disclosure index; (iii) Beta is used in substitution for the CAPM as proxy for Cost of Capital. t-stats are presented in parentheses; (iv) Introᵢ is the Introduction stage; (v) Growᵢ for Growth companies; (vi) Shakeᵢ for the stage of Shake-out; (vii) Declᵢ for those companies into the Decline stage; and (vii) * significant at 10% level; ** significant at 5% level; and *** significant at 1% level.

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