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**Customer Value Disclosure and Analyst Forecasts:
The Influence of Environmental Dynamism**

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Abstract:

In this paper, we explore the relationships between customer value disclosure, analyst following, and earnings forecasts, taking into account environmental dynamism as captured by R&D intensity, sales variability and the reverse of industry concentration. Results show that customer value disclosure is positively associated with analyst following. Second, our findings show that customer value disclosure increases consensus among analysts and reduces forecast dispersion. Third, environmental dynamism enhances the association between customer value disclosure and analyst following. Fourth, environmental dynamism enhances the association between customer value disclosure and analyst earning forecasts. It appears that customer metrics attract analysts and improve their ability to forecast earnings. Results also suggest such disclosure to be particularly relevant for forecasting earnings of firms involved in dynamic environments.

Key words: analyst following, analyst forecasts, customer value disclosure, environmental dynamism.

Résumé:

Dans cet article, nous explorons les relations entre le reporting valeur-client, le suivi des analystes et les prévisions de résultats, en tenant compte du dynamisme de l'environnement tel que capté par l'intensité des activités de R&D, la variabilité des ventes et l'inverse de la concentration de l'industrie. Les résultats montrent que le reporting valeur-client est positivement associée au suivi des analystes. Deuxièmement, le reporting valeur client augmente le consensus chez les analystes et réduit la dispersion des prévisions de résultats. Troisièmement, le dynamisme de l'environnement améliore la relation entre le reporting valeur-client et le suivi des analystes. Enfin, le dynamisme de l'environnement améliore la relation entre le reporting valeur-client et la précision des prévisions des analystes. Il semble que les informations portant sur la valeur-client attirent les analystes et améliorent leur capacité de prédire les résultats. Il ressort également de nos analyses que le reporting valeur-client est particulièrement pertinent pour la prévision de résultats des firmes œuvrant dans des environnements dynamiques.

Mots clés: dynamisme de l'environnement, suivi des analystes, prévisions des analystes, reporting valeur-client.

1. Introduction

Analysts are sophisticated users of information that play a critical role in capital market efficiency. Analysts use their earnings forecasts along with other information to estimate stock's value and make recommendations. Corporate disclosure is an essential source of information for analysts. Previous studies provide empirical evidence that corporate disclosure is associated with analyst following, more accurate analyst earnings forecasts, and less dispersion among individual analyst forecasts. These studies suggest that analysts would look for corporate disclosure as it improves their ability to forecast earnings.

Kaplan and Norton (1996) argue that customer related metrics are leading indicators of a firm's future financial performance. An emerging body of literature seeks for empirical evidence of this argument and generally shows a positive relationship between customer metrics and future accounting performance. Most of these studies are industry-specific and focus on one customer related metric such as customer satisfaction or customer loyalty. To the extent that customer metrics are informative of future earnings, we expect that customer value disclosure would attract analysts and increase their ability to forecast earnings. Moreover, we expect customer value disclosure to be particularly relevant for forecasting earnings of firms involved in more dynamic environments.

Dynamism refers to rapid changes that are hard to predict and heightens uncertainty in a firm's environment. Turbulence in the market place may reflect changes in customers' composition and preferences, advances in technologies, and competition intensity. Firms operating in high market turbulence more frequently alter their products and services in order to cater to customers' changing preferences and competitors' attacks. Forecasting earnings in such a context is particularly challenging as it requires anticipating changes in market patterns or technology while predicting the success of a firm's market-based strategy. Customer value

disclosure captures organizational success in satisfying their customers, in recruiting and retaining them, in extending new products and services to them, and in meeting the needs of their target segments. According to Kaplan and Norton (2004), managing customer related metrics enables firms to articulate the customer and market-based strategy that will deliver superior future financials returns. Although firms may be reluctant to release such strategic information, competition may induce them to voluntary disclose the information in an attempt to attract customers and investors alike.

In this paper, we explore the relationships between customer value disclosure, analyst following, and analyst earnings forecasts, taking into account environmental dynamism as captured by R&D intensity, sales variability and the reverse of industry concentration (competition). Our findings tend to confirm our expectations. First, results show that customer value disclosure is positively associated with analyst following. Second, customer value disclosure appears to increase consensus among analysts and to reduce forecast dispersion. Third, environmental dynamism enhances the association between customer value disclosure and analyst following. Fourth, environmental dynamism enhances the association between customer value disclosure and analyst earnings forecasts.

To the best of our knowledge, this study is the first to investigate how environmental dynamism influences the relationship between customer related disclosure and analyst earnings forecasts. The remainder of the paper is organized as follows. Section 2 presents the theoretical background and hypotheses. The study's method is described in section 3. Results are presented in section 4. Finally, section 5 provides a conclusion and a discussion of potential implications of the results.

2. Background and hypotheses

2.1 Corporate disclosure, analyst following, and analyst earnings forecasts

Liquid and efficient capital markets rely on investors' ability to obtain at low cost, timely, and relevant information about a firm's performance. In this regard, analysts play a critical role in collecting and processing information for stock market participants. Analysts use their earnings forecasts along with other information to estimate share price and make sell, buy, or hold recommendations (Bradshaw, 2004). Earnings forecast precision is an important issue for the analyst since poor predictions impact on his reputation, turnover and promotion (Mikhail *et al.*, 1999; Hong and Kubik, 2003; Wu and Zang, 2009). In the forecasting process, time is also a crucial issue. Investors react to early more than to late analyst recommendations, even though forecasts tend to be more precise when the window is reduced (Womack, 1996). In this vein, Cooper *et al*. (2001) find that lead analysts, based on their forecast timeliness, have a greater impact on stock prices than follower analysts. They also find that performance rankings on that basis are more informative than those built on abnormal trading volume and forecast accuracy.

Analysts need relevant information in order to produce fast and precise earnings forecasts, and part of this information comes from corporate disclosure. In Lang and Lundholm (1996), leading analysts evaluate the informativeness of a wide range of corporate disclosure such as annual published information, quarterly and other published information, and investors' relations. The authors provide evidences that firms with more informative disclosure policies have a larger analyst following, more accurate analyst earnings forecasts, and less dispersion among individual analyst forecasts. Based on a survey of experts involved in the process of listing international securities, Higgins (1998) documents an association between the level of firms' financial disclosures and analysts' ability to forecast earnings per share. Focusing on information provided

in the annual report, Hope (2003a) also documents an association between the level of firms' disclosure and forecast accuracy. Barron et al. (1999) provide empirical evidence that analyst forecast error and dispersion vary inversely with the quality of publicly available information contained in the Management Discussion and Analysis report.

An emerging body of literature suggests that customer related measures may be useful in predicting a firm's future earnings and, ultimately, its stock market value. Kaplan and Norton (1996) argue that customer related metrics are leading indicators of a firm's future financial performance. Most of the studies that seek empirical evidence of this argument are industry-specific and focus on one customer related metric. A positive relationship between customer satisfaction and future accounting performance was also documented in the telecom industry (Banker et al., 2000). Smith and Wright (2004) report that customer loyalty measures explain relative revenue growth and profitability while providing competitive advantage in the PC industry.

In resort industry, Ittner and Larcker (1998) show that customer satisfaction is a leading indicator of future financial performance measures, such as sales or earnings, which ultimately translate into enhanced stock market performance. Amir and Lev (1996) report that the number of customers signed up by a wireless operator, and its related costs, contain relevant information about future earnings and stock returns. Moreover, Rajgopal et al. (2003) show that order backlog predicts future earnings and share price. Anderson et al. (1994) show positive contemporaneous associations between customer satisfaction and return on assets in Swedish manufacturing firms, but weaker or negative associations in service firms. Finally, based on the American Customer Satisfaction Index, Ngobo et al. (2011) show that customer satisfaction reduces earnings forecast errors.

To the extent that customer metrics are informative about a firm's future financial performance, we hypothesize that customer value disclosure would attract analysts and increase their ability to forecast earnings:

H1: Customer value disclosure attracts analyst.

H2: Customer value disclosure is relevant for analyst earnings forecasts.

2.2   Environmental dynamism and analyst earnings forecasts

Dynamism refers to rapid changes that are hard to predict and heightens uncertainty in a firm's environment (Duncan, 1972; Dess and Beard, 1984). Turbulence in the market place may reflect changes in the composition of customers and their preferences and in the competition intensity. Firms operating in high market turbulence more frequently alter their products and services in order to cater to customers' changing preferences and competitors' attacks (Wang, 2007). Those changes may also reflect technological advances and firms' ability to adjust their processes accordingly. Competition attacks may take the form of innovative products, aggressive promotional campaign, new distribution channel, etc.

Environmental dynamism increases the difficulty of forecasting earnings and, therefore, the necessity for analysts to collect and process additional information. A more stable environment is likely to be associated with more stable, and thus easier to predict, patterns in sales and earnings numbers. In a dynamic environment, analysts must predict the success of the firm's recent initiatives while anticipating changes in market patterns or technology. Moreover, firms more involved in innovation activities have greater investment in intangible assets such as

patents, copyrights, trademarks and software, which have more uncertain payoffs than the other assets of the firm (Barth *et al.*, 2001).

Analyst motivation to follow a firm is driven by economic and reputational considerations. Although environmental dynamism increases the difficulty and thus the cost of forecasting earnings, it also represents potential value creation for investors and analysts. Innovative firms may represent a potential of growth that is valued by stock market participants. Consistently, Anagnostopoulou and Levis (2008) find a relation between R&D intensity and consistent growth in sales and gross income in situations where a firm is forced to innovate because of the industry in which it operates. Barth *et al.* (2001) show that analyst coverage is greater for firms with more intangible assets. In addition, potential value creation derives from stock mispricing associated with market instability.

Finally, analysts may have fewer reputational concerns when forecasting earnings of firms surrounded by uncertainty. Ackert and Athanassakos (2003) show that the analysts' optimism increases with the firm uncertainty, measured by the standard deviation of earnings forecasts. When there is little uncertainty, dispersion in analyst forecasts is likely to be lower and analysts may wish to avoid standing out from the crowd. By comparison, when uncertainty is high, dispersion in analyst forecasts is likely high and analysts have fewer reputational concerns when they issue forecasts. Previous studies show that analyst coverage is increasing with uncertainty about earnings predictability (Barth et al., 2001; Bhushan, 1989; Lang et al., 2003; Branson and Pagash, 2005).

Although past financial performance may be the best predictors the future in a stable setting, forecasting earnings of firms involved in a dynamic environment is particularly challenging. Analysts should anticipate changes in market patterns or technology while predicting customers' reactions to a firm's strategic initiatives. Customer value disclosure

captures organizational capacity to satisfy their customers, to recruit and retain them, to extend new products and services to them, and to meet the needs of their target segments. Kaplan and Norton (1996) balanced scorecard contains key performance indicators, grouped into four axes namely learning and growth, business process, customers, and financial. Each indicator is part of a chain of cause and effect that cross axes and eventually lead to financial outcomes. In that chain, customer metrics appear as the outcome of previous initiatives to improve business processes, and leading indicators of a firm's financial performance. According to Kaplan and Norton (2004), managing customer related metrics enables firms to articulate the customer and market-based strategy that will deliver superior future financials returns. Relying on customer metrics should be particularly relevant to predict future earnings of firms involved in dynamic and thus unstable environment.

Firms may be reluctant to release strategic information that could induce proprietary costs. The balanced scorecard is a strategic tool that contains long-term outcomes and drivers of success. Incumbent firms with good news to communicate may choose to withhold information to prevent competition (Dye, 1985). However, Arya and Mittendorf (2007) demonstrate that while competition can inhibit disclosure, analysts' insistence on guidance can be beneficial to firms and consumers alike. In their setting, although firms are reluctant to disclose the information that competitors deem pertinent, competition may induce them to voluntary release information in an attempt to attract customers. In addition, if a firm opts not to disclose the information, it runs the risk of losing analyst following (Bhushan, 1989; Lang and Lundholm, 1996; Healy *et al.*, 1999).

Therefore, we expect customer value disclosure to be particularly attractive and relevant to forecast earnings of firms involved in dynamic environment. Recent research provides empirical evidence of the relevance of customer related metrics to predict future financial

performance. Most of these studies emerge from industries highly competitive and in which there are high levels of innovation (e.g. telecom, PC industry). Moreover, the relevance of non-financial measures for value creation has been widely recognized in industries where there are sizable intangibles assets (e.g. Dempsey *et al*., 1997; Healy *et al*., 1999). Hence, the two following hypotheses:

> *H3: Environmental dynamism enhances the association between customer value disclosure and analyst following.*

> *H4: Environmental dynamism enhances the relevance of customer value disclosure for analyst earnings forecasts.*

3. Method

3.1 Sample

The sample comprises 179 observations for the year 2010. We collected customer value disclosure from corporate websites in January and February 2010. Disclosure formats include annual reports, web pages and sustainability reports. 188 non-financial firms represented on the Toronto Stock Exchange S&P/TSX Index were identified (the total index comprises 220 firms). From 188 firms, nine have no forecast dispersion. This provides a sample of 179 firms. Financial data was collected based on the information available in Compustat and Stock Guide in the spring of 2010. Sample firms operate in the following industries: Materials; Energy; Industrials; Consumer discretionary; Consumer staple; Utilities; Telecommunications; Information technology; and Health care.

3.2   Empirical models

This study attempts to provide an integrated analysis of firms' customer value disclosure strategy, analyst following and analyst forecasts taking into account environmental dynamism.

In the first model, we do not observe endogeneity between *Analyst following* and *Customer value disclosure* (see results' section for the test of endogeneity). Therefore, for these regressions, we will rely on OLS estimations.

Analyst following $_{it}$ =

$f(\text{ß}_0 + \text{ß}_1 \text{ Share price volatility} + \text{ß}_2 \text{ Firm size} + \text{ß}_3 \text{ Control block} + \text{ß}_4 \text{ Disclosure} +$

$\text{ß}_5 \text{ Disclosure*Dynamism} + \text{ß}_6 \text{ Dynamism)}_{it}$

We also rely on OLS estimations for forecast dispersion regressions since we do not observe endogeneity between *Forecast dispersion* and *Customer value disclosure* (see results' section).

Forecast dispersion $_{it+1}$ =

$f(\text{ß}_0 + \text{ß}_1 \text{ Analysts} + \text{ß}_2 \text{ Beta} + \text{ß}_3 \text{ Negative earnings} + \text{ß}_4\text{Disclosure} +$

$\text{ß}_5 \text{ Disclosure*Dynamism} + \text{ß}_6 \text{ Dynamism)}_{it}$

Finally, given the endogenous nature of disclosure and analysts' consensus (see results' section), we rely to the following system of structural equations:

Consensus (p) $_{it+1}$ =

$f($ß$_0$ + ß$_1$ Analysts + ß$_2$ Beta + ß$_3$ Negative earnings + ß$_4$Disclosure +

ß$_5$ Disclosure*Dynamism + ß$_6$ Dynamism$)$ $_{it}$

Disclosure $_{it}$ =

$f($ß$_0$ + ß$_1$ Reverse of industry concentration + ß$_2$ Reverse of capital intensity +

ß$_3$ Sales variability + ß$_4$ R&D + ß$_5$ Free cash flow + ß$_6$ Analyst following + ß$_7$ Firm size$)$ $_{it}$

Two different variables are used to measure the relevance of disclosure for forecasting earnings: *Forecast dispersion* and *Consensus*. *Forecast dispersion* is computed as the standard deviation of EPS forecasts for 2010 scaled by the absolute value of reported EPS for 2011. We rely on Barron *et al.* (1998) to assess the degree to which analysts share a common belief, i.e. consensus. *Consensus*, denoted *p*, is a function of forecast dispersion, error, and the number of forecast. It is computed as:

$$p = \frac{SE - D/N}{(1-1/N)D + SE}$$

Where: D   Dispersion in analyst forecasts, i.e., the sample variance of the individual forecasts around the mean forecast

   SE   Squared error of the mean forecast

   N   Number of analysts

Baron et al. (1998) investigate, from an analytical perspective, what the forecasts of analysts reveal about their information environment, that is, the general properties of their

information and beliefs. They assume that analyst earning forecast is their best estimate of earning based on available information, which consists of public (common across analysts) and private (idiosyncratic) information. Their model demonstrates how these two types of information result in forecast errors and dispersion and how the underlying unobservable characteristics of the analyst's information environment are revealed by expressions involving observable constructs.

Consensus measures how much the average belief reflects public versus private information. We expect customer value disclosure to increase the precision or quality of public information available to analysts and, therefore, to increase their consensus. When all available information is public, all analysts' beliefs are identical and p should de equal to 1.

3.3 Measurement of variables

Disclosure. Prior research shows that analyst coverage tends to be positively related to the degree of corporate information, presumably because better disclosure decreases the cost of doing research on a company (Lang and Lundholm, 1996; Healy *et al.*, 1999). Therefore, analysts are less likely to be attracted to firms with poor disclosure (Lang and Lundholm, 1996; Healy *et al.*, 1999; Bushman and Smith, 2003).

Customer value disclosure is based on balanced scorecard literature and emerging performance measurement practices (e.g. Ittner and Larker, 1998; Kaplan and Norton, 1996; Robb et al., 2001). We measure disclosure using a coding instrument in a way that is similar to Wiseman (1982), Aerts et al. (2007), and Cormier et al. (2009a, b). The grid comprises 15 items (see table 1). The rating is based on a score of one to three per element, with each item possibly comprising many elements. A score of three is given for an element that is described in monetary or quantitative terms, a score two for an element that is specifically described, and a score of one

for an element discussed in general. To ensure consistency among firms, two persons reviewed all individual scores independently. One of the co-researchers subsequently reviewed all disagreements.

3.3.1 Analyst following model

Share price volatility. Prior research documents a relationship between share price volatility and analyst coverage (e.g. Bhushan, 1989; Lang *et al*., 2003), suggesting that the demand for analysts' services is higher for firms with higher financial risk. Therefore, we expect a positive relationship between *Share price volatility* and analyst following. Share price volatility is defined as the standard deviation of percentage changes in daily stock prices.

Firm size. Prior research shows that firm size is positively related to analyst following. Bhushan (1989) argues that firm size affects both the aggregate demand and the aggregate supply for analysts' services. Demand is positively affected by firm size because the aggregate potential payoff for shareholders from access to higher quality information is more important for larger firms. Supply is positively affected presumably because there are significant fixed costs in following a firm, and the payoff from following it is related to its size (Bhushan, 1989). Therefore, we expect a positive relationship between firm size as measured by ln(Assets), and analyst following.

Control block. There is likely to be a greater demand for analysts' services if ownership is more widely dispersed. As Hope (2003c) posits, when ownership is concentrated, information is more likely to be communicated through private channels, decreasing the role of financial analysts. Moreover, Lang *et al*. (2004) argue that analysts are reluctant to follow firms with potential agency problems. They document that analyst coverage is negatively related to the control rights held by families or management groups. The variable is measured as the percentage

of voting shares that are closely held (percentage of votes attached to the shares of a firm held by directors, and individuals or companies that own more than 10% of shares outstanding). We anticipate a negative relationship between control block and analyst following.

Three distinct variables are used to capture the environmental dynamism and its impact on the association between customer value disclosure and analyst following. We estimate three separate regressions adding in turn interaction terms *Disclosure*R&D, Disclosure*Sales variability,* and *Disclosure*Reverse of industry concentration* to analyst forecast regressions.

R&D. The extent of R&D is expected to enhance the association between customer value disclosure and analyst following. The interaction term is introduced in the model: *Disclosure*R&D. R&D* is measured as 1+log R&D. We expect the coefficient on the variable *Disclosure*R&D* to be positively associated with analyst following.

Sales variability. Sales variability is expected to enhance the association between customer value disclosure and analyst following. The interaction term is introduced in the model: *Disclosure*Sales variability*. We measure S*ales variability* in the following manner. First, we compute the absolute value of the percentage change in sales from period t to period t-1. Then, we subtract the absolute value of the percentage change in sales at the industry level and reach a net of industry sales variability. We think that sales variability at the firm level must take into consideration the uncertainty that faces the whole industry in which the firm operates (Ghosh and Olsen, 2009). We expect the coefficient on the variable *Disclosure*Sales variability* to be positively associated with analyst following.

Reverse of industry concentration. We expect competition in the product market to enhance the association between customer value disclosure and analyst following. The four-firm concentration ratio, which consists of the percentage of market share owned by the largest four firms in the industry (otherwise known as the Herfindhal index) is commonly used. A high

concentration ratio indicates that competitors are very strong and likely to use any information being disclosed to their advantage and to the detriment of the discloser's stockholders (Darrough and Stoughton, 1990). We computed industry concentration ratios based on 1 213 non-financial firms included in Stock Guide (from 38 firms for consumer staple to 434 for industrials). The concentration ratio is measured as 1- the percentage of market share owned by the largest four firms in the industry. The variable *Reverse of industry concentration* is computed by ranking industries based on the reverse of concentration ratio. We expect the coefficient on the variable *Disclosure*Reverse of industry concentration* to be positively associated with analyst following.

3.3.2   Analyst forecasts model

In addition to voluntary disclosure, three control variables are added to the model of analyst forecasts: Beta; Negative earnings, and analyst following. Hope (2003a, b) documents a relation between forecasts' properties, analyst following and negative earnings. Patton and Verardo (2010) observe that the increase in betas is greater for earnings announcements with larger positive or negative surprises, and with greater analyst forecast dispersion. Furthermore, the increase in betas is greater for stocks with higher analyst coverage. We expect that beta and negative earnings should increase forecast dispersion and uncertainty common to all analysts (p). The opposite is expected for analyst following.

Three distinct variables are used to capture the environmental dynamism and its impact on the association between customer value disclosure and analyst forecasts. We estimate three separate regressions adding in turn interaction terms *Disclosure*R&D, Disclosure*Sales variability,* and *Disclosure*Reverse of industry concentration* to analyst forecast regressions. We expect coefficients on the variable *Disclosure*R&D, Disclosure*Sales variability* and

Disclosure*Reverse of industry concentration to be positively associated consensus (p) and negatively associated with forecast dispersion.

3.3.3   Disclosure model

Barriers to entry constitute a cost that a new entrant would have to face compared to existing firms. These include cost in making capital investment intensity, existing intellectual property rights that make entry difficult, and industry concentration. Dye (1985) asserts that an incumbent firm with good news to communicate may choose to withhold information to prevent competition. The lower the market competition, the easier for a firm to keep private information (Verrecchia, 1983). In the opposite, Darrough and Stoughton (1990) assess that the more it is difficult to enter a market, the more confident the incumbents will feel about disclosing information.

Reverse of industry concentration. The demand for disclosure varies among industries (Wagenhofer, 1990). Industry concentration is a proxy for barriers to entry as the higher the concentration within an industry, the more existing firms are entrenched and the more difficult it is for a new firm to gain a foothold. Essentially, the concentration ratio is an indicator of the relative size of firms in relation to the industry as a whole. The reverse of industry concentration captures the level of competition in an industry.

Reverse of capital intensity. Product market concerns also revolve around a firm's capital investment intensity as it underlies its commitment to its various business partners (suppliers and customers) and increases its visibility to the surrounding communities. Under these particular conditions, additional disclosure will facilitate a firm's commercial operations and, ultimately, benefit stockholders. We measure capital investment intensity as a firm's gross property, plant

and equipment, divided by its total assets. This variable captures the level of competition at the firm level.

Prior literature proposes two conflicting predictions concerning the association between competition and disclosure. First, the lower the market competition, the easier for a firm to keep private information. Second, the more it is difficult to enter a market, the more confident the incumbents will feel about disclosing information. Since the actual impact of competition on customer value disclosure is unclear, no directional predictions are made for our two variables.

Sales variability. Sales variability *is* measured as the absolute value of the percentage change in sales from period t to period t-1, net of the industry sales variability. In a situation of sales instability, the firm may want to enhance its communication about its products and clientele. However, in such an uncertain context, the reliability of customer value disclosure may be an issue. Since the actual impact of sales variability on customer value disclosure is unclear, no directional predictions are made for the variable.

R&D. Proprietary costs are likely to increase with innovation. Dye (1985) asserts that an incumbent firm with good news to communicate may choose to withhold information to prevent competition. Hence, a firm proactive in R&D activities will fear to release information that could advantage competitors. However, innovative firms have new products to offer and to advertise, leading them to communicate information about customer value. Since the actual impact of R&D on customer value disclosure is unclear, no directional predictions are made for the variable. *R&D intensity* is measured as 1+log R&D.

Two variables are used to capture capital markets' information considerations that affect corporate disclosure: *Free cash flow* and *Analyst following*.

Free cash flow is a measure of external financing (Jensen, 1986; Dechow *et al*., 1996). It proxies for the demand for external financing (in a negative sense) by measuring a firm's ability to cover its capital expenditures. The higher the free cash flow, the lower the need for external financing. We can also argue that the higher a firm's free cash flow the higher its capacity to support proprietary costs. We measure that variable as cash flow from operations minus capital expenditures scaled by total assets. We expect a positive relationship between free cash flow and customer value disclosure.

Analyst following. A firm's analyst following is often used as a proxy for the level of other disclosures and the extent of a firm's communication with financial analysts (Leuz, 2003). Moreover, Lang and Lundholm (1996) and Healy et al. (1999) find a positive relation between analyst following and the quality of corporate disclosure. Hence, we expect a positive relation between analyst following and disclosure.

Firm size. Prior evidence is consistent in showing a positive relationship between the extent of corporate disclosure and firm size (Scott, 1994; Neu et al., 1998). Firm size proxies also for other factors, such as the extent of monitoring by financial analysts. Firm size, measured as Ln(Assets), is introduced with an expectation of a positive relationship with customer value disclosure.

4.   Results

4.1   Descriptive statistics

As illustrated in Table 1, customer value disclosure shows a mean score of 9.51. Components that exhibit the highest mean scores are Customer profile/Market segments/Market

share/Number of customers (2.62) and Attributes of products/Brands/Range of products/Competitive advantage (1.89). Internal consistency estimate (not tabulated) shows that the variance is quite systematic with a Cronbach's alpha on score components of 0.72. This is slightly higher than Botosan (1997) who finds an alpha of 0.64 for an index including five categories of disclosure in annual reports. Cronbach's alpha estimates the proportion of variance in the test scores that can be attributed to a true score variance. It can range from 0 (if no variance is consistent) to 1.00 (if all variances are consistent). According to Nunnaly (1978), a score of 0.70 is acceptable.

[Insert table 1]

Table 2 provides some descriptive statistics about sample firms' financial variables. In average, firms are followed by close to 7 analysts. Sample firms are relatively large (total assets averaging $7.5 billion) and are followed by seven analysts on average. About 22% of sample firms have a concentrated ownership. The level of R&D expenditures is quite low averaging 0.54 in percentage of sales. This is not surprising given the importance of resource-based industries in Canada. Competition is quite high, as expressed by variable *Reverse of capital intensity* (mean of 0.49), and the *Reverse of concentration ratio* (mean of 0.95) while *Sales variability* scaled by industry is quite high (mean of 0.51).

[Insert table 2]

Table 3 presents correlations. Consistent with H1, *Analyst following* is statistically correlated with *Disclosure* (0.18). *Analyst following* is also correlated with *Systematic risk* (0.11),

Firm size (0.16) and environmental uncertainty proxies, i.e. *R&D* (0.23), *Sales variability* (0.15). Consistent with H2, *Disclosure* is correlated with *Consensus* (*p*) (0.16) and *Forecast dispersion* (-0.17). *Disclosure* is negatively correlated with *Share price volatility* (-0.23). Finally, as expected, R&D intensity is positively correlated with *Reverse of industry concentration* (0.11) and *Sales variability* (0.19). Firms facing high competition and unstable sales have an incentive to innovate to survive in the product market.

[Insert Table 3]

From table 4, we observe that analyst following, consensus (p) and forecast dispersion vary according to the level of dynamism. As expected, dynamic firms are followed by more analysts, show lower consensus and higher forecast dispersion.

[Insert table 4]

4.2   Multivariate analyses

Since we posit that a firm's information dynamics may affect customer value disclosure, analyst following as well as analyst forecasts simultaneously, we first assess whether or not interaction exists between these variables using Hausman tests (without the interaction term for dynamism). Based on this procedure, we reject the null hypothesis of no endogeneity with respect to *Consensus (p)* and *Disclosure* (t=-4.19; p < 0.00). Therefore, these variables are treated endogenously. In light of this diagnostic, we rely on a three-stage estimation model for the simultaneous test of consensus (p) and customer value disclosure. 3SLS (which combines 2SLS

and Seemingly Unrelated Least Square - SURE) may improve the efficiency of parameter estimates when there is contemporaneous correlation of errors across equations. Furthermore, the greater the intra-equation multicollinearity, the more likely 3SLS provides a considerable gain in efficiency for the entire system of SURE (Binkley, 1982). In practice, the contemporaneous correlation matrix is estimated using OLS residuals.

For *Consensus* simultaneous regressions, we observe a significant correlation of errors across equations (-0.51 between *Consensus* and *disclosure* equations for R&D, -0.50 for Sales variability and -0.48 for Reverse of industry concentration). Concerning intra-equation multicollinearity, we observe that interaction terms are highly correlated. *Disclosure* is correlated at 0.85 with *Disclosure*Reverse of industry concentration* and 0.63 with *Disclosure*R&D*. Since multicollinearity could be an issue, SURE is likely to improve the efficiency of the entire system (Binkley, 1982).

With respect to *Forecast dispersion* (1.14; $p < 0.257$), and *Analyst following* (-1.29; 0.199), we do not observe endogeneity with *Disclosure.* For these regressions, we will rely to OLS estimations. The software being used is STATA. Finally, we exclude from regressions all observations with standardized residuals exceeding two.

4.2.1   Analyst following and environmental dynamism

Table 5 reports results of an OLS estimation regarding the determinants of analyst following taking into account environmental dynamism.[1] Results show that customer value disclosure is positively associated with analyst following for *R&D* (0.072; $p < 0.01$), *Sales*

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[1] We run a principal component factor analysis on the three distinct variables used to capture the environmental dynamism, i.e. R&D, Sales volatility, and Concentration ratio. All three variables load on a single factor (45% of variance explained).

variability (0.0.041; p < 0.05), and *Reverse of industry concentration* regressions (0.048; p < 0.01) since the coefficient on *Disclosure* is positive and significant. This is consistent with hypothesis 1. Consistent with hypothesis 3, environmental dynamism enhances the association between customer value disclosure and analysts following since coefficients on interaction terms are positive and significant in all three regressions.

As a sensitivity analysis, since the marginal effect of the number of analysts following a firm is likely to decrease, we use the logarithm of one plus the number of analysts who follow the firm as a measure of analyst following. Results (not tabulated) remain almost similar to those provided in table 5.

[Insert Table 5]

4.2.2 Analyst forecasts, disclosure and environmental dynamism

Table 6 reports results of OLS regression estimations regarding the determinants of forecast dispersion. As expected, we observe that customer value disclosure decreases analyst forecast dispersion. This is consistent with hypothesis 2. As expected, consistent with hypothesis 4, this relation is enhanced for dynamic firms, as expressed by *Disclosure* and *Sales variability* (-0.003; p < 0.05), and the *Reverse of industry concentration* (-0.003; p < 0.05). Moreover, dynamism in itself increases forecast dispersion in the case of sales variability (0.047; p < 0.01) and competition (0.073; p < 0.01).

In panel A of Table 7, we present simultaneous test of analyst forecasts and customer value disclosure for the precision of common information, i.e. consensus (*p*), treating the determinants of customer disclosure as instruments in 3SLS estimations. As expected, consistent with hypothese 2, we observe that customer value disclosure increases common information

among analysts. Coefficients on *Disclosure* are positive and significant in all three regressions. This relation is enhanced for dynamic firms, as expressed by *Disclosure* and the level of R&D (0.006; $p < 0.05$), and *Sales variability* (0.021; $p < 0.05$). This is consistent with hypothesis 4.

[Insert Table 6]

Panel B of Table 7 presents the results for the disclosure regressions. Our findings show that coefficients on *Reverse of Capital intensity*, *Free cash flow*, *Analyst following* and *Firm size* are positively and statistically associated with customer value disclosure in all three regressions while the coefficient on *Reverse of industry concentration* and *R&D* are negatively related to *Disclosure* for the three regressions. Consistent with prior research, voluntary disclosure is positively related to analyst following, free cash flow and firm size.

As for competition, the higher competition at the industry level, the less the firm discloses information about its customers. This is consistent with Dye's (1985) assertion that an incumbent firm with good news to communicate may choose to withhold information to prevent competition. However, the less barriers to entry at the firm level, as expressed by the reverse of capital intensity, the more the firms seems to release information about its customers. This result is consistent with Darrough and Stoughton (1990) who assess that the more it is difficult to enter a market, the more confident the incumbents will feel about disclosing information.

As mentioned earlier, the industry concentration ratio is computed at country-level and does not take into account foreign competition. As a sensitivity analysis, we add the number of geographic segments as a control variable in the disclosure regression. The coefficient on the variable *Geographical segments* is not significant and results for the three regression models remain similar as those presented in table 7.

The ability of a firm to support proprietary costs, as proxied by *Free cash flow*, is positively related to *Disclosure* for all three regressions.

[Insert table 7]

5.   Discussion and conclusion

Environmental dynamism is the most important contributor to environmental uncertainty (Duncan, 1972). Uncertainty is one of the most powerful contextual variables affecting organizational design and managerial decisions (Ghosh and Olsen, 2009). Therefore, it should also affect the process of forecasting earnings. In this paper, we build on prior literature on voluntary disclosure by investigating the relationship between analyst following, analyst forecasts and customer value disclosure considering environmental dynamism.

First, results suggest that customer value disclosure attracts financial analysts. Our results show that customer value disclosure is positively associated with analyst following. Second, it appears that customer value disclosure increases consensus among financial analysts and forecast dispersion. Third, environmental dynamism enhances the association between customer value disclosure and analyst following. Finally, environmental dynamism enhances the association between customer value disclosure and consensus in analyst earnings forecasts.

The present study contributes to our knowledge of voluntary disclosure in the following manner. Our findings reveal that the relations between customer value disclosure, analyst following and analyst forecasts are not straightforward but depend on a firm's environmental uncertainty. Such insights may help standard setters and regulators in the development of new and effective disclosure guidelines.

The results of this study should be interpreted with caution at least two reasons. Our model is sensitive to the choice and validity of independent variables, especially those treated endogenously. To mitigate specification error, we base the choice of explanatory variables on prior empirical studies. However, it does not completely eliminate the potential for model misspecification and bias of the regression coefficients. Second, our measure of disclosure is based on a coding instrument that assumes the relevance of the information collected. However, selected items may not fully capture the underlying phenomenon.

Prior research documents that institutional characteristics affect the information environment across countries, thus potentially influencing analysts' costs and benefits from collecting and processing corporate information. A country's governance regime affects both the quality of voluntary disclosure and the effectiveness of its use by stock market participants (Roe, 2003). Since investor protection rights vary internationally, an objective for future research could be to analyze different governance regimes. For example, it would be interesting to assess the moderating role of country-level governance mechanisms and market regulation on the relation between environmental uncertainty and analysts' decision to cover a firm as well as the quality of their forecasts.

Table 1

Customer value disclosure
Component Scores

	Min.	Max.	Mean	Std dev.
Distinct attributes of products / Brands / Range of products / Competitive advantage	0	34	1.89	4.47
Reliability: errors / returns	0	13	0.53	1.69
Price	0	9	0.46	1.47
Delivery time	0	6	0.25	0.97
Awards	0	20	0.66	2.69
Product security	0	15	0.48	1.81
Product life cycle (launch, growth, maturity, decline)	0	3	0.10	0.49
Advertising and product promotion (launching, marketing)	0	7	0.26	1.01
Customer profile / market segment / market share / number of customers	0	45	2.62	5.52
Pre-sales support: information / counseling / order tracking	0	7	0.47	1.32
After-sales service / insurance/repair	0	13	0.46	1.48
Customer satisfaction / complaints management	0	13	0.39	1.55
Customer loyalty	0	5	0.11	0.58
Program loyalty	0	12	0.41	1.67
Order backlog	0	15	0.18	1.20
Total score	0	79	9.51	15.55

Table 2
Descriptive statistics

	Minimum	Maximum	Mean	Median	Std dev.
Analyst following	0	40	6.80	5.00	5.67
p	-0.37	0.99	0.59	0.76	0.41
Forecast dispersion	0.001	2.22	0.23	0.11	0.36
Systematic risk	0	4.61	1.12	1.00	0.72
Share price volatility	2.10	18.00	6.38	5.95	2.63
Control block (%)	0.01	94.3	22.46	14.02	26.36
R&D (in % of sales)	0	79.25	0.54	0.00	5.91
Sales variability (ABS Net change in sales)	0	8.47	0.51	0.25	1.02
Reverse of concentration ratio	0.79	0.99	0.95	0.97	0.04
Reverse of capital intensity	0.03	0.99	0.49	0.44	0.31
Firm size (total assets in million $)	107	143 671	7 575	2 350	16 925
Free cash flow	-0.02	0.26	-0.01	0.01	0.09

Table 3
Correlations

		2	3	4	5	6	7	8	9	10	11	12	13
1	Analyst following	0.03	-0.11	*0.14	*0.11	*0.18	*-0.11	*0.23	*0.15	-0.11	0.04	*0.16	0.01
2	*p*	1	0.02	-0.10	0.00	*0.16	*0.13	-0.05	0.01	*0.26	*-0.14	0.09	*0.11
3	Forecast dispersion		1	0.05	0.11	*-0.17	-0.02	-0.06	0.03	-0.02	-0.05	*-0.19	*-0.12
4	Systematic risk			1	*0.59	*-0.27	0.04	*0.27	*0.17	*-0.25	*0.40	*-0.16	*-0.24
5	Share price volatility				1	*-0.23	*0.19	*0.19	*0.18	*-0.12	*0.37	*-0.25	*-0.21
6	Disclosure customers					1	*-0.13	-0.06	-0.10	*0.25	*-0.24	*0.31	*0.25
7	Control block						1	0.03	0.04	0.04	*0.12	*-0.28	*0.14
8	R&D							1	*0.24	-0.04	*0.15	0.10	-0.09
9	Sales variability								1	-0.03	0.08	*-0.17	*-0.24
10	Reverse of capital intensity									1	-0.09	-0.06	*0.30
11	Reverse of concentration ratio										1	*-0.17	-0.08
12	Firm size											1	*0.15
13	Free cash flow												1

Note: *: $p < 0.10$.

Table 4
Analyst following, analyst forecasts and dynamism

	Analyst following					Mean p	Forecast dispersion
	Minimum	Maximum	Mean	Median	Std dev.		
Sales variability							
< Median	1	20	7.93	7	4.45	0.65	0.15
> Median	1	40	8.65	8	5.35	0.55	0.31
R&D							
< Median	1	19	7.55	7	4.06	0.69	0.22
> Median	1	40	10.93	10	6.62	0.50	0.24
Reverse of industry concentration							
< Median	1	40	7.68	6	5.78	0.77	0.08
> Median	1	20	8.64	8	4.32	0.50	0.27

Table 5
OLS Estimation of the Relationship between
Analyst Following and Customer Value Disclosure
in Interaction with Environmental Dynamism

N = 179	Sign	R&D intensity	Sales variability	Reverse of industry Concentration
Share price volatility	+	**0.191	0.127	**0.198
Firm size	+	***0.272	***0.337	***0.315
Control block	-	-0.004	*-0.018	-0.009
Disclosure	+	***0.072	**0.041	***0.048
Disclosure*Dynamism	+	0.003	**0.071	**0.062
Dynamism	+	***1.809	0.459	-0.734
Adjusted R-square		15.7%	18.3%	23.4%
F-statistic/P		6.49/0.000	7.94/0.000	9.84/0.000
Outliers		10	0	13

*: $p < 0.10$; **: $p < 0.05$; ***: $p < 0.01$. One-tailed.

Table 6
OLS Estimation of the Relationship between
Analyst Forecasts and Customer Value Disclosure
in Interaction with Environmental Dynamism

N=179	Sign	R&D intensity	Sales variability	Reverse of industry concentration
Forecast dispersion				
Analysts	-	**-0.007	***-0.008	***-0.006
Beta	+	***0.064	**0.048	***0.055
Negative earnings	+	*0.067	**0.066	**0.061
Disclosure	-	***-0.005	**-0.002	**-0.002
Disclosure*Dynamism	-	0.000	**-0.003	**-0.003
Dynamism	?	-0.078	**0.047	***0.073
Adjusted R-square		9.2%	13.6%	17.9%
F-statistic/P		4.13/0.000	.77/0.000	7.44/0.000
Outliers		4	5	8

*: $p < 0.10$; **: $p < 0.05$; ***: $p < 0.01$. One-tailed if there is a predicted sign, two-tailed otherwise.

Table 7
3SLS Estimation of the Relationship between
Analyst Forecasts and Customer Value Disclosure
in Interaction with Environmental Dynamism

N=179	Sign	R&D intensity	Sales variability	Reverse of industry concentration
Panel A Consensus (p)				
Analysts	-	**-0.015	***-0.019	-0.007
Beta	+	0.033	0.062	0.047
Negative earnings	+	***0.171	***0.194	**0.152
Disclosure	+	**0.017	**0.017	***0.033
Disclosure*Dynamism	+	**0.006	**0.021	-0.021
Dynamism	?	-0.059	-0.107	0.073
Ch2/P		24.7/0.000	26.1/0.000	26.5/0.000
Panel B Disclosure				
Reverse of industry concentration	?	***-1.246	***-1.152	**-0.632
Reverse of capital intensity	?	***10.188	***7.621	***10.178
Sales variability	?	-0.426	-1.659	-1.491
R&D	?	***-1.443	***-1.287	*-0.696
Free cash flow	+	**26.972	*22.047	**26.011
Analyst following	+	***0.407	***0.389	***0.293
Firm size	+	***1.911	***2.092	***1.961
Chi2/P		56.3/0.000	52.2/0.000	45.4/0.000
Outliers		4	15	14

*: $p < 0.10$; **: $p < 0.05$; ***: $p < 0.01$. One-tailed if there is a predicted sign, two-tailed otherwise.

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