ESG UQÀM

Chaire d'information financière et organisationnelle

The Nature and Extent of Performance Disclosure on the Web: Information Asymmetry-Based Evidence

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December 2007

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Abstract

Adopting an integrated analysis of firms' web-based performance disclosure strategy, we extend the existing literature on voluntary disclosure by investigating the impact of the nature (financial versus non-financial, qualitative versus quantitative) and extent of web-based performance disclosure on stock price volatility. Results suggest that only qualitative disclosure reduces stock price volatility, both financial and non-financial related disclosures. Furthermore, it does appear that firms take into account ultimate costs and benefits to stockholders when determining the nature and extent of their web-based performance disclosure. Finally, our results suggest that efficient governance leads to more transparency in quantitative performance disclosure while the extent of CEO stock options leads to less transparency in qualitative performance disclosure.

Key words: Information asymmetry, voluntary disclosure, corporate governance, web-based disclosure, media exposure.

Incidence de la nature et de l'ampleur de la communication de la performance par Internet sur la volatilité des titres boursiers

Résumé

La présente étude porte sur l'incidence de la nature (information financière versus non financière, qualitative versus quantitative) et de l'ampleur de la communication de la performance par Internet sur la volatilité des titres boursiers. Nos résultats montrent que seule l'information qualitative réduit l'asymétrie d'information sur les marchés boursiers, qu'elle soit de nature financière ou non financière. En outre, les coûts et bénéfices pour la firme (coûts d'information et coûts exclusifs) sont des déterminants clés du niveau de communication sur la performance organisationnelle. Enfin, une saine gouvernance mène à une plus grande transparence dans la communication d'informations qualitatives alors que la présence d'options sur actions mène à moins de transparence dans la communication d'informations quantitatives.

Mots-clés : asymétrie d'information, communication volontaire, gouvernance, communication par Internet, exposition aux médias.

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INTRODUCTION

The Web has led firms to adapt their disclosure strategies since it offers much more flexibility than traditional external reporting means. Internet is now seen as the best platform for the disclosure management and stewardship of financial and non-financial information (Robb, Single and Zarzeski, 2001; Marston and Polei, 2004). Moreover, there is essentially no marginal distribution cost if additional information is released. Aerts, Cormier and Magnan (2007) assert that the determination of web-based corporate performance disclosure, as well as how financial analysts rely on such disclosure for their forecasting work, is affected by a firm's country-specific governance regime.

In this paper, we extend Aerts, Cormier and Magnan (2007) that is based on a comparative study between Europe and North America to further focus on one specific contracting and governance regime, i.e., Canada, considering the nature and extent of web-based disclosure and firm-specific governance features. We assert and test that the determination of corporate performance disclosure, information asymmetry and analyst following are closely intertwined processes. Accordingly, our research design takes into account the simultaneous effects of a firm's web-based performance disclosure strategy on: 1) the determinants of the nature and extent of web-based performance disclosure 2) the impact of the nature and extent of web-based performance disclosure on share price volatility, and, 3) the extent of its analyst following. More specifically, the aim of this paper is to assess how the nature (financial versus non-financial and qualitative versus quantitative) and the extent of web-based performance disclosure affects stock price volatility. To the best of our knowledge, this study is the first to investigate the impact of the nature of web-based performance disclosure on information asymmetry.

We rely on a conceptual framework that weaves together three complementary perspectives: information costs and benefits, analyst following interactions, and governance and public pressure concerns. From an information costs and benefits perspective, we argue that organisations provide performance disclosure to cater to their stockholders' needs and interests; a necessity if they are to be able to tap capital markets efficiently in the future. However, an organisation's propensity to provide information to capital markets is conditioned by its analyst following and governance structure, particularly at the board level. Finally, beyond capital markets, any organisation evolves within a broader societal context where it must defend and legitimize its purpose and the value of its activities. Failure to establish a confident relation with society, or its agents (government, regulators), may jeopardize an organisation's going concern value. Therefore, we expect that societal concerns, as expressed through the prism of media coverage, will influence the nature and extent of a firm's performance disclosure, especially at critical junctures.

Our results from simultaneous equations suggest that only qualitative-based disclosure, i.e. indicative and descriptive information, reduces stock price volatility, either financial or non-financial related disclosure. As expected, firm size attenuates the impact of performance disclosure on share price volatility. Furthermore, consistent with the nature of their performance disclosure, it does appear that firms take into account ultimate costs and benefits to stockholders when determining the extent of their disclosure. Our findings are consistent with our view that the determination of web-based voluntary disclosure espouses a multi-tiered process. Information costs are generally associated with quantitative performance disclosure. We also document that governance and monitoring issues are associated with quantitative performance disclosure. Finally, not surprisingly, analyst following does not create a demand for financial related disclosure since, in most cases, analysts are already aware of a firm's publicly financial information.

The remainder of the paper is organized as follows. Section 2 contains a theoretical background and research propositions. The study's methodology is described in section 3. Results are presented in section 4. Finally, section 5 provides a discussion of results'

potential implication.

2.   THEORETICAL BACKGROUND AND RESEARCH PROPOSITIONS

2.1   Prior research on voluntary disclosure

The board of directors and top management are accountable toward the firm's shareholders. Hence, the firm must provide shareholders with value-relevant information that impounds cost-benefit trade-off assessments. By reassuring a firm's investors about various aspects of its operations or performance, expanded disclosure leads to a reduction in information asymmetry between managers and investors and, ultimately, to a reduction in information costs to be incurred by investors (e.g., Kim and Verrecchia 1994). This, in turn, brings benefits to a firm by allowing it to lower its cost of capital, to raise its valuation multiples, to increase stock liquidity and to enhance interest by institutional investors (Healy, Hutton and Palepu, 1999).

Information costs and benefits. Grossman (1981) and Milgrom (1981) assert that there is an information gap between investors and managers. If a firm's managers do not provide credible information, investors can choose to collect and analyze data from alternative information sources at their own cost. However, from society's perspective, non-disclosure may be deemed inefficient as it leads many investors to simultaneously incur costs for the collection of the same information (Rubinstein 2001). Hence, under certain conditions, a firm may decide to voluntarily disclose information if doing so is less costly than having investors and other market participants incur information costs themselves (Atiase, 1985; Lang and Lundholm, 1993). Firms with a higher level of perceived risk have also an incentive to provide additional disclosure. The scope of Healy and Palepu's (2001) review of the literature illustrates the perceived importance of information asymmetry and, hence, of information costs, as determinants for corporate disclosure.

Litigation/proprietary costs. By contrast, disclosure can be costly to the firm if outside parties use the information in ways that are harmful to its interests (e.g., competitors, pressure groups). However, by incurring costs that result from disclosure of proprietary information, a firm enhances the credibility of the information being released and improves its reputation as a quality discloser (Skinner, 1994). Such ability to incur costs from the release of proprietary information is determined by a firm's financial condition. Hence, in choosing a disclosure strategy, managers have to trade off the benefits from expanded disclosure against the costs of disclosing potentially damaging information. Prior evidence in financial reporting does suggest that information costs are a critical determinant of corporate financial disclosure decisions.

A firm's decision to disclose information to investors is influenced by concern that such disclosures can damage their competitive position in product markets (Healy and Palepu, 2001). Some proprietary costs appear when a third party whose interests are not compatible with those of the firm can use the disclosed information. Thus, the capacity of the business to support these costs will determine the size of information disclosed. Unlike information cost hypothesis, proprietary cost hypothesis assumes there are no conflicts of interest between managers and shareholders.

Managers typically do not reveal all value-relevant information. A likely reason is that bringing private information into the public domain exposes the firm to actions by third parties that potentially reduce its future cash flows (Dye 1985). Suppliers, customers or debtholders may use proprietary information to review their contractual relationships with the firm, with possible negative monetary implications. Competitors may rely on information released by a firm to gain a competitive edge. Since they result from the disclosure of proprietary information, such costs are deemed proprietary (Verrecchia 1983; Scott 1994). By incurring proprietary costs, a firm enhances the credibility of the information being released and, hence, the value-creation potential of its reporting strategy (Skinner 1994). For instance, there is evidence that better quality voluntary disclosure potentially leads to a reduction in a firm's cost of capital (Botosan 1997; Sengupta 1998). Before a firm can benefit from information disclosure, it must build up a

reputation among stakeholders to be a credible discloser (Healy, Hutton and Palepu, 1999). In other words, for disclosure to have value, a firm must initially incur some costs, most likely by disclosing proprietary information that may be used by some stakeholders in reducing firm value (Verrecchia, 1990).

2.2 Governance and Monitoring

Prior studies show that a firm's governance influences the quality of its voluntary disclosure (Eng and Mak, 2003). More specifically, the intensity of monitoring by a board has a direct influence on managerial discretion and typically requires firms to engage into more extensive organisational performance measurement and reporting (Fama, 1980).

Such monitoring by the board can be implemented through various means and attributes. For instance, an independent board is more likely to be effective in assessing managerial decisions and performance than a board that comprises only insiders (Fama and Jensen, 1983; Beasley, 1996; Xie *et al*., 2003). With respect to voluntary disclosure, Chen and Jaggi (2000) document that a board that comprises mostly independent non-executive directors is more likely to be associated with comprehensive financial disclosure. Another example is provided by Karamanou and Vafeas (2005) who show that firms with better governance are more likely to issue voluntary earnings forecasts. However, Cheng and Courtenay (2005) find that the relation between governance and disclosure is enhanced if there is an efficient regulatory environment.

Furthermore, there is evidence that stock options can align manager interests with shareholder interests. However, contracting costs may lead to incomplete contracts and agency conflicts. Aboody and Kaznik (2000) show that managers with stock-based compensation mislead shareholders by accelerating bad news and by delaying good news, thus potentially reducing the exercise price of coming stock option grants. Hence, web-based disclosure is likely to be opportunistically affected by the presence of CEO stock options.

2.3   Governance and media coverage

To legitimize their firm's activities, managers must be able to assess and react to public concerns. In other words, they need to assess the nature and scope of the comments expressed by the public regarding the firm's activities. One such outlet is the media. Increased media attention on a particular issue or organization leads to increased community concern (Brown and Deegan, 1998). This suggests that media attention, e.g., through press coverage, directly underlies public pressures managers and the board may face regarding their firm's activities.

The media and the business press tend to view the functioning of the board of directors as the most central internal governance mechanism. The board of directors is expected to assume an effective oversight function. One could refer to these pressures as external accountability pressures (with increased external transparency as the most straightforward - although indirect - means to discharge these accountability pressures). External (independent) members have their reputation as professional referees at stake (Fama and Jensen, 1983 and will be more sensitive to reputational risk (Aguilera, 2005) threats than inside directors. Reputational risk rests highly on media coverage.

2.4   Analyst following

As financial analysts are an integral part of the information dissemination process in capital market, the imperfect provision and use of available information would be reflected in the way they function, and in the quality of their forecasts. As the major capital market intermediaries, their role and behaviour are largely affected by the imperfections and constraints of the capital market and by the complexity of the regulatory environment in which they operate. Bricker *et al.* (1999) show that analyst following is positively related to equity trading, equity issuance and corporate disclosure, and negatively related to risk, insider and institutional ownership (organizational

structure) and complexity. Moreover, Aerts, Cormier and Magnan (2007) find that web-based corporate disclosure attracts financial analysts.

2.5   Research propositions

Firms with high share price volatility have incentives to reduce information asymmetry between managers and investors since such actions lower financing (Gibbins, Richardson and Waterhouse, 1990; Frankel, McNichols and Wilson, 1995; Clarkson, Kao and Richardson, 1994). By reassuring a firm's investors regarding various aspects of its operations or performance, expanded disclosure leads to a reduction in information asymmetry between managers and investors and, ultimately, to a reduction in information *costs* incurred by investors (e.g., Kim and Verrecchia 1994).

In the literature, several approaches to assess a firm's information asymmetry have been proposed. Francis, Khurana and Pereira (2005), Leuz and Verrecchia (2000), Healy Hutton and Palepu (1999) and Welker (1995) show that the extent of information asymmetry – proxied by bid-ask spread, share price volatility or stock liquidity – is negatively associated with disclosure quality.

Cormier, Ledoux and Magnan (2008) show that a firm's web-based performance disclosure strategy affects earnings valuation multiples, but in a differential way according to the nature of the information being disclosed. More specifically, while disclosure about Human & Intellectual capital and to a lesser extent Social responsibility is associated with a larger earnings multiple, i.e. a lower cost of capital, the authors do not find any association concerning disclosure about Customer value and Financial/Governance. A potential explanation for the absence of a significant relationship for financial disclosure is the fact that market participants perceive differently the nature of the disclosed information, i.e. qualitative versus quantitative information.

In the current study, we expect a higher relationship between qualitative performance disclosure and share price volatility than for quantitative performance disclosure. The reason for this expectation is that a significant portion of quantitative financial information disclosed on the web is already available from other sources (e.g. annual report). This gives rise to our first research proposition:

Proposition 1) The association between share price volatility and the extent of web-based performance disclosure will be higher for qualitative disclosure.

Prior research document that information asymmetry is lower for large firms compared with small firms (Leuz and Verrecchia, 2000). Size controls for a firm's information environment. The number of investors in large firms is significantly higher than in small firms. Therefore, the amount of liquidity trading should be significantly higher for large firms than for small firms. Cheng, Gopinath and Krishnamurti (2002) show that an increase in trading activity of large firms leads to improvement in liquidity while an increase in small firms' trading activity leads to deterioration in liquidity. The authors document that while more frequent trading is associated with an improvement in liquidity, as proxied by the bid-ask spread, for large market capitalization stocks, the converse is true for small stocks. Therefore, we can expect performance disclosure to have a lower impact on share price volatility for large firms since investors have access to more information. Hence, our second proposition:

Proposition 2) The association between share price volatility and the extent of web-based performance disclosure will be lower for large firms.

The effectiveness of analysts' monitoring, as well as market efficiency in a particular firm's shares are enhanced if the number of analyst following the firm increases (Lang and Lundholm, 1996). Hope (2003) shows that analyst following essentially acts as a substitute for quality of financial disclosure. In a similar vein, Botosan (1997) and Richardson and Welker (2001) report that for firms with few analysts, corporate disclosure does affect the cost of capital, but this is not the case for firms with extensive

following. Hence, we expect the impact of web-based performance disclosure in explaining stock price volatility to vary with the number of analysts who follow the firm. This gives rise to our third proposition.

> *Proposition 3) Extensive analyst following weakens the association between the extent of web-based performance disclosure and share price volatility.*

3.   METHOD

3.1   Sample

The sample comprises 167 observations of web performance disclosure for the year 2003 and 147 from 2005. All non-financial firms represented on the Toronto Stock Exchange S&P/TSX Index were initially identified. Missing data for some firms (e.g., the need for more than one year of data for some financial information) resulted in a final sample of 167 firms in 2003. We use 2003 web-performance disclosure as a lag variable explaining disclosure in 2005. The sample reduction from 2003 to 2005 is due to mergers and acquisitions. Performance disclosure was collected from Web sites (web page and HTML) in summer 2003 and then 2005. Web sites were analyzed once in each of Summer 2003 and 2005. The same coding grid has been used by Cormier, Ledoux and Magnan (2008) for a Canadian sample and Aerts, Cormier and Magnan (2007) in a Europe versus North America comparative study.

Multivariate analyses were performed on 2005 web-based performance disclosure. Financial data for 2004 was collected from the Stock Guide and governance data was collected from 2004 proxy statements. The final sample is 130 firms since, out of the initial sample of 147 firms, there are missing data for board size and board independence (2 firms), stock options (12 firms). Data non-availability for some firms (e.g., the need for more than one year of data for some financial information) resulted in a final sample of 130 firms. Sample firms operate in the following industries: Metals and mines; Gold and

precious metals; Oil and gas; Paper and forest products; Consumer products; Industrial products; Real estate; Utilities; Communication and media; Merchandising.

3.2 Empirical model

This study attempts to provide an integrated analysis of firms' web-based performance disclosure strategy. We posit that this strategy affects simultaneously share price volatility, performance disclosure, and analyst following. It is thus important to actually control for the presence of endogeneity between our critical variables. To control for endogeneity, a simultaneous equations model is used.

The following structural equations model summarizes the approach to be adopted in the empirical analysis:

Share price volatility$_{it+1}$ =

$f(\beta_0 + \beta_1$Size + β_2Systematic risk + β_3Free float + β_4Performance disclosure + β_5Performance disclosure*Size + β_6Performance disclosure*Analyst following + β_7Analyst following) $_{it+1}$

Performance disclosure$_{it+1}$ =

$f(\beta_0 + \beta_1$New Financing + β_2Free float + β_3Analyst following + β_4Leverage + β_5Profitability + β_6US listing + β_7Size + β_8Board independence + β_9Board independence*Media exposure + β_{10}Media exposure + β_{11}Board size + β_{12}Audit committee size + β_{13}CEO stock options) $_{it}$

Analyst following $_{it}$ =

$f(\beta_0 + \beta_1$US listing + β_2Free float + β_3Leverage + β_4Size + β_5Systematic risk + β_6Lag Performance disclosure) $_{it}$

3.3 Measurement of web-base performance disclosure

Performance disclosure indicators, financial or non-financial, are based on balance scorecard literature and emerging performance measurement practices (e.g. for financial and governance disclosure [Standard & Poors, 2002]; for investors, governance and social responsibility disclosures [Pirchegger and Wagenhofer, 1999; Marston and Polei, 2004]; for indicators about operations' efficiency, value for client, innovation, development and growth [Ittner and Larker, 1998; Kaplan and Norton, 1996;Robb, single and Zarzeski, 2001]). We measure web-based performance disclosure using a coding instrument in a way that is similar to Wiseman (1982), Cormier and Magnan (2003), Aerts, Cormier and Magnan (2007) and Cormier, Ledoux and Magnan (2008). The grid comprises 85 items. The 85 performance disclosure items are grouped into six categories: financial performance, corporate governance, customer value, human and intellectual capital, production efficiency, innovation, and development and growth. The web content is split among qualitative elements (indicative, descriptive) and monetary or quantitative elements. Each element is scored 1, and an item may include many elements. Our disclosure measure comprises only information that is on a firm's Web site and provided in an HTML format and specifically excludes mandated corporate documents which were linked to the web site (e.g., audited financial statements in PDF). Web sites were analyzed and coded online, with the structure of the web site being kept on a CR-Rom for future reference and validation. To ensure consistency across firms, two persons reviewed all individual scores independently. All disagreements were subsequently reviewed by one of the co-researchers. [1]

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1 A coding manual documenting coding instructions as well as standardized coding worksheets were prepared before hand. Each coder then applied the following coding sequence: (1) independent identification of the occurrence of items relative to the different coding categories; (2) independent coding of the items according to quality level of content and (3) timed reconciliation on a subset of company reports. The coders were intensively trained in applying coding instructions and in using the coding worksheets. They were unaware of the research hypotheses. Initial differences in identifying grid items accounted for on average 7% of the maximum number of items identified. Of the information quality level coding, less than 10% had to be discussed for reconciliation. Disagreement between coders mostly happened at the beginning of the coding process (essentially the first 40 sample firms). A researcher reconciled coding disagreements exceeding 5% of the highest total score between the two coders. Smaller disagreements were resolved by the two coders themselves. Overall, we think that this coding process provides a reliable measure of web-based disclosure. Internal consistency estimates (Cronbach's alpha on score components) show that the variance is quite systematic (alpha= 0.82 for sample period and 0.72 for 2005). 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 true score variance. It can range from 0 (if no variance is consistent) to 1.00 (if all variance is consistent). According to Nunnaly (1978), a score of 0.70 is acceptable.

We focus on voluntary performance disclosure on a firm's Web site, as it is comprehensive and accessible to everyone at low cost. Our disclosure measure comprises only information that is on a firm's Web site and does not encompass paper-based disclosure. In a Canadian context, mandated disclosure is being filed on SEDAR (a system of electronic data archiving and retrieval that is maintained by securities regulators). SEDAR includes all documents which disclosure is mandated by securities regulators: financial statements, annual reports, proxy statements, MD&A and press releases (which typically concern material changes). However, all these documents are also available on paper form. The content of all these documents is pre-specified and regulated. Therefore, our disclosure measure is likely to reflect mostly information that a firm is voluntary.

The use of a coding scale to qualify a firm's performance disclosure is appropriate for the following reasons. First, it allows for an integration of different types of information into a single figure that is comparable across firms in terms of relevance. Second, a qualitative scale allows for the researcher's judgment to be impounded in rating the value or quality of the disclosure made by a firm. While this process is more subjective, it ensures that irrelevant or redundant generalities are not considered strategic performance disclosure.

3.4   Explanatory Variables Measurement

3.4.1. *Determinants of share price volatility*

Prior studies on the determinants of information asymmetry component of cost of capital suggest numerous determinants other than voluntary disclosure (Leuz and Verrecchia, 2000). Based on that literature, we use firm size, systematic risk, free float and analyst following as determinants of share price volatility.

Size. Several studies (e.g. Botosan and Plumlee, 2005; Hail, 2002; Gebhardt, Lee and Swaminathan, 2001; Sengupta, 1998; and Botosan, 1997) find that larger firms benefit from a lower information asymmetry and therefore a lower cost of capital. Therefore, firm size controls at least partially for the firm's information environment (Leuz and Verrecchia, 2000). We thus expect share price volatility to be negatively associated with firm size.

Systematic risk. The higher a firm's systematic risk, the more difficult it is for investors to precisely assess a firm's value and the more likely they are expected to incur information costs to assess its risk drivers. Prior research shows that investors charge a higher cost of equity for firms with higher systematic risk (e.g. Leuz and Verrecchia, 2000; Hail and Leuz, 2006; Botosan and Plumlee, 2005; Mikhail, Walther and Willis, 2004; Gebhardt, Lee and Swaminathan, 2001; and Botosan, 1997). A positive relation is expected between systematic risk and share price volatility.

Free float. We use free float as an inverse proxy for the presence of insiders since control blocks have generally greater superior access to private information (Leuz and Verrecchia, 2000). Hence, we expect a negative association between free float and share price volatility.

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' communication with financial analysts (Leuz, 2003). Hence, we expect a negative relation between analyst following and share price volatility.

3.4.2. *Determinants of performance disclosure*

Verrecchia (1983) argues that whether a firm will voluntarily disclose corporate information is a function of the proprietary costs associated with the disclosure. Unless there is perceived benefit that outweighs the proprietary cost, firms will not disclose. We could argue that quantitative disclosures are likely to be viewed by management as

having higher proprietary value (they will reveal more to competitors, for example) than qualitative disclosures, and as such, will be less preferred as a disclosure tool than other types of disclosure, except when the contracting incentives (e.g. new financing) or governance pressures are high enough to induce the disclosure of information potentially more litigious (quantitative versus qualitative disclosure).

Information costs. Three variables are used to capture investors' information needs and, information costs with respect to a firm's web-based performance disclosure: New Financing; Free float; and Analyst following.

New financing. Lang and Lundholm (1993) document a positive relationship between the need for financing and voluntary disclosure (as measured by financial analysts' disclosure scores). Issues of long-term debt and equity are a measure of actual external financing (Dechow, Sloan and Sweeney, 1996). The variable measures the actual amount of long term financing raised through stock or debt offerings scaled by total assets. We expect a positive relationship between the variable *New financing* and web-based quantitative disclosure.

Free float. Ownership structure can determine the level of monitoring and, thereby, the extent of disclosure (Eng and Mak, 2003). Firms with widely-held ownership are expected to be responsive to public investors' information costs since no dominant shareholders typically have access to the information they need (Hope, 2003) and do want or need to share it with other stakeholders such as employees (Roe, 2003). Yhim, Karim and Ruthledge document that the proportion of outside ownership is significantly associated with high-level forecast precision. A positive relation is expected between Concentrated Ownership and web-based quantitative disclosure.

Analyst following. Lang and Lundholm (1996) and Healy, Hutton and Palepu (1999) find a positive relation between analyst following and the quality of a firm's disclosure. Hence, we expect a positive relation between analyst following and the extent of web-

based performance disclosure, both qualitative and quantitative (Khanna, Palepu and Srinivasan, 2004).

Litigation/proprietary costs. A priori, the magnitude of potential costs a firm faces because of disclosure is difficult to assess since it requires the identification of all parties that may use information to the firm's detriment. However, a firm's financial condition does provide a measure of its willingness to release proprietary information since only firms that are financially sound may be able to trade off the benefits from additional disclosure with the costs of revealing potentially damaging information. In contrast, firms in poor financial condition may be unable to withstand the initial negative consequences that are needed to gain any benefits from more extensive disclosure. Four variables proxy for a firm's ability to support proprietary costs: Profitability; Leverage; US listing; and Firm size.

Profitability. Many studies document a positive association between a firm's level of disclosure and its financial performance (Mills and Gardner, 1984; Cochran and Wood, 1984; McGuire, Sundgren and Schneeweis, 1988; Cormier and Magnan, 2003). A positive relationship is expected between profitability, as measured by return on assets, and quantitative performance disclosure.

Leverage. Firms in poor financial condition may not be able to withstand the initial negative consequences that are needed to gain any benefits from more extensive disclosure. Thus, consistent with prior findings (McGuire, Sundgren and Schneeweis, 1988; Cormier and Magnan, 2003), it is expected that there is a negative relationship between a firm's leverage as measured by Long term financial debt/Total assets and quantitative performance disclosure.

Firm Size. Prior evidence is consistent in showing a positive relation between the extent of corporate disclosure and firm size (Scott, 1994; Cormier and Magnan, 1999; Neu, Warsame and Pedwell, 1998). Firm size proxies also other factors, such as the extent of monitoring by analysts. Under these conditions, firm size, measured as ln(Assets), is

introduced with an expectation of a positive relation with web-based quantitative performance disclosure.

Governance and monitoring. Four variables are introduced to capture the impact of corporate governance as a monitoring factor affecting web-based disclosure.

Concentrated ownership. Concentrated ownership is measured as a dichotomous variable taking a value of one (1) when an investor, or a related group of investors, owns more than 10% of a firm's outstanding voting shares, and zero (0) otherwise. A negative relationship is expected between concentrated ownership and quantitative performance disclosure.

Board independence and media exposure. We expect board independence, measured as the proportion of outside directors, to be associated with voluntary disclosure. Another aspect of board independence is the separation of the roles of Chair and Chief Executive Officer. Our variable takes the value of zero (0) when the majority of directors are not independent, one (1) when the majority of directors are independent and two (2) when the majority of directors are independent, and the function of CEO and Chair of the board is separate. We expect a positive relationship between this variable and quantitative performance disclosure. In addition, we expect that in the absence of media coverage, the impact of external board members on disclosure transparency will be restricted to financial disclosure while they will influence non-financial disclosure when the firm is facing extensive media coverage. In the absence of media coverage, external board members will focus on financial disclosure transparency while they will also monitor non-financial disclosure when the firm is facing extensive media coverage. We expect that as media exposure increases, board members will monitor more transparency in web-based performance disclosure and thus more quantitative disclosure.

Board size and Audit committee size. Beasley (1996) finds a positive relationship between board size and the likelihood of financial statement fraud while Abbott, Park and Parker (2000) find no relationship. Moreover, Bédard, Chtourou and Courteau (2004) find that

board size is associated with less earnings management but only for income decreasing accruals. Moreover, we put forward the view that audit committee effectiveness is a critical determinant of voluntary web-based disclosure. In Canada, audit committees must comprise at least three independent members. We can argue that three is a small number for the audit committee to play effectively its monitoring role and that adding a few more members could be beneficial in that regard. Hence, we expect board size and audit committee size to be positively associated with web-based quantitative performance disclosure.

Stock options. The importance of contracting costs may lead to incomplete contracts and agency conflicts. The more agency conflicts between managers and shareholders are important, the more managers with stock-based compensation will manage web-based disclosure to maximize the value of their stock options. We expect the voluntary nature of web-based disclosure to be opportunistically affected by the presence of CEO stock options. Since the actual impact of stock options on performance reporting is unclear, no directional predictions are made.

3.4.3. *Determinants of analyst following*

Since analyst following and web-based performance disclosure are not likely to be exogeneous (Lang, Lins and Miller, 2003), it is thus important to assess the determinants of a firm's analyst coverage and as such to include corporate performance disclosure as a determinant.

Lag Performance disclosure. Prior research shows that analyst coverage tends to be positively related to the degree of information disclosure by a company, presumably because better disclosure decreases the cost of doing research on a company (Lang and Lundholm, 1996; Healy, Hutton and Palepu, 1999). Hence, analysts are less likely to be attracted to firms with poor disclosure (Lang and Lundholm, 1996; Healy, Hutton and Palepu, 1999; Bushman and Smith, 2003).

US listing. We also expect that foreign listings will potentially influence the demand for analysts' services. Lang, Lins and Miller (2003) find that firms that are cross-listed on the US exchanges have greater analyst following than firms that are not cross-listed. Foreign listing is likely to stimulate activity by analysts in the foreign country, adding to the domestic supply of analysts' services. In addition, since foreign investors are likely to experience greater information asymmetry than domestic investors, they create greater demand for analysts' research. From the supply side, analysts may be more inclined to follow cross-listed firms since these firms are more likely to attract a larger investor base.

Free float. There is likely to be a greater demand for analysts' services if ownership is more widely dispersed. As Hope (2003) posits, when ownership is diffused, information is less likely to be communicated through private channels, increasing the role of financial analysts. Moreover, Lang, Lins and Miller (2004) argue that analysts are unwilling to follow firms with potential agency problems. They document that analyst coverage is positively related to the absence of control rights held by family or management groups.

Leverage. In contrast to well-capitalized firms, indebted firms rely less on equity markets to raise capital. Hence, this reduces their appeal and value for analysts. Therefore, we expect a negative relation between leverage and analyst following.

Firm size. Prior research on analyst following in the US shows that firm size is positively related to analyst following. Bhushan (1989) argues that company size affects both the aggregate demand and the aggregate supply for analysts' services. Demand is positively affected by company 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 company and the payoff from following is related to its size (Bhushan, 1989).

Systematic risk. Prior research documents a relation between stock volatility and analyst coverage (e.g. Bhushan, 1989; Lang, Lins and Miller, 2003), suggesting that demand for

analysts' services in higher for companies with higher financial risk. Therefore, we expect a positive relationship between beta and analyst coverage.

3.5.   Variable measurement

Independent variables	Measure
Information costs	
Systematic risk	Beta in 2004
New financing	Long-term debt borrowing plus stock issued in 2004 scaled by total assets.
Free float	The percentage of shares that are not closely held (total shares outstanding minus control blocks of 10% or more).
Analyst following	Number of analysts following a firm in 2004.
Litigation/Proprietary costs	
Leverage	Long term debt / Total assets
Profitability	Return on assets
US listing	SEC registration (binary variable 1; 0 if not).
Firm size	Ln(Total Assets) as of year-end 2004
Governance/Monitoring	
Board independence	(0) if a majority of directors are not independent; (1) if a majority of directors are independent; (2) if a majority of directors are independent and if the function of CEO and Chair of the board is separated.
Board size	Number of directors on the board.
Audit committee size	Number of audit committee members.
CEO stock options	Value of in-the-money exercisable stock options / salaries + bonus
Media Exposure	Number of articles in international publications that are surveyed by ABI Inform for 2004.

4.   RESULTS

4.1   Descriptive statistics

Table 1 provides some descriptive statistics about sample firms' independent variables. Sample firms are relatively large and exposed to media (average of 5.061 articles in 2004). About 60% of sample firms have a concentrated ownership, with more than 50% being publicly-traded in the United States. 12% of sample firms have recently relied on capital markets for additional financing. CEO value of in-the-money exercisable stock options represents almost twice their salary and bonus. Our sample firms have independent directors in a proportion of 36% while CEO board chair duality in 20%.

[Insert table 1]

As illustrated in Table 2, from 2003 to 2005, on average level of performance disclosure increases from 22.55 to 26.32 for qualitative items and decreases from 8.98 to 6.94 for quantitative items. In 2005, among the seven disclosure components, corporate governance exhibits the highest qualitative score (9.09) while financial performance has the highest score for quantitative items (2.03). The lowest score relates to financial performance (0.06) for qualitative items and to Innovation/development and growth for quantitative items (0.34).

[Insert table 2]

4.2   Determinants of web-based total disclosure strategies (qualitative and quantitative)

Since we posit that a firm's information dynamics affect performance disclosure, analyst following and media exposure simultaneously, we first assess whether or not endogeneity exists between these variables using a Hausman test. Using this procedure, we reject the null hypothesis of no endogeneity with respect to Share price volatility and analyst following (Rho = 0.676; $p < 0.126$), and total performance disclosure and Stock price volatility (Rho = 1; $p < 0.124$). Endogeneity does not appear to be an issue for the relation between total performance disclosure and analyst following (Rho = -0.991; $p < 0.362$).

Table 3 reports results of a three-stage estimation model regarding the simultaneous test of performance disclosure, analyst following and media exposure for qualitative and quantitative disclosure. The seemingly unrelated regression (SURE) method is used.[2]

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2 The seemingly unrelated regression, also known as Zellner's method, estimates the parameters of the system, accounting for heteroskedasticity, and contemporaneous correlation in the errors across equations.

Consistent with proposition 1, the association between share price volatility and the extent of web-based performance disclosure is only present for qualitative disclosure (-0.268; $p < 0.01$). As expected (proposition 2), this association is reduced by firm size (0.012; $p < 0.01$) while contrary to expectations (proposition 3), extensive analyst following does not appear to weaken the association between the extent of web-based performance disclosure and share price volatility (0.001; $p < 0.265$ two-tailed).

Concerning the determinants of performance disclosure, we observe that information costs and benefits [New financing (3.227; $p < 0.10$), Free float (3.076; $p < 0.05$), Analyst following (0.087; $p < 0.10$)] and corporate governance [board independence*Media exposure 0.125; $p < 0.05$) and board size (0.201; $p < 0.10$)] are associated with quantitative disclosure.[3] The magnitude of the CEO's stock option value is negatively associated with qualitative disclosure (-0.062; $p < 0.01$). These results suggest that efficient governance leads to more transparency while the extent of CEO stock options lead to less qualitative transparency. The fact that voluntary disclosure could be opportunistically affected by the extent of the CEO stock option is consistent with findings by Aboody and Kaznik (2000).

With respect to the determinants of analyst following, as expected, firm size, systematic risk and prior disclosure are positively related to larger analyst coverage while more levered firms seem to attract less financial analysts. Our results are similar for qualitative and quantitative disclosure.

[Insert table 3]

The simultaneous approach allows constraints on coefficients to be placed across equations and to employ techniques that account for correlation in the residuals across equations.

3 Consistent with proposition 4, the coefficient test for b_8Board independence + b_9Board independence*Media exposure = 0 is rejected (t=2.14; $p < 0.034$).

4.3   Web-based disclosure patterns

A factor analysis is performed on the six performance disclosure components to assess performance disclosure patterns across firms (see table 3). Using 0.50 as the cut-off for component matrix coefficients, two factors emerge. The first factor concerns financial information and corporate governance practices, so-called *financial related disclosure*. The second combination concerns customer value, human/intellectual capital, production efficiency and innovation, development and growth financial disclosure, so-called *non-financial related disclosure.*

[Insert table 4]

4.4   Determinants of web-based disclosure strategies (financial and non-financial related disclosure)

Table 5 provides evidence regarding financial related disclosure (Financial and corporate governance). Results are consistent with those shown in table 3. As expected, for financial disclosure, we find an association between qualitative financial related information and share price volatility (-0.340; $p < 0.01$) and no association for quantitative financial information (-0.039; $p < 0.473$ two-tailed). An explanation for that result is the fact that most quantitative financial information disclosed on the web is already available from other sources (e.g. annual report). Consistent with results presented in table 3 for total disclosure, the association between qualitative financial related disclosure and share price volatility is reduced by a firm size (0.015; $p < 0.01$) while contrary to proposition 3, extensive analyst following does not weaken the association between the extent of web-based performance disclosure and share price volatility.

We note a negative relationship between audit committee size and quantitative financial disclosure. This result is consistent with prior research asserting that an effective audit committee is able to constrain managerial opportunism (e.g. Xie *et al.* 2003; Bédard *et al.* 2004). Accordingly, the presence of an effective audit committee seems to restrain managers' ability to disclose opportunistically financial information.

[Insert table 5]

Concerning non-financial related disclosure, results are consistent with financial related disclosure, i.e. we show an association between qualitative financial related information and share price volatility (-0.301; $p < 0.01$) and no association for quantitative financial information (0.252; $p < 0.613$ two-tailed). Once again, the association between qualitative financial related disclosure and share price volatility is reduced by a firm size (0.014; $p < 0.01$) while contrary to proposition 3, extensive analyst following does not weaken the association between the level of web-based performance disclosure and share price volatility.

While the presence of an effective audit committee seems to refrain managers' ability disclose opportunistically financial information, our results suggest that the size of the audit committee leads to more quantitative non-financial related disclosure. This result suggests that an effective audit committee leads to more transparency in non-financial disclosure and more conservatism in financial disclosure.

[Insert table 6]

As a sensitivity analysis, we estimate an OLS regression including the four individual performance disclosure components. Results (not tabulated) confirm those presented in tables 5 and table 6. The coefficient for qualitative financial disclosure (-0.056; $p < 0.05$) and the coefficient for qualitative non-financial disclosure (-0.365; $p < 0.01$) are negative and significant, while coefficients for quantitative disclosure (financial and non-financial) are not statistically significant.

CONCLUSION

In this paper, we build on prior literature on voluntary disclosure by investigating the impact of the nature and the extent of web-based performance disclosure on stock price volatility. We adopt a conceptual framework that weaves together three complementary perspectives: Capital market(s)-driven information costs and benefits, analyst following interactions, and governance and public pressure concerns.

Through simultaneous equations, our results suggest that only qualitative performance disclosure reduces stock price volatility, i.e. financial and non-financial related disclosure. Moreover, as expected, firm size attenuates the impact of performance disclosure on stock volatility. Our results show that firms take into account ultimate costs and benefits to stockholders when determining the extent of their disclosure. Our results also suggest that efficient effective governance leads to more transparency in performance disclosure. Our results suggest that the extent of CEO stock options is associated with less performance disclosure. The fact that voluntary disclosure could be opportunistically affected by the extent of the CEO stock option is consistent with findings by Aboody and Kaznik (2000).

Our results reinforce the view that future research on voluntary disclosure should take into account the nature of disclosure and not only its extent. Our findings also suggest that corporate disclosure is the outcome of multiple interfaces between different stakeholders. We conclude that a firm's disclosure about various aspects of its performance is not solely driven by economic costs and benefits considerations but is also influenced by the effectiveness of its internal governance mechanisms. One could infer that effective internal governance may need to be reinforced by strong external monitoring through more open disclosure. It also appears that a board's role in disclosure matters is conditional upon the extent to which a firm is subjected to public pressures. Finally, while the presence of an effective audit committee seems to refrain managers' ability disclose opportunistically financial information, our results suggest the opposite

for non-financial disclosure. This result could suggest that the monitoring role of audit committee members for corporate reporting is essentially limited to financial aspects.

The results of this study should be interpreted with caution at least for two reasons. First, 3SLS is sensitive to the choice and validity of the instruments (Barhart and Rosenstein, 1998). To mitigate specification error, we base the choice of instruments for the disclosure model on information economics theory, as well as on prior empirical studies. However, it does not completely eliminate the potential for model misspecification and bias of the coefficients that would result from such misspecification. A second potential limitation is the paper's focus on HTML disclosure, which excludes hyperlinked documents in PDF. However these documents (e.g., quarterly or annual financial statements, press releases, annual reports, sustainability reports or proxy statements) are typically also published in paper form (re. Aerts, Cormier and Magnan, 2007 shows that most of them are also paper-based with a web version in PDF). In light of this evidence, we decided to exclude PDF documents that are linked to web sites from our study.

Table 1
Descriptive statistics

	Mean	Std dev.	Minimum	Maximum
Information asymmetry				
Share price volatility (std dev. of change in daily stock prices for year 2005)	2.233	1.494	0.818	10.385
Information costs				
Systematic risk	0.682	0.489	0	2.71
New financing	0.086	0.119	0	0.70
Free float	0.776	0.225	0.098	0.999
Analyst following	6.829	5.888	0	35
Litigation/Proprietary costs				
Leverage	0.220	0.214	0	2.00
Profitability	0.035	0.131	-1.07	0.56
US listing	0.511	0.501	0	1
Firm size (Total Assets in million Can $)	4 844	7 226	26	40 076
Governance/Monitoring				
Board independence	0.909	0.515	0	2
Board size	9.987	2.755	4	18
Audit committee size	3.980	1.103	2	9
CEO stock options	1.786	21.715	0	229
Media Exposure	5.061	10.106	0	58

Table 2
Performance disclosure
Mean scores by component

	2003		2005		
	Qualitative content	Quantitative content	Qualitative content	Quantitative content	Cronbach Alpha
Financial performance	0.02	2.72	0.06	2.03	0.87
Corporate Governance	7.38	1.60	9.09	1.70	0.83
Customer Value	7.18	1.54	6.80	1.30	0.70
Human / Intellectual Capital	3.65	1.32	5.85	0.67	0.76
Production Efficiency	3.37	1.28	4.47	0.87	0.65
Innovation / Development and Growth	0.96	0.52	0.97	0.34	0.82
Total score	22.55	8.98	26.32	6.94	0.72
N	155		155		

Table 3
Three stage regression model - Seemingly unrelated regressions
Total disclosure

		Qualitative			Quantitative		
		Share price volatility	**Disclosure**	**Analyst following**	**Share price volatility**	**Disclosure**	**Analyst following**
Share price volatility							
Firm size	-	***-0.690			***-0.374		
Systematic risk	+	***0.912			***0.765		
Free float	-	0.358			0.437		
Disclosure	-	***-0.268			0.092		
Disclosure*Firm size	+	***0.012			-0.003		
Disclosure*Analyst following	+	0.001			-0.001		
Analyst following	-	-0.041			-0.014		
Disclosure							
Information costs							
New financing	+		-12.380			*3.277	
Free float	+		3.591			**3.076	
Analyst following	+		***0.605			*0.087	
Litigation/Proprietary costs							
Leverage	-		-5.031			-2.487	
Profitability	+		-0.104			0.249	
Foreign listing	+		***6.189			***1.657	
Firm size	+		***2.983			***0.803	
Governance/Monitoring							
Board independence	+/-		-0.756			0.616	
Board independence*Media exposure	+		0.121			**0.125	
Media Exposure	+/-		-0.191			***-0.197	
Board size	+		0.199			*0.201	
Audit committee size	+		-1.241			-0.028	
CEO stock options	+/-		*-0.062			-0.012	
Analyst Following							
US listing	+			-0.031			0.067
Free float	+			-0.332			-0.416
Leverage	-			***-10.042			***-10.842
Firm size	+			***1.134			***1.123
Systematic risk	+			***3.667			***3.400
Lag disclosure	+			*0.049			*0.136
Adjusted R^2		41.3%	23.4%	22.8%	36.5%	21.4%	23.9%
Chi2		85.1	42.5	39.8	68.4	31.7	38.9
P value		(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
N=130							

Coefficients for intercept and industry dummies not reported

Table 4
Principal Component Factor Analysis
Varimax Rotated Component Matrix

	Factor 1	Factor 2
Financial related disclosure		
Financial performance	0.739	
Corporate Governance	0.722	
Non-Financial related disclosure		
Customer Value		0.806
Human / Intellectual Capital		0.673
Production Efficiency		0.437
Innovation / Development and Growth		0.583
Eigenvalue	1.95	1.09
Explained Variance (%)	32.49	18.21
Cumulative (%)	32.49	50.70

Table 5
Three stage regression model - Seemingly unrelated regressions
Financial related disclosure

		Qualitative			Quantitative		
		Share price volatility	**Disclosure**	**Analyst following**	**Share price volatility**	**Disclosure**	**Analyst following**
Share price volatility							
Firm size	-	***-0.528			***-0.392		
Systematic risk	+	***0.818			***0.791		
Free float	-	0.423			0.468		
Disclosure	-	***-0.340			-0.039		
Disclosure*Firm size	+	***0.015			0.002		
Disclosure*Analyst following	+	0.002			0.001		
Analyst following	-	*-0.038			-0.021		
Disclosure							
Information costs							
New financing	+		-2.322			*2.222	
Free float	+		***10.208			**1.548	
Analyst following	+		-0.119			0.037	
Litigation/Proprietary costs							
Leverage	-		-3.698			-1.543	
Profitability	+		-0.326			0.886	
Foreign listing	+		***3.681			**0.918	
Firm size	+		***3.290			***0.472	
Governance/Monitoring							
Board independence	+/-		-0.306			*0.669	
Board independence*Media exposure	+		0.138			**0.088	
Media Exposure	+/-		*-0.309			***-0.127	
Board size	+		-0.288			0.055	
Audit committee size	+		-0.531			*-0.331	
CEO stock options	+/-		**-0.058			-0.009	
Analyst Following							
US listing	+			0.234			-0.084
Free float	+			-0.212			-0.522
Leverage	-			***-10.645			***-10.328
Firm size	+			***1.310			***1.162
Systematic risk	+			***3.486			***3.822
Lag disclosure	+			-0.099			*0.220
Adjusted R^2		38.8%	26.7%	22.9%	36.3%	15.6%	23.5%
Chi2		76.7	44.5	37.3	68.7	21.3	38.3
P value		(0.000)	(0.000)	(0.000)	(0.000)	(0.066)	(0.000)
N=130							

Coefficients for intercept and industry dummies not reported

Table 6
Three stage regression model - Seemingly unrelated regressions
Non-Financial related disclosure

		Qualitative			Quantitative		
		Share price volatility	Disclosure	Analyst following	Share price volatility	Disclosure	Analyst following
Share price volatility							
Firm size	-	***-0.635			***-0.372		
Systematic risk	+	***0.869			***0.754		
Free float	-	0.442			0.447		
Disclosure	-	***-0.301			0.252		
Disclosure*Firm size	+	***0.014			-0.010		
Disclosure*Analyst following	+	0.001			-0.001		
Analyst following	-	*-0.041			-0.014		
Disclosure							
Information costs							
New financing	+		*-11.386			1.048	
Free float	+		-2.591			*1.528	
Analyst following	+		***0.667			*0.054	
Litigation/Proprietary costs							
Leverage	-		-2.099			-0.944	
Profitability	+		0.569			-0.653	
Foreign listing	+		***4.014			0.748	
Firm size	+		0.788			**0.326	
Governance/Monitoring							
Board independence	+/-		0.069			-0.054	
Board independence*Media exposure	+		0.012			0.036	
Media Exposure	+/-		0.031			-0.069	
Board size	+		0.470			*0.141	
Audit committee size	+		-0.919			*0.316	
CEO stock options	+/-		-0.031			-0.003	
Analyst Following							
US listing	+			-0.045			0.209
Free float	+			-0.381			-0.233
Leverage	-			***-9.744			***-11.037
Firm size	+			***1.101			***1.174
Systematic risk	+			***3.665			***3.248
Lag disclosure	+			**0.096			0.135
		40.3%	18.2%	23.3%	36.8%	16.7%	23.3%
		82.3	41.2	45.1	69.3	23.6	37.8
		(0.000)	(0.000)	(0.000)	(0.000)	(0.035)	(0.000)

Coefficients for intercept and industry dummies not reported

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Appendix
Performance disclosure grid
Coding scores

Liquidity	Product description
Indebtedness	Quality / up-to-date technology
Interest coverage	Reliability: errors / returns
Total solvency	Price
Net operating income	Delivery time
Gross margin	Awards
REA or REO	*Total product*
EPS (diluted)	Customer profile / market segment / market share / number of customers
Stock price or stock return	Pre-sales support: • information / counsel / orders follow-up
EVA	After-sales service / insurance
Total profitability	Customer satisfaction / complaints management
Total financial performance	Customer loyalty
Leadership	Awards
Mission	*Total Customers*
Strategic planning	Service Internet (1 of order, 2 if service, 3 if both)
Risk management	E-business sales
Globalization	E-business productivity [Cost efficiency / speed]
Total strategic management	Impact (award, number of users or visitors)
Competence of managers	*Total e-business*
Managers' compensation	**Total customer value**
Total managers	Hiring / new employees
Competence Board	Qualification / expertise
Independence Board	Training
Compensation (stocks/options)	Description of job requirements 1, 2, 3
Other committees	*Total competence*
Total directors	Employee empowerment / involvement
Competence Audit committee	Capacity to suggest and to implement changes
Independence Audit committee	Teamwork
Relations with external auditors	Performance assessment
Relations with internal auditors	Performance based compensation
Total Audit committees	Earnings-based compensation
Ownership structure	Carrier opportunities
Other	Award
Total ownership	Fringe benefits
Total corporate governance	*Total motivation/work climate*
	Employees satisfaction, survey
	Employee turnover
	Other
	Total satisfaction
	Total human/intellectual capital

Investment ($)
Reengineering / downsizing
Process improvement methods (ex. Kaisen)
ISO 9000, total quality management – TQM
Others (benchmarking, JIT, etc.)
Total operations rationalization
Production cost
Production capacity
Waste
Inventory / run out rate
Quality of equipment and technology
Flexibility
Process description (1,2,3)
Others
Total productivity-cost
Production time
Unplanned downtime
Total productivity-speed / cycle time
Partnerships
Acquisitions
Total strategic alliances
Total production efficiency

Sales – new products
Market share – new products
Awards
Total new products
Investments in R&D
Description of products in development
Product testing
Awards
Others - R&D
Total R&D
Increase in sales / market shares
Increase in investments
Total growth
Total innovation, development et growth
Total performance management