



**Market Assessment of Intangibles and Voluntary Disclosure
about Innovation: The Incidence of IFRS**

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Market Assessment of Intangibles and Voluntary Disclosure about Innovation: The Incidence of IFRS

This study aims to investigate stock market assessment of intangibles and voluntary disclosure about innovation considering the adoption of IFRS. The two research questions are: (1) Does voluntary disclosure about innovation improve the ability of stock markets to assess accounting numbers recognized in Canadian financial statements? (2) What is the incidence of IFRS on this matter? It appears that prior to the adoption of IAS 38, voluntary disclosure about innovation was allowing market participants to better assess the value of intangibles, i.e. capitalized, amortized, and expensed. Hence, our results suggest that, before the adoption of IAS 38, voluntary disclosure was improving the ability of investors to assess the existence of unbooked intangible assets and of financial analysts to reduce forecast dispersion. This suggests complementarity between mandated and voluntary disclosure. However, the relevance of voluntary disclosure about innovation decreases under IFRS. The international standard on intangible assets requires entities to recognize an intangible asset if certain criteria are met. The Standard also requires disclosure of specific information on these intangible assets. In such a context, market participants would refer to a lesser extent to voluntary disclosure.

Key words: IFRS, intangible assets, voluntary disclosure.

Lien entre le reporting volontaire sur l'innovation et l'évaluation des éléments incorporels par les marchés boursiers : Impact des IFRS

Cette étude vise à étudier la pertinence pour le marché boursier des éléments incorporels et la divulgation volontaire sur l'innovation en analysant l'impact de l'adoption des IFRS. Les deux questions de recherche sont: (1) Le reporting volontaire sur les activités d'innovation améliore-t-il la pertinence pour le marché boursier des dépenses incorporelles comptabilisées dans les états financiers canadiens pré adoption des IFRS ? (2) Quelle est l'incidence des IFRS en cette matière ? Il semble que, avant l'adoption de la norme IAS 38 par le Canada, le reporting volontaire sur l'innovation permettait aux participants sur le marché boursier de mieux évaluer la valeur des dépenses incorporelles. Nos résultats suggèrent que, avant l'adoption de la norme IAS 38, le reporting volontaire améliorerait la capacité des investisseurs à évaluer l'existence d'éléments incorporels hors bilan et aux analystes financiers de réduire la dispersion des prévisions de résultats. Cela suggère une complémentarité entre le reporting obligatoire et volontaire. Toutefois, la pertinence du reporting volontaire sur l'innovation diminue à la suite de l'adoption de la norme IFRS sur les actifs incorporels. La norme internationale sur les actifs incorporels impose de capitaliser les investissements en incorporels si certains critères sont respectés. La norme exige également la divulgation d'informations spécifiques sur ces actifs incorporels. Dans un tel contexte, les participants au marché boursier sont moins tributaires du reporting volontaire sur l'innovation.

Mots clés: normes IFRS, actifs incorporels, reporting volontaire.

Introduction

A growing part of the market capitalization is attributed to intangible assets. In the U.S., 80 percent of the market value of the S&P 500 in 2010 could be attributed to intangible assets, up from 68% in 1995 and 32% in 1985 (Ocean Tomo, 2010). Value creation mainly derives from the creation of intangible assets in the form of intellectual property such as patented inventions, product software and services development. Innovation shapes firms' ability to dominate within their market niches. The market value of a firm cannot be adequately established without considering its intangible capital.

The ability of financial statements to properly account for intangible capital is often questioned. The cost of intangibles has traditionally been expensed as incurred, especially in the U.S., and the absence of disclosure on this regard (e.g., revenues from recently introduced products) may reduce the value relevance of intangibles. This is especially an issue in telecommunication, biotechnology, and other fast changing technology industries, that heavily invest in intangibles such as R&D and brand development. In the wireless industry, Amir and Lev (1996) find that earnings, book values, and operating cash flows are largely irrelevant for security valuation, except when combined with non-financial information.

As financial statements do not always meet the information needs of investors, managers may complement mandatory reporting by voluntarily releasing financial and non-financial information. The corporate website, because of its flexibility, accessibility and interactivity, is a powerful platform to communicate corporate information to various stakeholders. Previous studies have shown the impact of voluntary disclosure on the cost of capital, trading volume, analyst forecasts, bid/ask spread, and stock prices (see Healy

and Palepu, 2001). The value relevance of the information provided on a firm's website has also been documented (e.g. Ettredge *et al.* 2002; Chang *et al.*, 2008; Cormier *et al.* 2009b; 2010). We expect voluntary disclosure to improve market assessment of accounting information on intangibles.

In 2008, the Canadian accounting standards body issued a standard on intangible assets that complies with the international standard IAS 38 *Intangible assets*. The standard provides criteria for recognition, accounting treatment, and disclosure requirement on intangibles. Recent studies show that IFRS allow investors to better integrate intangible assets in stock prices in French (Boulerne and Sahut, 2010) and Portuguese (Oliveira *et al.*, 2010) contexts. The adoption of this new accounting standard in Canada provides an opportunity to investigate the complementarity between mandated and voluntary discloses on intangibles as well as the impact of IFRS on this matter.

More specifically, this study aims to investigate stock markets' assessment of intangibles accounted for in Canadian financial statements and voluntary disclosure about innovation on corporate web sites, considering the adoption of IFRS. The two research questions are: (1) Does voluntary disclosure about innovation improves the ability of stock markets to assess intangible assets and expenses? (2) What is the incidence of IFRS on this matter?

Our results suggest complementarity between mandated and voluntary disclosure. It appears that prior to the adoption of IAS 38, voluntary disclosure about innovation was allowing market participants to better assess the value of intangible assets and expenses. More specifically, our findings suggest that, under Canadian GAAP, voluntary disclosure was improving the ability of investors to assess the existence of unbooked intangible

assets and of financial analysts to reduce forecasts dispersion. However, as expected, the relevance of voluntary disclosure about innovation decreases under IFRS. The international standard on intangible assets requires entities to recognize an intangible asset if certain criteria are met. The standard also requires disclosure of specific information on these intangible assets. In such a context, market participants would refer to a lesser extent to voluntary disclosure on innovation activities.

To our knowledge, this is the first study to investigate the relationship between mandatory disclosure and voluntary disclosure about intangibles and evaluate the impact of IFRS on this matter.

2. Accounting standards on intangible assets

In February 2008, the Canadian Institute of Chartered Accountants (CICA) issued Section 3064 *Goodwill and Intangible Assets* which replaced existing Section 3062 *Goodwill and Other Intangible Assets* and Section 3450 *Research and Development*.¹ Section 3064 is one of the first steps to IFRS convergence in Canada as it is the equivalent to International Financial Reporting Standard (IFRS) IAS 38 *Intangible Assets*.² The objective of IAS 38 is to prescribe the accounting treatment for intangible

¹ The section is effective for annual financial statements relating to fiscal years beginning on or after October 1, 2008.

² The only substantial difference between IAS 38 and CICA section 3064 is that IAS 38 allows for intangible assets to be valued using either the cost method or the revaluation method, if there is an active market for the asset, whereas section 3064 permits only the cost method. This difference is somewhat minimized in practice, since criteria for an active market are not often met.

assets that are not dealt with specifically in other Standards.³ IAS 38 requires an entity to recognize an intangible asset if, and only if, specific criteria are met. The Standard also specifies how to measure the carrying amount of intangible assets and requires specified disclosures about intangible assets.

IAS 38 defines an intangible asset as an identifiable non-monetary asset without physical substance. The definition requires an intangible asset to be identifiable to distinguish it from goodwill. An asset is identifiable if it is either separable, i.e. capable of being separated from the entity and sold or otherwise traded; or arise from contractual rights or other legal rights (IAS 38, §12). An item that meets the definition of an intangible asset is recognized if it is probable that future economic benefits attributable to the asset will flow to the entity; and the cost of the asset can be measured reliably (IAS 38, §21). An item is recognized as an intangible asset if the definition and recognition criteria are met.

An intangible asset can be acquired or internally generated. IAS 38 allows for the recognition of costs incurred during the development phase of a project if specific criteria are met. An intangible asset arising from development is recognized if an entity can demonstrate all of the following: the technical feasibility of completing the intangible asset to its entry into service or being sold; its intention to complete the intangible asset and use or sell it; its ability to use or sell intangible assets; how the intangible asset will generate probable future economic benefits (the entity must demonstrate, among other

³ For example, IAS 38 would not apply to intangible assets held by an entity for sale in the ordinary course of business (IAS 2 *Inventories*), goodwill acquired in a business combination (see IFRS 3 *Business Combinations*), or intangibles classified as held for sale in accordance with IFRS 5, *Non-current Assets Held for Sale and Discontinued Operations*.

things, the existence of a market for the output of the asset or the intangible asset itself or, in the event that it will be used internally, the usefulness of the intangible asset); the availability of resources to complete the development, and; the entity's ability to measure reliably the intangible expenditures (IAS 38, §57).

Expenditure incurred during the research phase of a project is always expensed. Moreover, internally generated brands, mastheads, publishing titles, customer lists, and similar items cannot be recognized as intangible assets, the rationale being that such expenditures cannot be distinguished from the cost of developing the business as a whole. Thus, internally generated goodwill is not recognized as an asset because it is not an identifiable resource controlled by the entity that can be measured reliably at cost (IAS §38, §48 and §49). Other examples of items that are expensed as incurred include start-up costs, expenditures for training, advertising, and promotional activities.

Examples of directly attributable costs include: costs of materials and services used or consumed in generating the intangible asset; the costs of salaries and fringe benefits resulting from the creation of intangible assets; fees for registration of a legal right; amortization of patents and licenses that are used to generate the intangible asset, and; the interest expense when the firm's accounting methods allow for the capitalization of interests (IAS 38, § 66).

After the initial recognition, IAS 38 specifies that a depreciable intangible asset should be amortized over its useful life according to the consumption of economic benefits of the asset.

Finally, for each class of intangible assets, an entity must include the following information in distinguishing between internally generated intangible assets and other

intangible assets: the useful lives are indefinite or finite and, if finite, the length utility or the depreciation rates used; depreciation methods used for intangible assets with a finite useful life, the gross carrying amount and any accumulated depreciation (aggregated with accumulated impairment losses) at the opening and closing balances of the period; income statement items for which the amortization of intangible assets is included and a reconciliation of the carrying amount at the beginning and end of the period showing the information required by IAS 38 (IAS 38, §118).

In comparison to IAS 38, Canadian accounting standards before 2008 contained little development on the criteria for recognition of intangible assets and their accounting treatment after their initial recognition. In general, the internally developed intangibles were expensed and intangible assets acquired in business combinations were part of the goodwill. IAS 38 requires that identifiable intangible assets being distinguished from the goodwill in a business combination. Under IFRS 3 *Business combinations*, goodwill arising in a business combination represents a payment made by the acquirer in anticipation of future economic benefits from assets that cannot be separately identified and recognized. Section 3064 in accordance with IFRS has brought significant changes in accounting numbers⁴ as well as new disclosure requirements.

The question that arises is whether this high level of details in the information required under IFRS, in particular singling out the internally generated intangible assets and other intangible assets, may reduce the relevance of voluntary disclosure about innovation.

⁴ For example, following the adoption of the standard 3064 (equivalent to IAS 38) for the year 2009, Bombardier shows an increase in intangible assets of \$ 1.13 billion and a decrease goodwill of \$ 523 million.

3. Background and hypotheses

3.1 Financial reporting on intangibles and stock markets

Intangibles have been shown to be positively associated with share prices. With respect to R&D expenditures, Sougiannis (1994) shows that its increase leads to larger profits over a period of at least seven years. Lev and Sougiannis (1996) find that equity and earnings adjusted for the capitalization of R&D investments are positively associated with stock returns and prices. Similarly, Aboody and Lev (1998) show the costs of software development to be positively related to stock prices and future earnings. Since the capitalization of R&D is for all practical purposes not allowed in the United States, researchers restate the data as if the firm had opted for the capitalization of development expenditures. Therefore, results of these studies should be interpreted with caution because if the firm was allowed to capitalize R&D, this could have an impact on earnings management and transparency in financial reporting (Boulerle and Sahut, 2010). However, studies in other countries tend to confirm the overall results of U.S. studies. For example, Zhao (2002) reaches similar conclusions from a comparative study of four countries (France, the UK, Germany and USA). The relevance of accounting information for stock markets is higher in countries that allow the capitalization of R&D expenditures, namely the UK and France.

Focusing on the volatile industry of biotechnology, Xu (2006) finds a significant impact of R&D strategy in terms of drug discovery and diversification of products in development on share price volatility. Firms with more diversified portfolios of products

are associated with lower price volatility and lower stock returns. In contrast, firms that have more concentrated drug portfolios are associated with increased share price volatility and a higher dividend yield.

Finally, concerning the value relevance of disclosure about patents, Hirshey *et al.* (2001) find that when used in conjunction with traditional R&D expenditure information, scientific information on patent quality appears to give investors a more useful basis upon which to assess the economic merit of the firm's R&D effort. According to the authors, this complementary relationship suggests that consistent patent citation information may help investors to assess the future earnings potential of a firm's scientific discoveries.

3.2 Voluntary disclosure on intangibles and stock markets

Prior literature suggests that voluntary disclosure extending beyond financial performance measures may be value relevant for investors as it helps to bridge the growing gap between traditional financial statements and market valuation needs (Botosan and Harris, 2000; Healy and Palepu, 2001). With respect to non-financial disclosure, prior research documents an association with corporate performance. Amir and Lev (1996) study the cell-phone industry and conclude that investors overwhelmingly value non-financial information over traditional, financial statement variables. Riley *et al.* (2003) and Behn and Riley (1999) reach the same conclusion for the airline industry.

In the banking sector, Beaver *et al.* (1989) show that voluntary financial disclosure concerning characteristics of the loan portfolio has incremental explanatory

power of market-to-book ratios beyond that provided by the allowance for loan losses. In addition, Scott (1994) shows the proprietary cost implications and value relevance of voluntary pension disclosures. In the resort sector, Ittner and Larcker (1998) show that disclosure of information on the degree of customer satisfaction is positively associated with excess returns over a period of ten days, so that information is only partially reflected in book values. For his part, Jones (2007) provides evidence of the capacity of voluntary disclosure on R&D to reduce errors in analysts' forecasts.

Many studies refer to Association for Investment Management and Research (AIMR) disclosure scores to measure financial disclosure quality (e.g. Botosan, 1997; Healy *et al.*, 1999; Botosan and Plumlee, 2005). These studies conclude that greater disclosure reduces the cost of capital. There are also studies focusing on non-financial disclosure in general (e.g. Cormier *et al.*, 2010) or more specific disclosure such as customer satisfaction (e.g. Ittner and Larcker, 1998; Banker *et al.*, 2000), corporate governance attributes and disclosure (e.g. Niu, 2006), and social and environmental disclosure (e.g., Richardson and Welker, 2001).

Regarding web-based voluntary disclosure, based on an Australian sample, Chang *et al.* (2008) examine the association between web-based corporate disclosure quality and information asymmetry using a checklist to evaluate a firm's web-based investor-relations practices. Firms with higher disclosure quality through their investor-relations activities have higher analyst following, attract more institutional investors, have more active trading volume, and are larger in terms of market capitalization. Moreover, bid-ask spreads decrease with increased disclosure quality. Ettredge *et al.* (2002) also find a relationship between web-based financial disclosure and information asymmetry. More

specifically, they show that information for investors voluntarily disclosed on web sites is associated with firm size, information asymmetry, demand for external capital, and a firm's disclosure reputation.

Previous studies also highlight the limitations of traditional models of evaluation in situations where intangible assets are particularly prominent. Using the model of Feltham and Ohlson (1995), Amir and Lev (1996) show the lack of value relevance of accounting data in fast-changing, technology-based industries. The authors propose to incorporate new dimensions, including intangible assets in the traditional models and show that the assets related to customer and market share are statistically associated with stock prices. More specifically, on a stand-alone basis, financial information is irrelevant for security valuation while combined with non-financial information, earnings do contribute to security prices. This suggests complementarity between financial and non-financial disclosure. In the pharmaceutical sector, Barth *et al.* (1998a) show that the explanatory power of earnings is higher than equity, so that, except for the financial sector where the reverse applies, no significant difference was observed in other sectors. According to the authors, earnings is the proxy for assets not recognized in the model of Feltham and Ohlson (1995). Finally, the longitudinal study by Lev and Zarowin (1999) shows that the relevance of accounting information has declined over the last twenty years, the explanatory power of Ohlson goes from 92.3% in 1977 to 61.8% 1996. The authors also found an inverse relationship between the relevance of earnings for stock markets and the importance of development expenditures.

Previous findings show that voluntary disclosure about human capital is positively associated with and with lower share price volatility (Cormier *et al.* 2009a). In addition,

Cormier *et al.* (2009b) show that the voluntary disclosure about customers attracts financial analysts and is associated with lower share price volatility. Finally, Orens *et al.* (2009) shows that disclosure on the web about customers, products and intellectual capital is associated with less information asymmetry and a lower cost of equity and debt.

3.3 Hypotheses

Previous research shows the relevance of intangible capital such as the importance of innovation activities for the stock market valuation and value creation. This information has traditionally been disclosed voluntarily but IFRS increase requirements on this matter. Prior research suggests a complementarity between financial and non-financial information on intangible capital.

In addition, IFRS are much more stringent and precise than the prior Canadian standards on accounting for intangible assets and previous work has shown that intangible assets are more valued according to IFRS than under local GAAP. Therefore, we anticipate that the relevance of voluntary disclosure about innovation for stock market valuation of intangible assets and expenses will decrease under IFRS.

The relevance of accounting information for stock markets is higher in countries that allow the capitalization of R&D expenditures Zhao (2002). Prior research document that investments in intangibles are generally regarded by investors as an asset rather than an expense. Voluntary disclosure should help market participants to better assess accounting information on intangibles, especially for capitalized amounts since they are

likely to represent probable future economic benefits. Combined with voluntary disclosure, a capitalized amount of intangibles should be valued positively while expensed intangibles could be valued negatively if the market perceives that future economic benefits of innovation activities are uncertain. Hence, we can expect that voluntary disclosure will improve the ability of stock markets to assess accounting information on intangibles to a larger extent for capitalized costs than for expensed costs.

We propose the following four hypotheses:

H1a: Voluntary disclosure improves the ability of stock markets to assess intangible assets.

H1b: Voluntary disclosure improves the ability of stock markets to assess intangible expenses.

H2a: IFRS reduces the importance of voluntary disclosure in stock markets' assessment of intangible assets.

H2b: IFRS reduces the importance of voluntary disclosure in stock markets' assessment of intangible expenses.

4. Method

4.1 Sample

This study focuses on 97 non-financial firms in the market index S&P/TSX for years 2005 and 2010, representing a sample of 194 firms-years. Web sites of 155 firms were coded in 2005 and, of these, 58 were merged or removed from the stock market between 2005 and 2010. The need for comparability between both years explains our final sample. Voluntary disclosure on innovation was collected from corporate web sites in springs 2005 and 2010. Financial statements available during data collection were those of fiscal years ending in 2004 and 2009. Financial data come from Compustat and Stock Guide databases. Sample firms operate in the following industries: Materials; Health care; Information technology; Consumer discretionary; Consumer staples; Industrial products; Energy; Utilities; and Real estate.

4.2 Empirical models

Three empirical models are developed. The first model investigates the stock market valuation of intangible assets and disclosure about innovation. This model allows assessing the incidence of voluntary disclosure on market assessment of intangible assets. The model of stock market valuation is based on the basic accounting equation where earnings is used as a growth factor (Fetltham and Ohlson, 1995, Amir and Lev, 1996, Collins *et al.*, 1999).

The first model is the following (financial variables per share):

(1) Market Value =

$$\begin{aligned} & \beta_0 + \beta_1 \text{ Equity net of goodwill and intangible assets}_{it} + \beta_2 \text{ Goodwill}_{it} + \\ & \beta_3 \text{ Intangible assets}_{it} + \beta_4 \text{ Earnings}_{it} + \beta_5 \text{ Intangible assets*Disclosure}_{it} + \\ & \beta_6 \text{ Intangible assets*Disclosure*IFRS}_{it} + \beta_7 \text{ Intangible assets*IFRS}_{it} + \\ & \beta_8 \text{ Disclosure*IFRS}_{it} + \beta_9 \text{ Disclosure}_{it} + \beta_{10} \text{ IFRS}_{it} + \varepsilon \end{aligned}$$

Isolating intangible assets from equity allows for the appreciation of its market value. If mandatory and voluntary disclosures are complementary for assessing accounting numbers related to intangibles, the coefficient on *Intangible assets*Disclosure* should be positive. The interaction term on *Intangible assets*Disclosure*IFRS* captures the impact of IFRS on that matter.

In the second model (financial variables per share), we desegregate earnings to assess the relevance of components related to intangibles. More specifically, this model allows assessing the incidence of voluntary disclosure about innovation on market valuation of expensed R&D expense and amortization of intangible assets.

(2) Market Value =

$$\begin{aligned} & \beta_0 + \beta_1 \text{ Equity net of goodwill and intangible assets}_{it} + \beta_2 \text{ Goodwill}_{it} + \\ & \beta_3 \text{ Intangible assets}_{it} + \\ & \beta_4 \text{ Earnings net of expensed R\&D and amortization of intangible assets}_{it} + \\ & \beta_5 \text{ Expensed R\&D}_{it} + \beta_6 \text{ Amortization of intangible assets}_{it} + \end{aligned}$$

$$\begin{aligned}
& \beta_7 \text{ Expensed R\&D*Disclosure}_{it} + \beta_8 \text{ Expensed R\&D*Disclosure*IFRS}_{it} + \\
& \beta_9 \text{ Amortization of intangible assets*Disclosure}_{it} + \\
& \beta_{10} \text{ Amortization of intangible assets*Disclosure*IFRS}_{it} + \\
& \beta_{11} \text{ Expensed R\&D*IFRS}_{it} + \beta_{12} \text{ Amortization of intangible assets*IFRS}_{it} + \\
& \beta_{13} \text{ Disclosure*IFRS}_{it} + \beta_{14} \text{ Disclosure}_{it} + \beta_{15} \text{ IFRS}_{it} + \varepsilon
\end{aligned}$$

The third model (financial variables per share) investigates how intangible expenses and voluntary disclosure about innovation affect analysts forecast dispersion. Lang and Lundholm (1996), Higgins (1998) and Hope (2003) provide evidence consistent with the view that more corporate disclosure leads to less analyst forecast dispersion. Thus, if voluntary disclosure improves the ability of stock markets to assess expenses related to intangibles, it should decrease forecast dispersion.

(3) Earnings (Price) dispersion =

$$\begin{aligned}
& \beta_0 \text{ Beta}_{it} + \beta_1 \text{ Analysts}_{it} + \beta_2 \text{ Negative earnings}_{it} + \beta_3 \text{ Expensed R\&D}_{it} + \\
& \beta_4 \text{ Amortization of intangible assets}_{it} + \beta_5 \text{ Expensed R\&D*Disclosure}_{it} + \\
& \beta_6 \text{ Expensed R\&D*Disclosure*IFRS}_{it} + \\
& \beta_7 \text{ Amortization of intangible assets*Disclosure}_{it} + \\
& \beta_8 \text{ Amortization of intangible assets*Disclosure*IFRS}_{it} + \\
& \beta_9 \text{ Expensed R\&D*IFRS}_{it} + \beta_{10} \text{ Amortization of intangible assets*IFRS}_{it} + \\
& \beta_{11} \text{ Disclosure*IFRS}_{it} + \beta_{12} \text{ Disclosure}_{it} + \beta_{13} \text{ IFRS}_{it} + \beta_{14} \text{ Innovation Industry}_{it}
\end{aligned}$$

Earnings (Price) dispersion. Earnings dispersion is measured as the absolute value of standard deviation of forecasted EPS scaled by for the median of forecasted

EPS. Price dispersion is measured as the standard deviation of estimated stock price scaled by the median of the estimated price.

Beta. Systematic risk measures the inherent uncertainty in predicting earnings (Johnson, 2004; Barron *et al.*, 2009). A negative relationship is expected between beta and analyst forecast dispersion.

Analysts. Analyst forecasts are likely to improve as more information about a company is processed and disclosed by analysts (Alford and Berger, 1999). Prior evidence is consistent with analyst coverage being associated with less dispersion in analysts' forecasts (Hope, 2003; Lys and Soo, 1995). A negative association between analyst following and forecast dispersion is expected.

Negative earnings. Forecasting earnings is more difficult for companies that experience losses. We use an indicative variable for negative earnings and anticipate a positive relationship between this binary variable and forecast dispersion (Hope, 2003). We expect forecast dispersion to be higher for firms with negative earnings.

Innovation industries. Barron *et al.* (2002) document that the dispersion in analysts' earnings forecasts is substantially larger in R&D intensive industries. R&D investments increase the ambiguity and uncertainty in the information about firms' future returns. We classify an industry as involved in innovation activities when the median of the sum of expensed R&D expense and amortization of intangible assets, scaled by total assets, is greater than zero. We anticipate more forecast dispersion for firms involved in innovation activities.

4.3 Measurement of voluntary disclosure and coding instrument

Voluntary disclosure about innovation is coded from web sites of sample firms. Only documents in HTML are coded. Most PDF documents (e.g. financial statements, press releases, annual reports, proxy statements) are also published on paper format and, therefore, the voluntary nature of disclosure is less certain. Our coding scheme presented in the appendix includes 10 items grouped under two categories: development and growth and R&D activities. The web content is coded according to indicative/general aspect (1 point), descriptive / qualitative (2 points) and quantitative / monetary (3 points). This approach is similar to that used by Orens *et al.* (2009) and is based on indicators proposed by Kaplan and Norton, 1996, Ittner and Larcker, 1998 and Robb *et al.* (2001).

The coding of web sites was conducted by two research assistants for all sample firms. Disagreements were then reviewed by one of the co-researchers. According to previous work in non-financial disclosure, we removed redundancies and repetitions (Lang and Lunholm, 1993; AIMR, 2002; Botosan, 1997; Healy *et al.*, 1999).⁵

⁵ Coding procedures, instructions and standardized coding sheets have been prepared in advance. The coders were trained in the application of encoding instructions and using the coding sheets. They were unaware of the research hypotheses. The initial differences in the identification of elements of the grid have averaged 5% of the maximum number of objects identified. From these differences, less than 10% requested conciliation by a co-researcher. Disagreements between coders occurred mostly early in the coding process (mainly for the twenty largest firms in the sample). A co-researcher has reconciled disagreements over 5% of the highest score between the two coders. Minor disagreements have been resolved by the two coders themselves. Overall, we believe that this coding process provides a reliable measure of web disclosure as shown by internal consistency tests (see Table 1 for Cronbach's Alpha).

5. Results

Results presented in Table 1 show that, in average, intangible assets increased significantly from 2004 to 2009 (mean of \$3.24 per share versus \$2.26 per share) while the goodwill did not vary significantly (from \$3.24 per share to \$3.76 per share). The expensed R&D (from \$0.14 per share to \$0.50 per share) as well as amortization of intangible assets (from \$0.06 per share to \$0.31 per share) significantly increased between 2004 and 2009. We also observed (not reported) that the number of firms that capitalize intangibles has increased by 50% from 2004 to 2009.

[Insert Table 1]

We observe from Table 2 that disclosure scores about innovation slightly decreased from 2005 to 2010, from 2.16 to 1.74. The Cronbach's alpha shows that the variance is quite systematic in disclosure scores (alpha exceeding 0.73). These numbers are higher than that of Botosan (1997) who found an alpha of 0.64 for an index based on five components of disclosure in annual reports. This exceeds the acceptable level of reliability, which has traditionally been set at 0.70 or higher (Nunnally, 1978). The Cronbach's alpha estimates the proportion of variance that can be attributed to true score variance. It can vary from 0 (no variance is consistent) to 1.00 (if all variances are consistent).

[Insert Table 2]

In Table 3, we present the disclosure scores by industry. We classify an industry as involved in innovation activities when the median of the sum of expensed R&D and amortization of intangible assets, scaled by total assets, is greater than zero. The lowest mean scores are observed for consumer discretionary (0.70) while the highest mean scores are in health care industry (8.75).

[Insert Table 3]

Since we use panel data, the problem of heteroscedasticity and autocorrelation might be an issue. To this end, we estimate regressions by the method of feasible generalized least squares (FGLS). The test of Breusch-Pagan/Cook-Weisberg shows the presence of heteroscedasticity (Chi2 = 4.26 [0.039] for the model 1; 164.7 [0.000] for the model 2; 358.8 [0.000] for model 3 earnings dispersion estimation, and 151.3 [0.000] for model 3 Price dispersion estimation). Thus, the structure of errors among the panels will be presumed to be heteroscedastic. In addition, to ensure that the presence of outliers does not bias our results, we exclude observations with standardized residuals exceeding two. The statistical software used was STATA.

Table 4 presents results for model 1, stock market valuation of intangible assets and voluntary disclosure about innovation. Consistent with hypothesis 1a, results show that voluntary disclosure on innovation improves the ability of stock markets to assess intangible assets under Canadian GAAP since the coefficient on the interaction term *Intangible assets*Disclosure* is positive and significant (0.117, $p < 0.05$). This result suggests a complementarity between mandatory financial reporting and voluntary disclosure. Voluntary disclosure about innovation would allow the market to assess the

existence of unbooked intangible assets. Moreover, consistent with hypothesis 2a, IFRS appears to reduce the importance of voluntary disclosure on the stock market valuation of intangible assets since the coefficient on the interaction term *Intangible assets*Disclosure*IFRS* is negative and significant (-0.227; $p < 0.01$). Student t-test for equality of coefficients shows that the sum of coefficients for *Intangible assets*Disclosure* and *Intangible assets*Disclosure*IFRS* is statistically close to zero ($t = 0.04$; $p < 0.8423$), which suggests that under IFRS, voluntary disclosure about innovation does not improve stock markets' assessment of intangible assets.

[Insert Table 4]

In Table 5, we report results for model 2, stock market valuation of expensed R&D and intangible amortization and disclosure about innovation. Consistent with hypothesis 1b, the coefficient on the interaction term *Amortization of intangible assets*Disclosure* (10.218; $p < 0.01$) is positive and significant. Student t-test for equality of coefficients shows that the sum of coefficients for *Amortization of intangible assets* and *Amortization of intangible assets*Disclosure* is statistically different from zero ($t = 5.51$; $p < 0.018$), which suggests that after controlling for voluntary disclosure about innovation, amortization of intangibles is not considered as an expense.. Consistent with hypothesis 2b, the effect of disclosure on the market's assessment of this expense is eliminated under IFSR, since the coefficient on the interaction term *Amortization of intangible assets*Disclosure*IFRS* is negative and significant (-9.298; $p < 0.05$), and the sum of coefficients for *Amortization of intangible assets*Disclosure* and *Amortization of intangible assets*Disclosure*IFRS* is statistically close to zero ($t = 0.94$; $p < 0.332$).

As for R&D expense, the interaction terms on *Expensed R&D*Disclosure* and *Expensed R&D*Disclosure*IFRS* are not statistically significant, suggesting no effect of voluntary disclosure on stock markets' assessment of this expense neither under Canadian GAAP nor IFRS.

[Insert Table 5]

In Table 6, we report results for model 3 on the relation between analysts forecast dispersion, expensed R&D, intangible amortization and disclosure about innovation. Consistent with hypothesis 1b, disclosure about innovation improves the ability of stock markets to assess expenses related to intangibles since it reduces analysts' forecast dispersion associated with both expensed R&D and amortization of intangible assets.

However, a better assessment of the amortization of intangible assets (expensed R&D) reduces price (earnings) dispersion. Indeed, the interaction term on *Expensed R&D*Disclosure* (-0.017; $p < 0.01$) is associated with a reduction in earnings forecast dispersion while *Amortization of intangible assets*Disclosure* (-0.051; $p < 0.01$) is associated with a reduction in stock price forecast dispersion. The amount of amortization of other intangibles is related to the amount of other intangibles recognized as an asset, which is likely to help financial analysts to assess a firm's market value. Finally, consistent with hypothesis 2b, IFRS reduces the associations between *Expensed R&D*Disclosure*IFRS* (0.041; $p < 0.01$) and earnings dispersion and between *Amortization of intangible assets*Disclosure*IFRS* (0.054; $p < 0.01$) and price dispersion. Student t-test for equality of coefficients shows that the sum of coefficients for *Amortization of intangible assets* and *Amortization of intangible assets*Disclosure* is

statistically different from zero ($t = 2.69$; $p < 0.107$). Student t-test shows that the sum of coefficients for *Amortization of intangible assets* and *Amortization of intangible assets*Disclosure* is statistically equal to zero ($t = 0.31$; $p < 0.579$). This suggests that the effect of voluntary disclosure under IFRS is reduced or eliminated.

[Insert Table 6]

Conclusion

This study investigates stock market assessment of intangibles accounted for in financial statements and voluntary disclosure about innovation considering the adoption of IFRS. More specifically, the two research questions are: (1) Does voluntary disclosure on innovation improve the ability of stock markets to assess intangibles recognized in Canadian financial statements? (2) What is the incidence of IFRS on this matter?

It appears that, under Canadian GAAP, voluntary disclosure about innovation allows market participants to better assess the value of intangible assets related to intangibles. Our results suggest that voluntary disclosure improves the ability of investors to assess the existence of unbooked intangible assets and expense and of financial analysts to reduce their forecast dispersion. This suggests complementarity between mandated and voluntary disclosure. However, the relevance of voluntary disclosure about innovation decreases under IFRS. Market participants would refer to a lesser extent to voluntary disclosure under an improved accounting standard.

Overall, our results are consistent with IFRS having significantly improved the information content of accounting information on intangible assets in Canada. In this

context, stock market participants are less in need of information on innovation activities generated on corporate websites, at least in its current form.

Managers will have an incentive to better target their communications on the web or other media to ensure a degree of complementarity with financial reporting generated by IFRS. In this sense, this study contributes to the voluntary disclosure literature.

The results of this study should be interpreted with caution for at least three reasons. First, our measure of disclosure about innovation is based on a coding instrument that assumes the relevance of the information collected. However, selected items may not fully capture the underlying phenomenon. A second potential limitation is restricting the coding to HTML documents and excluding documents in PDF format. However, most PDF documents (e.g. financial statements, press releases, annual reports, newsletters) are also published in paper format, making the voluntary nature of PDF disclosure less certain. Finally, the sample size may be an issue. However, sample firms represent a wide range of industries and a significant portion of market capitalization in Canada.

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Table 1

Descriptive statistics
Scaled by number of shares outstanding at year-end

| N: 194 | Min. | Max. | Mean | Median | Std Dev. |
|-----------------------------------|-------------|-------------|-------------|---------------|-----------------|
| Year Canadian GAAP | | | | | |
| Goodwill | 0 | 109.04 | 3.76 | 0.72 | 11.63 |
| Intangible assets | 0 | 65.12 | 2.26 | 0.08 | 7.93 |
| Expensed R&D | 0 | 3.54 | 0.14 | 0 | 0.44 |
| Amortization of intangible assets | 0 | 1.68 | 0.06 | 0 | 0.19 |
| Earnings forecast dispersion | 0.01 | 10.28 | 0.32 | 0.11 | 1.16 |
| Price dispersion | 0.04 | 0.54 | 0.13 | 0.11 | 0.09 |
| Year IFRS | | | | | |
| Goodwill | 0 | 54.78 | 3.27 | 0.66 | 6.59 |
| Intangible assets | 0 | 75.00 | 3.24 | 0.25 | 10.41 |
| Expensed R&D | 0 | 38.80 | 0.50 | 0 | 3.94 |
| Amortization of intangible assets | 0 | 17.60 | 0.31 | 0 | 1.79 |
| Earnings forecast dispersion | 0 | 5.14 | 0.25 | 0.13 | 0.57 |
| Price dispersion | 0.05 | 0.98 | 0.20 | 0.15 | 0.16 |

Table 2
Voluntary Disclosure about innovation
Mean scores

| N=194 | Min. | Max. | Mean | Std Dev. | Cronbach Alpha |
|-----------------------------|------|------|------|----------|-------------------|
| R&D activities | 0 | 16 | 1.21 | 2.78 | |
| Sales and investment growth | 0 | 10 | 0.74 | 1.18 | |
| Total | 0 | 18 | 1.95 | 3.57 | |
| Total - Year Canadian GAAP | 0 | 18 | 2.16 | 3.71 | 0.74 |
| Total - Year IFRS | 0 | 16 | 1.74 | 3.42 | 0.73 |

Table 3
Voluntary Disclosure about innovation
Mean scores by industry

| | Industries involved in innovation | | | Industries less involved in innovation | | | | | |
|-----------------------------|-----------------------------------|-------------|------------------------|--|------------------|------------|--------|-----------|-------------|
| | Materials | Health care | Information technology | Consumer discretionary | Consumer staples | Industrial | Energy | Utilities | Real estate |
| R&D | 1.59 | 6.75 | 3.20 | 0.17 | 0.18 | 1.08 | 0.67 | 1.31 | 0 |
| Sales and investment growth | 0.91 | 2.00 | 1.00 | 0.53 | 0.91 | 0.15 | 1.00 | 0.50 | 0.83 |
| Total | 2.50 | 8.75 | 4.20 | 0.70 | 1.09 | 1.23 | 1.67 | 1.81 | 0.83 |
| N | 46 | 4 | 20 | 36 | 22 | 26 | 18 | 16 | 6 |

Table 4
FGLS Cross-Sectional Regression on Stock Market Valuation of Intangible Assets
and Voluntary Disclosure about Innovation

| Model 1 | Sign | Coefficient | | P value |
|--|------|-------------|-----|--------------|
| Dependent variable : Stock price | | | | |
| Equity net of goodwill and intangible assets | + | 1.002 | | 0.000 |
| Goodwill | + | 0.846 | | 0.000 |
| Intangible assets | + | 0.907 | | 0.000 |
| Earnings | + | 3.407 | | 0.000 |
| Intangible assets*Disclosure | + | 0.117 | H1a | 0.034 |
| Intangible assets*Disclosure*IFRS | - | -0.227 | H2a | 0.001 |
| Intangible assets*IFRS | +/- | 0.248 | | 0.007 |
| Disclosure*IFRS | +/- | 0.216 | | 0.264 |
| Disclosure | +/- | -0.215 | | 0.172 |
| IFRS | +/- | -2.144 | | 0.001 |
| Wald chi2 (P value) | | | | 2,026 (0.00) |
| N | | | | 187 |
| | | | | 7 outliers |

One-tailed if directional prediction, two-tailed otherwise.

Table 5
FGLS Cross-Sectional Regression on Stock Market Valuation of
Expenses related to Intangibles and Voluntary Disclosure about Innovation

| Model 2 | Sign | Coefficient | P value |
|--|------|-------------|--------------|
| Dependent variable: Stock price | | | |
| Equity net of goodwill and intangible assets | + | 0.985 | 0.000 |
| Goodwill | + | 0.877 | 0.000 |
| Intangible assets | + | 1.059 | 0.000 |
| Earnings net of expensed R&D and amortization of intangible assets | + | 1.827 | 0.000 |
| Expensed R&D | - | -5.894 | 0.046 |
| Amortization of intangible assets | - | -5.534 | 0.061 |
| Expensed R&D*Disclosure | + | 0.174 | H1b 0.275 |
| Expensed R&D*Disclosure*IFRS | - | 0.839 | H2b 0.306 |
| Amortization of intangible assets*Disclosure | + | 10.218 | H1b 0.017 |
| Amortization of intangible assets*Disclosure*IFRS | - | -9.298 | H2b 0.028 |
| Expensed R&D*IFRS | +/- | -0.438 | 0.907 |
| Amortization of intangible assets*IFRS | +/- | 2.465 | 0.594 |
| Disclosure*IFRS | +/- | -0.161 | 0.535 |
| Disclosure | +/- | -0.323 | 0.158 |
| IFRS | +/- | -1.576 | 0.007 |
| Wald chi2 (P value) | | 1,050 | 0.000 |
| N | | 164 | |
| | | 30 outliers | |

One-tailed if directional prediction, two-tailed otherwise.

Table 6
FGLS Cross-Sectional Regression on Analysts Forecast Dispersion, Expenses related to Intangibles and Voluntary Disclosure about Innovation

| Model 3 | Sign | Earnings Dispersion | Price Dispersion |
|---|------|------------------------|---------------------|
| Beta | + | ***0.086 | ***0.055 |
| Analysts | - | ***-0.003 | ***-0.003 |
| Negative Earnings | + | ***0.149 | ***0.064 |
| Expensed R&D | ? | ***0.275 | **0.048 |
| Amortization of intangible assets | ? | -0.015 | ***0.252 |
| Expensed R&D*Disclosure | ? | ***-0.017 H1b | -0.002 |
| Expensed R&D*Disclosure*IFRS | ? | ***0.041 H2b | -0.009 |
| Amortization of intangible assets*Disclosure | - | -0.064 H1b | **-0.051 |
| Amortization of intangible assets*Disclosure*IFRS | + | 0.049 H2b | **0.054 |
| Expensed R&D*IFRS | ? | ****-0.279 | 0.039 |
| Amortization of intangible assets*IFRS | ? | 0.019 | ***-0.319 |
| Disclosure*IFRS | ? | 0.002 | -0.001 |
| Disclosure | ? | -0.005 | -0.004 |
| IFRS | ? | ***0.018 | ***0.027 |
| Innovation Industries | + | ***0.077 | ***0.029 |
| Wald chi2 (P value) | | 584(0.00) | 2,710(0.00) |
| N | | 173 | 157 |
| | | 3 outliers | 7 outliers |

*: $p < 0.10$; **: $p < 0.05$; ***: $p < 0.01$. One-tailed if directional prediction, two-tailed otherwise.

Appendix 1

Coding grid- Disclosure innovation

Investments in R&D

Description of products in development (Brands / Patents / Copyrights / Licenses)

Product testing / Prototype simulation / Advanced training

Awards for R&D activities / Leadership in new technologies

Others R&D

R&D activities

Sales related to innovations / new products

Market share related to innovations / new products

Awards related to innovations / new products (Innovative products)

Increase in sales and market shares / Growth strategy / Position in global market

Increase in investments

Sales and investment growth

Total innovation