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Market assessment of intangibles and voluntary disclosure about innovation: the incidence of IFRS

Marie-Josée Ledoux and Denis Cormier
ESG UQAM, Montreal, Canada

Abstract

Purpose – The purpose of this paper is to investigate the incidence of International Financial Reporting Standard (IFRS) on stock market assessment of intangibles and voluntary disclosure about innovation.

Design/methodology/approach – The authors develop three regression models. The first model investigates the stock market valuation of intangible assets and disclosure about innovation. The second model desegregates earnings to assess the relevance of components related to intangibles. The third model investigates how intangible expenses and voluntary disclosure affect analysts forecast dispersion.

Findings – Results show that the value relevance of intangible assets and expenses improves with the adoption of IAS 38. Overall, results indicate a decrease in the value relevance of voluntary disclosure about innovation under IFRS. More specifically, results suggest some overlap in the information content of mandated and voluntary disclosure for stock market valuation of intangible assets under IFRS. Findings also suggest that voluntary disclosure moderates market's assessment of expensed intangibles under both Canadian GAAP and IFRS.

Research limitations/implications – IAS 38 requires entities to recognize an intangible asset if certain criteria are met and to disclose specific information about it. In such a context, market participants may refer to a greater extent to financial reporting and to a lesser extent to voluntary disclosure when valuating intangibles.

Practical implications – Managers will have an incentive to better target their communications to ensure a degree of complementarity with financial reporting. In this sense, this study contributes to the voluntary disclosure literature.

Originality/value – To the best of the authors' 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.

Keywords International standards, Financial reporting, Disclosure, Intangible assets, Stock markets, Canada, International Financial Reporting Standards, Voluntary disclosure

Paper type Research paper

1. Introduction

A growing part of the market capitalization is attributed to intangible assets. In the USA, 80 percent of the market value of the S&P 500 in 2010 could be attributed to intangible assets, up from 68 percent in 1995 and 32 percent in 1985 (Ocean Tomo, 2010).

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Increasingly, companies find that creating value and competitive advantage can only be achieved by innovation in products and processes (Holland, 2003). 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 value of a firm cannot be established without considering its intangible capital. However, the ability of financial reporting to properly account for intangibles is often questioned. A large part of investments in intangibles is expensed as incurred although they create value, and the absence of disclosure on this regard (e.g. revenues from recently introduced products) may reduce the value relevance of financial reporting concerning 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 typically provide on voluntary basis financial and non-financial information that goes beyond statutory requirements. Based on interviews with 25 large UK firms, Holland (2004) shows that companies are aware that they need to communicate about how they create value and how much of the value created results from knowledge; an intangible asset that is often over-looked by investors. Previous studies have shown the impact of voluntary disclosure about intangibles on stock prices (Abdolmohammadi, 2005). The value relevance of the information provided on firms' web sites has also been documented (Gerpott *et al.*, 2008; Orens *et al.*, 2009; Cormier *et al.*, 2009b). The corporate web site, because of its flexibility, accessibility and interactivity, appears to be a powerful platform to communicate corporate information to various stakeholders.

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 prescribes the accounting treatment (including the recognition criteria as well as disclosure requirements) for 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. This result could be due to the fact that IFRS are generally more stringent and more detailed than the local accounting standard they replace. This is the case in Canada with regard to accounting for intangibles. Therefore, we expect that market participants will refer to a greater extent to financial reporting and to a lesser extent to voluntary disclosure when assessing a firm's intangibles following the adoption of IFRS.

More specifically, this study aims to investigate the incidence of IFRS on stock markets' assessment of intangibles accounted for in Canadian statements and voluntary disclosure about innovation. First, our results show that the value relevance of intangible assets largely improves with the adoption of IAS 38. Second, our results indicate a decrease in the value relevance of voluntary disclosure about innovation under IFRS. More specifically, results suggest some overlap in the information content of mandated and voluntary disclosure for stock market valuation of intangible assets under IFRS. It also suggests that voluntary disclosure about innovation moderates market's assessment of expensed intangibles under both Canadian GAAP and IFRS.

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 CICA 3064 *Goodwill and Intangible Assets* which replaced existing CICA 3062 *Goodwill and Other Intangible Assets* and CICA 3450 *Research and Development*. CICA 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*[1]. The objective of IAS 38 is to prescribe the accounting treatment for intangible assets that are not dealt with specifically in other standards[2]. 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 specific 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). 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.

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 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 rational 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.

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 (§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 (CICA 1581). Since 2009, CICA 1582 that supersedes CICA 1581 requires intangible assets to be distinguished from 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. CICA 3064 in accordance with IFRS has brought significant changes in accounting numbers[3] as well as new disclosure requirements. Table I summarizes key differences between IAS 38 and Canadian GAAP.

3. Background and hypotheses

3.1 Financial reporting about intangibles and stock markets

Previous studies show the limitations of financial reporting to reflect stock market prices in sectors that are heavily investing in intangible assets. Amir and Lev (1996) highlight the lack of relevance of financial reporting for stock market pricing in fast-changing, technology-based industries. Using a traditional valuation model (Feltham and Ohlson, 1995) for a sample of firms in the mobile phone sector, Amir and Lev show that book value of equity as well as earnings and cash flows are not associated with stock prices. Moreover, Lev and Zarowin (1999) show that the explanatory power of book value of equity as well as earnings has declined between 1977 and 1996, period over which US firms have experienced a significant growth. The authors find that an increase in the rate of change in equity (a growth factor) as well as in R&D intensity is associated with a decline in earnings informativeness. They also document a positive association between a firm's rate of change and the intensity of

	IFRS (IAS 38)	Canadian GAAP
The asset is identifiable and can be measured reliably	Part of the definition of an intangible asset	Not mentioned
Internally generated intangibles		
Future economic benefits	Research phase – expense Development phase – asset	Research phase – expense Development phase – asset only for R&D
No future economic benefits	Expensed	Expensed
Acquired intangibles		
Future economic benefits	Asset	Part of the goodwill if acquired in business combinations Asset for other acquisitions
Disclosure requirements	More extensive disclosure	Less extensive disclosure

Table I.
Differences between the Canadian and IFRS standards on accounting for intangibles

its R&D activities. Finally, Barth *et al.* (1998) show that the explanatory power of earnings is higher than that of equity book value for pharmaceutical firms while the reverse is true for financial firms. No significant difference was observed between the explanatory power of equity and that of earnings for durable manufacturing firms. According to the authors, earnings reflect the value of unrecognized assets, although it most likely does it with error.

Several studies have addressed the question of whether investors consider R&D expenditures as an asset, which should reflect in a firm's market value, or as an expense for the year they are incurred. In the American context, Connolly and Hirschey (1984) find a positive effect of R&D on future profits while Sougiannis (1994) shows that a dollar spent in R&D is associated with an increased market value of five dollars. Consistently, Lev and Sougiannis (1996) find that equity and earnings adjusted for the capitalization of R&D expenditures are positively associated with stock return and prices. Chan *et al.* (2001) find that firms with high R&D to equity market value (which tend to have poor past returns) earn large excess returns. A similar relation exists between advertising and stock returns. As the capitalization of R&D is not allowed in the USA, except for software development, those researchers are using simulated data, which may bring some limitations on their results. The possibility to capitalize R&D expenditures could have had an impact on contracting issues and disclosure strategy. However, using archival data, Aboody and Lev (1998) show that the cost of software development is correlated with stock prices and future earnings.

International studies tend to confirm the overall results of US studies. For example, Zhao (2002) shows from a comparative study of four countries (France, Britain, Germany and the USA) that the relevance of accounting for stock markets would be higher in countries that allow the inclusion in assets of R&D, namely the UK and France. This is consistent with the fact that investments in intangibles are generally considered by investors as an asset rather than an expense.

3.2 Voluntary disclosure about intangibles and stock markets

Previous literature suggests that voluntary disclosure may be relevant for investors as it helps to bridge the gap between financial reporting and market valuation needs (Botosan and Harris, 2000; Healy and Palepu, 2001). Many studies have focused on the value relevance of voluntary disclosure about intangibles. Abdolmohammadi (2005) find a positive relationship between disclosure in annual reports about brands and stock market value. In the cell-phone industry, Amir and Lev (1996) conclude that investors value non-financial information beyond financial reporting. Riley *et al.* (2003) and Behn and Riley (1999) reach the same conclusion for the airline industry. In the resort sector, Ittner and Larcker (1998) show that disclosure about customer satisfaction is positively associated with excess returns over a period of ten days, so that information is only partially reflected in book values. Moreover, Hirshey *et al.* (2001) demonstrate that when used in conjunction with traditional accounting information about R&D, scientific information on patent quality appears to give investors a useful basis for assessing the economic value of the firm with respect 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. Consistently, Jones (2007) provides evidence of the capacity of voluntary disclosure on R&D to reduce errors in analysts' forecasts.

Based on a sample of telecommunications network operators, Gerpott *et al.* (2008) show that intangible disclosure in annual reports and web sites have a positive impact on market capitalization. Previous studies also show that voluntary disclosure on the web about human capital is associated with higher earnings response coefficients (Cormier *et al.*, 2009b) and lower share price volatility (Cormier *et al.*, 2009a). Finally, Orens *et al.* (2009) show that the 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

Prior research shows the importance of innovation for creating value as well as the relevance of intangible capital for stock market valuation. It also shows the limitations of financial reporting to reflect stock market prices in sectors that are heavily investing in intangible assets and the relevance of voluntary disclosure to bridge the gap between financial reporting and market valuation needs.

Moreover, recent studies have shown that intangible assets are more valued under IFRS than under local GAAP, which could be due to the fact that IFRS are generally more stringent and more detailed than the local accounting standard they replace. The high level of details in the information required under IFRS, including disclosure about internally generated intangible assets, may reduce investors' needs to rely on voluntary disclosure about innovation to value intangibles. Given that IFRS are more stringent and precise than the prior Canadian standards on accounting for intangible assets, we anticipate that the relevance of Canadian financial statements for stock market valuation increases with the adoption of IFRS while that of voluntary disclosure about innovation decreases.

We propose the following two hypotheses:

H1. The value relevance of intangible assets and expenses improves under IFRS.

H2. The value relevance of voluntary disclosure about innovation decreases under IFRS.

4. Method

4.1 Sample

This study focuses on 97 non-financial firms in the Canadian market index S&P/TSX for years 2005 and 2010, representing a sample of 194 firms-years. Disclosure about innovation was coded from web sites in 2005 for 155 firms. Of these, 58 firms were merged or removed from the stock market between 2005 and 2010. The need for comparability between both years explains our final sample. This sample represents 55 percent of the market capitalisation of non-financial firms listed on the Toronto Stock Exchange (TSE) at the end of 2010. Voluntary disclosure on innovation was collected in springs 2005 and 2010. We rely on financial statements available at that time. 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

Given that a firm's information dynamics may simultaneously affect disclosure strategy and our dependant variables, we first assess whether or not endogeneity exists between

the variables using the Hausman test. Endogeneity tests (reported in the results section) confirm these interrelations, which justifies relying on simultaneous equations.

Two empirical models are developed to investigate stock market valuation of intangible components of financial reporting and voluntary disclosure about innovation. Those models of stock market valuation are based on the basic accounting equation where earnings is used as a growth factor (Feltham and Ohlson, 1995; Amir and Lev, 1996; Collins *et al.*, 1997). In the first model, intangible assets are isolated from equity, which allows assessing the incidence of IFRS on market valuation of intangible assets and voluntary disclosure about innovation. If disclosures improves the ability of stock markets to assess intangible assets, the coefficient on *Intangible assets*Disclosure* should be positive. The interaction term *Intangible assets*Disclosure*IFRS* captures the impact of IFRS on that matter.

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

$$\begin{aligned} \textit{Market Value} = {} & \beta_0 + \beta_1\, \textit{Equity net of goodwill and intangible assets}_{it} \\ & + \beta_2\, \textit{Goodwill}_{it} + \beta_3\, \textit{Intangible assets}_{it} + \beta_4\, \textit{Earnings}_{it} \\ & + \beta_5\, \textit{Intangible assets*Disclosure}_{it} \\ & + \beta_6\, \textit{Intangible assets*Disclosure*IFRS}_{it} + \beta_7\, \textit{Intangible assets*IFRS}_{it} \\ & + \beta_8\, \textit{Disclosure}_{it} + \beta_9\, \textit{Disclosure*IFRS}_{it} + \beta_{10}\, \textit{IFRS}_{it} + \varepsilon \end{aligned} \tag{1}$$

Instrumented: *Disclosure*.

Instruments: *Analyst following*, *Firm size*, *Leverage*, *ROA*, *Innovation industries*.

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

$$\begin{aligned} \textit{Market Value} = {} & \beta_0 + \beta_1\, \textit{Equity net of goodwill and intangible assets}_{it} \\ & + \beta_2\, \textit{Goodwill}_{it} + \beta_3\, \textit{Intangible assets}_{it} \\ & + \beta_4\, \textit{Earnings net of expensed R\&D and amortization of intangible assets}_{it} \\ & + \beta_5\, \textit{Expensed R\&D}_{it} + \beta_6\, \textit{Expensed R\&D*IFRS}_{it} \\ & + \beta_7\, \textit{Expensed R\&D*Disclosure}_{it} + \beta_8\, \textit{Expensed R\&D*Disclosure*IFRS}_{it} \\ & + \beta_9\, \textit{Amortization of intangible assets}_{it} \\ & + \beta_{10}\, \textit{Amortization of intangible assets*IFRS}_{it} \\ & + \beta_{11}\, \textit{Amortization of intangible assets*Disclosure}_{it} \\ & + \beta_{12}\, \textit{Amortization of intangible assets*Disclosure*IFRS}_{it} \\ & + \beta_{13}\, \textit{Disclosure}_{it} + \beta_{14}\, \textit{Disclosure*IFRS}_{it} + \beta_{15}\, \textit{IFRS}_{it} + \varepsilon \end{aligned} \tag{2}$$

Instrumented: *Disclosure*.

Instruments: *Analyst following*, *Firm size*, *Leverage*, *ROA*, *Innovation industries*.

Determinants of disclosure

Based on prior literature on voluntary disclosure, the following variables serve as the first-stage estimates of the determinants of disclosure about innovation.

Analyst following. Lang and Lundholm (1996) and Healy *et al.* (1999) find a positive relation between analyst following and the quality of corporate disclosure. Hence, we expect a positive relationship between the number of analyst following a firm and disclosure about innovation.

Firm size. Prior empirical evidence shows a positive relationship between the extent of corporate disclosure and firm size (Scott, 1994; Neu *et al.*, 1998). Firm size, measured as natural logarithm of total assets, is expected to be positively related to disclosure about innovation.

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 *et al.*, 1988; Cormier and Magnan, 2003), we expect a negative relationship between a firm's leverage (long term debts divided by total asset) and disclosure about innovation.

ROA. Prior studies document a positive association between a firm's level of disclosure and its financial performance (Cormier and Magnan, 2003; Murray *et al.*, 2006). We expect a positive relationship between profitability and disclosure about innovation.

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 0. We anticipate more disclosure 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. Our coding scheme presented in the Appendix includes ten items grouped under two categories: R&D activities and sales and investment growth. The content is coded according to indicative/general aspect (one point), descriptive/qualitative (two points) and quantitative/monetary (three 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 use of a 0-3 scoring scale is consistent with most prior work on disclosure (Botosan, 1997). The basis for coding is typically that an item is either disclosed or not (0 vs a particular score). Then, additional weight is given to disclosure items that are more informative. In our case, if the information is strictly indicative, it will be attributed a score of 1, if it is qualitative, a score of 2, and if it is quantitative a score of 3. The use of a tight scoring grid is consistent with the minimization of subjective judgment in the assessment of a firm's disclosure.

There is ample support to warrant such a disclosure weighting. For instance, in looking at voluntary environmental disclosure, Clarkson *et al.* (2008) assign higher

ratings to "hard" disclosure items than to "soft" disclosure: hard items would be difficult for poor performing companies to mimic. Hard disclosure is described in quantitative or monetary terms. Cho and Patten (2007) also assign a higher weighting to "hard" disclosure items than to "soft" disclosure items. Moreover, starting with Baginski *et al.* (1993), research on voluntary management earnings forecasts finds also that point monetary earnings forecasts (i.e. hard or precise) are perceived to be more valuable by investors than "soft" qualitative or range forecasts. Such "hard" forecasts are shown to reduce information asymmetry between investors and managers more than "soft" range or qualitative forecasts.

The coding 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 Lundholm, 1993; AIMR, 2002; Botosan, 1997; Healy *et al.*, 1999).

5. Results

Results presented in Table II show that, on average, intangible assets increased significantly from the two periods (from $2.26 to $3.24 per share) while the goodwill slightly decreased, which could be due to the fact that some intangible assets were included in the goodwill under Canadian GAAP. Expensed R&D (from $0.14 to $0.50 per share) as well as the amortization of intangible assets (from $0.06 to $0.31 per share) increased significantly between the two periods. We also observe (not tabulated) that the number of firms that capitalize intangibles has increased by 50 percent from both periods. Finally, the two periods appear comparable in terms of stock market growth as returns do not differ significantly between 2005 and 2010.

We observe from Table III that disclosure scores about innovation slightly decreased from 2005 to 2010 (from 2.16 to 1.74). The Cronbach's α shows that the variance is quite systematic in disclosure scores (α exceeding 0.73). These numbers are higher than that of Botosan (1997) who found an α 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 (Nunnaly, 1978). The Cronbach's α estimates the proportion

	Min.	Max.	Mean	Median	SD
Year Canadian GAAP (n: 97)					
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 (*n*: 91)	0.000	0.406	0.016	0.006	0.04
Stock return	−0.36	1.48	0.18	0.18	0.30
Year IFRS (n: 97)					
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 (*n*: 91)	0.000	1.105	0.026	0.009	0.11
Stock return	−0.58	2.76	0.25	0.18	0.43

Table II.
Descriptive statistics scaled by the number of shares outstanding at year-end

of variance that can be attributed to true score variance. It can vary from 0 (if no variance is consistent) to 1.00 (if all variances are consistent).

In Table IV, we present the disclosure scores by industry. We classify an industry as "more 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 0. The lowest mean scores are observed for consumer discretionary (0.70) while the highest mean scores are in health care industry (8.75).

Since we use panel data to estimate our models, the problem of heteroscedasticity and autocorrelation might be an issue. The test of Breusch-Pagan/Cook-Weisberg shows the presence of heteroscedasticity ($\chi^2 = 4.26$ [0.039] for the model 1 and 164.7 [0.000] for the model 2). Thus, the structure of errors among the panels is presumed to be heteroscedastic. To this end, we estimate regressions by the method of feasible generalized least squares (FGLS). The statistical software used is STATA. Based on the Hausman test, the null hypothesis of no endogeneity is rejected with respect to disclosure and stock price ($t = -2.81$; $p < 0.069$). In light of this diagnostic, we rely on two-stage estimation regressions for models 1 and 2. In addition, to reduce the effect of outliers, we winsorize the dependent variable in the following manner. First, we identify observations with standardized residuals exceeding two. Then, we replace these observations with the mean plus/minus two standard deviations from the mean.

Results (not tabulated) for the first-stage estimates of the determinants of disclosure about innovation show that *Firm size* (0.31; $p < 0.084$ one-tailed), *Leverage* (-2.48; $p < 0.082$ one-tailed) and *Innovation industries* (2.21; $p < 0.000$) are associated with *Disclosure about innovation*. This is consistent with our expectations.

Table V presents results for model 1 on stock market valuation of intangible assets and voluntary disclosure about innovation. Results show that the value relevance of intangible assets largely improves with the adoption of IAS 38 since the coefficient on the interaction term *Intangible assets*IFRS* (1.747; $p < 0.001$) is positive. This result suggests that Canadian financial statements offer more credible information under IFRS since investors assign a larger value to each dollar of capitalized intangibles following the adoption of IAS 38. Consistent with *H2*, findings show that the value relevance of voluntary disclosure about innovation decreased under IFRS since the coefficient on *Intangible assets*Disclosure*IFRS* is negative (-1.368; $p < 0.004$) while the coefficient on *Disclosure*IFRS* (0.313; $p < 0.636$) is not significant. More specifically, results show a substitution effect between *Intangible assets* and *Disclosure* under IFRS, suggesting that mandated and voluntary disclosure overlap in terms of information content following the adoption of IAS 38.

	Min.	Max.	Mean	SD	Cronbach's α
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

Note: $n = 194$

Table III.
Voluntary disclosure about innovation mean scores

	Industries more 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 IV.
Voluntary disclosure about innovation mean scores by industry

Model 1 Dependent variable: stock price	Sign	Coefficient	*p*-value
Equity net of goodwill and intangible assets	+	1.069	0.000
Goodwill	+	0.974	0.000
Intangible assets	+	1.305	0.000
Intangible assets*IFRS	+	1.747	0.001
Earnings	+	2.265	0.000
Intangible assets*Disclosure	+	0.011	0.490
Intangible assets*Disclosure*IFRS	−	−1.368	0.004
Disclosure	±	2.577	0.000
Disclosure*IFRS	±	0.313	0.636
IFRS	±	5.242	0.000
Wald χ^2 (*p*-value)			1,066 (0.00)
n			194

Notes: One-tailed if directional prediction, two-tailed otherwise; instrumented: Disclosure about innovation; Instruments: Analyst following, Firm size, Leverage, ROA, Innovation industries

Table V.
FGLS cross-sectional two-stage regression on stock market valuation of intangible assets and voluntary disclosure about innovation

In Table VI, we report results for model 2 on stock market valuation of expensed R&D, amortization of intangible assets, and voluntary disclosure about innovation. Under Canadian GAAP, *Expensed R&D* (23.139; $p < 0.084$) and *Amortization of intangible assets* (35.467; $p < 0.003$) are positively related to stock market value, which suggest that market participants rather see those expenses as assets, assigning them a future economic value. Consistent with *H1*, coefficients on interaction terms *expensed R&D*IFRS* (−85.761; $p < 0.000$) and *Amortization of intangible assets*IFRS*

Model 2 Dependent variable: stock price	Sign	Coefficient	*p*-value
Equity net of goodwill and intangible assets	+	1.078	0.000
Goodwill	+	1.011	0.000
Intangible assets	+	1.204	0.000
Earnings net of expensed R&D and amortization of intangible assets	+	2.131	0.000
Expensed R&D	±	23.139	0.084
Expensed R&D&IFRS	±	−85.761	0.000
Expensed R&D*Disclosure	±	−7.281	0.064
Expensed R&D*Disclosure*IFRS	±	21.743	0.000
Amortization of intangible assets	±	35.467	0.003
Amortization of intangible assets*IFRS	±	−37.616	0.004
Amortization of intangible assets*Disclosure	±	−25.911	0.043
Amortization of intangible assets*Disclosure*IFRS	±	30.235	0.021
Disclosure	±	3.015	0.000
Disclosure*IFRS	±	−0.946	0.222
IFRS	±	6.742	0.000
Wald χ^2 (*p*-value)		1,088	0.000
n		194	

Notes: One-tailed if directional prediction, two-tailed otherwise; instrumented: Disclosure about innovation; Instruments: Analyst following, Firm size, Leverage, ROA, Innovation industries

Table VI.
FGLS cross-sectional two-stage regression on stock market valuation of expenses related to intangibles and voluntary disclosure about innovation

(-37.616; $p < 0.004$) are negative, suggesting a more appropriate accounting treatment for intangibles. Following the adoption of IAS 38, *Expensed R&D* are negatively valued by stock market since the sum of coefficients *Expensed R&D* and *Expensed R&D*IFRS* is different from 0 (joint test $\beta_5 + \beta_6 = 0$, $t = 31.48$; $p < 0.000$) while *Amortization of intangible assets* is not valued anymore since the sum of coefficients *Amortization of intangible assets* and *Amortization of intangible assets*IFRS* is close to 0 (joint test $\beta_9 + \beta_{10} = 0$, $t = 0.19$; $p < 0.662$). The lost of relevance of amortisation of intangible assets for stock market also support the argument that intangible assets are better accounted for under IFRS than under Canadian GAAP.

Under Canadian GAAP, voluntary disclosure about innovation reduces the positive valuation of intangible expenses. The value relevance of disclosure does not decrease under IFRS, since coefficients on *Expensed R&D*Disclosure*IFRS* (21.743; $p < 0.000$) and *Amortization of intangible assets*Disclosure*IFRS* (30.235; $p < 0.021$) are positive. That is inconsistent with *H2*. The sum of coefficients on *Expensed R&D*Disclosure* and *Expensed R&D*Disclosure*IFRS* is different from 0 (joint test $\beta_7 + \beta_8 = 0$, $t = 15.97$; $p < 0.000$), suggesting that voluntary disclosure about innovation helps stock market to value expensed R&D under IFRS. However, voluntary disclosure has no impact on the assessment of amortization of intangible assets under IFRS since the sum of coefficients on *Amortization of intangible assets*Disclosure* and *Amortization of intangible assets*Disclosure*IFRS* is close to 0 (joint test $\beta_{11} + \beta_{12} = 0$, $t = 2.35$; $p < 0.126$). Overall, results suggest that disclosure about innovation moderates market's assessment of expensed intangibles under both Canadian GAAP and IFRS. Under Canadian GAAP, voluntary disclosure moderates the positive valuation of expensed intangibles while under IFRS, voluntary disclosure moderates the negative valuation of such expenses.

As a sensitivity analysis, we propose a third model that investigates how expensed R&D, amortization of intangible assets, and voluntary disclosure about innovation affects earnings forecast dispersion. Lang and Lundholm (1996) 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 financial analysts to evaluate expenses related to intangibles, it should decrease forecast dispersion:

$$\begin{aligned} \textit{Earnings forecast dispersion} = {} & \beta_0 + \beta_1 \textit{Beta}_{it} + \beta_2 \textit{Analysts}_{it} \\ & + \beta_3 \textit{Negative earnings}_{it} + \beta_4 \textit{Expensed R\&D}_{it} \\ & + \beta_5 \textit{Expensed R\&D*IFRS}_{it} \\ & + \beta_6 \textit{Expensed R\&D*Disclosure}_{it} \\ & + \beta_7 \textit{Expensed R\&D*Disclosure*IFRS}_{it} \\ & + \beta_8 \textit{Amortization of intangible assets}_{it} \\ & + \beta_9 \textit{Amortization of intangible assets*IFRS}_{it} \\ & + \beta_{10} \textit{Amortization of intangible assets*Disclosure}_{it} \\ & + \beta_{11} \textit{Amortization of intangible assets*Disclosure*IFRS}_{it} \\ & + \beta_{12} \textit{Disclosure}_{it} + \beta_{13} \textit{Disclosure*IFRS}_{it} + \beta_{14} \textit{IFRS}_{it} + \varepsilon \end{aligned} \tag{3}$$

Instrumented: *Disclosure*.

Instruments: *Analyst following*, *Firm size*, *Leverage*, *ROA*, *Innovation industries*.

Earnings forecast dispersion. Earnings forecast dispersion is measured as the standard deviation of estimated EPS scaled by stock price at the beginning of the period.

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

Analysts. 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 earnings 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 earnings forecast dispersion to be higher for firms with negative earnings.

In Table VII, we report results for model 3 on the relation between earnings forecast dispersion, expensed R&D, amortization of intangible assets, and voluntary disclosure about innovation. Based on the Hausman test, the null hypothesis of no endogeneity is rejected with respect to disclosure and earnings forecast dispersion ($t = 1.64$; $p < 0.103$). In light of this diagnostic, we rely on a two-stage estimation regression.

Under Canadian GAAP, *Expensed R&D* (0.013; $p < 0.064$) increases earnings forecast dispersion while *Amortization of intangibles* (-0.001; $p < 0.883$) is not significant. Under IFRS, *Expense R&D* does not affect earnings forecast dispersion since the sum of coefficients on *Expensed R&D* and *Expensed R&D*IFRS* (joint test $\beta_4 + \beta_5 = 0, t = 1.40$; $p < 0.237$) is close to 0. However, *Amortization of intangible assets* under IFRS appears to

Model 3 Dependent variable: earnings forecast dispersion	Sign	Coefficient	*p*-value
Beta	±	0.006	0.000
Analysts	±	−0.001	0.000
Negative Earnings	±	0.013	0.000
Expensed R&D	±	0.014	0.064
Expensed R&D*IFRS	±	−0.028	0.021
Expensed R&D*Disclosure	±	−0.003	0.250
Expensed R&D*Disclosure*IFRS	±	0.011	0.017
Amortization of intangible assets	±	−0.001	0.883
Amortization of intangible assets*IFRS	±	0.016	0.129
Amortization of intangible assets*Disclosure	±	0.004	0.611
Amortization of intangible assets*Disclosure*IFRS	±	−0.015	0.109
Disclosure	±	0.003	0.000
Disclosure*IFRS	±	−0.001	0.083
IFRS	±	0.003	0.003
Wald χ^2 (*p*-value)			829
n			182

Notes: One-tailed if directional prediction, two-tailed otherwise; instrumented: Disclosure about innovation; Instruments: Analyst following, Firm size, Leverage, ROA, Innovation industries

Table VII.
FGLS cross-sectional two-stage regression on analysts forecast dispersion, expenses related to intangibles, and voluntary disclosure about innovation

increase dispersion since the sum of coefficients on *Amortization of intangible assets* and *Amortization of intangible assets*IFRS* (joint test $\beta_8 + \beta_9 = 0$, $t = 7.48$; $p < 0.006$) is different from 0.

Under Canadian GAAP, accounting numbers on intangibles and disclosure about innovation have a positive impact on earnings forecast dispersion since the sum of coefficients on *Expensed R&D, Expensed R&D*Disclosure, Amortization of intangible assets, Amortization of intangible assets*Disclosure, Disclosure* is positively different from 0 (joint test $\beta_4 + \beta_6 + \beta_8 + \beta_{10} + \beta_{12} = 0$, $t = 5.20$; $p < 0.022$). Under IFRS, *Expensed R&D, Amortization of intangibles* and *Disclosure* combined do not impact on forecast dispersion (joint test β_4 *to* $\beta_{13} = 0$, $t = 0.04$; $p < 0.835$). Finally, disclosure has a lesser impact on forecast dispersion under IFRS than under Canadian GAAP (-0.001; $p < 0.083$). Accounting numbers about intangibles under IFRS would allow analysts to better assess future earnings. This is consistent with our hypotheses.

As a last sensitivity analysis, we estimate our second model using stock return instead of stock price. Independent variables are scaled by stock price at the beginning of the period. We assess whether endogeneity exists between *Disclosure about innovation* and *Stock return* using the Hausman test. Based on this procedure, the null hypothesis of no endogeneity is rejected with respect to disclosure and stock market returns ($t = -1.70$; $p < 0.091$). In light of this diagnostic, we rely on a two-stage estimation regression. Results reported in Table VIII are quite similar to those presented in Table VI based on the estimation of stock market price.

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.

Findings show that the value relevance of intangible assets largely improves with the adoption of IAS 38. Overall, results indicate a decrease in the value relevance

Table VIII.
FGLS cross-sectional two-stage regression on stock market return of expenses related to intangibles and voluntary disclosure about innovation

Model 2 Dependent variable: stock return	Sign	Coefficient	*p*-value
Expensed R&D	±	2.143	0.001
Expensed R&D*IFRS	±	−1.624	0.028
Expensed R&D*Disclosure	±	−1.048	0.000
Expensed R&D*Disclosure*IFRS	±	0.629	0.054
Amortization of intangible assets	±	6.426	0.004
Amortization of intangible assets*IFRS	±	−7.791	0.000
Amortization of intangible assets*Disclosure	±	−0.053	0.069
Amortization of intangible assets*Disclosure*IFRS	±	1.263	0.000
Disclosure	±	0.074	0.000
Disclosure*IFRS	±	−0.021	0.226
IFRS	±	0.125	0.000
Wald χ^2 (*p*-value)		666	0.000
n		194	

Notes: One-tailed if directional prediction, two-tailed otherwise; instrumented: Disclosure about innovation; Instruments: Analyst following, Firm size, Leverage, ROA, Innovation industries

of voluntary disclosure about innovation under IFRS. More specifically, results suggest some overlap in the information content of mandated and voluntary disclosure for stock market valuation of intangible assets under IFRS. It also suggests that voluntary disclosure about innovation moderates market's assessment of expensed intangibles under both Canadian GAAP and IFRS.

Our results are quite 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 web sites, at least in its current form. Managers will have an incentive to better target their communications 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 two 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. Second, 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.

Notes

1. The only substantial difference between IAS 38 and CICA 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 CICA 3064 permits only the cost method. This difference is somewhat minimized in practice, since criteria for an active market are not often met.
2. 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*.
3. 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.

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Appendix. Coding grid – disclosure innovation

R&D activities

Investments in R&D.

Description of products in development (brands/patents/copyrights/licenses).

Product testing/prototype simulation/advanced training.

Awards for R&D activities/recent accomplishments/leadership in new technologies.

Others R&D.

Sales and investment growth

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.

Total innovation.