The Effect of Voluntary XBRL Adoption on Audit Fees: Evidence from Belgium

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The European Parliament has voted for the new Transparency Directive that calls for the mandatory preparation of annual financial reports in a single digital format from January 1, 2020 such as eXtensible Business Reporting Language (XBRL). This paper examines whether the adoption of XBRL is associated with lower costs of audit in Belgium. Our results show that XBRL is negatively related to audit fees. The empirical findings suggest also that the association effect is stronger for larger firms that have sufficient resources and expertise to properly implement the technology.

INTRODUCTION

Given the high cost of developing and implementing data standards such as eXtensible Business Reporting Language (XBRL), it is critical to assess their influences before they are adopted on a large scale. The XBRL is a data formatting standard that enables the electronic communication of financial reports(Li et al. 2007; Rezaee 2009b; Troshani and Doolin 2007; Troshani and Lymer 2010).Moreover, the XBRL is a markup language designed to cade, use, and exchange business data in a way that computers can directly manage it. It's open standard, free of licence fees, derived from XML and promoted by XBRL International Inc. Thanks to XBRL accountants, auditors and users can share, reuse, and analyse data in a new interactive way. XBRL is either mandated or voluntarrily used for filing accounts in several countries including Australia, Belguim, Canada, China, Denmark, France, Germany, Israel, Italy, Korea, the Netherlands, Spain, Sweden, Singapore, the United Kingdom, India, Brazil, Japan and the USA(Fradeani et al. 2017).

The American Institute of Certified Public Accountants consider that the XBRL, ranked as one of top ten technologies for business professionals(PENG and Janie Chang 2010), has piqued mounting attention of a variety of regulators (Wenger et al. 2011).

In 2013, the European Parliament voted for the new European Union (EU) Transparency Directive on the harmonization of transparency requirements in relation to information about issuers whose securities

are admitted to trading on a regulated market. The Directive calls for a harmonized electronic format for reporting to facilitate accessibility, analysis and comparability of annual financial reports by 2020 after a cost–benefit analysis has been undertaken by European Securities and Markets Authority (ESMA) with due reference to current and future technological options, such as XBRL. Given the high cost of developing and implementing data standards such as XBRL and their significant impact(Zhu and Wu 2014),it is critical to assess their influences before they are adopted on a large scale.

In essence, XBRL can enhance the interchangeability of financial data by streamlining and integrating information flows among heterogeneous organizations. XBRL can facilitate the exchange of financial data between different computer platforms and accounting information systems and in doing so, enhance the transparency of financial reports (Abdolmohammadi et al. 2002; Doolin and Troshani 2007; Troshani and Lymer 2010, 2011; Fradeani et al. 2017).With greater transparency, it is reasonable to expect that firm monitoring functions, including external auditing, could be enhanced and related auditing costs reduced.

In a bid to further advance this line of research, this study investigates the effect of XBRL on audit fees with European evidence from the Belgian stock market. Belgium is one of the leading EU countries that have mandated XBRL for financial reporting. We specifically focus our attention on external auditing because it is considered to be an important monitoring function in the business information supply chain (Simkin et al. 2014). In fact, auditing evaluates the accuracy and fairness of financial statements relative to a jurisdiction's generally accepted accounting principles (GAAP) (De George et al. 2012; Simkin et al. 2014)and consequently improves the credibility of the firms which produce them. This makes it less costly for firms to achieve their investment growth aims (Khurana and Raman 2004) while also facilitating compliance with appropriate legislation(Li et al. 2007; Rezaee 2009a).We argue that XBRL enhances the transparency of financial reporting, which facilitates external auditing functions. With greater transparency, audit risks are likely to be reduced, resulting in lower audit costs for the firm (Pathak and Khadaroo 2005).

Several factors lead us to examine the effect of XBRL on audit fees in the Belgian private firm setting. First, in Europe, Belgium is among the first countries that adopted XBRL financial reporting. In 2004, the National Bank of Belgium took its first step to introduce XBRL. On July 15, 2006, XBRL Belgium became an established jurisdiction. The Banking, Finance and Insurance Commission (BFIC), the Belgian Banker's Association, and the National Bank of Belgium spent significant resources to promote and enforce XBRL financial reporting.

Second, unlike in the U.S., where only a small percentage of publicly listed firms joined the Securities and Exchange Commission's (SEC's) Voluntary Filing Program (Kaya 2014),currently and according to the Central Balance Sheet Office of the National Bank of Belgium,[1] more than 95% of Belgian private firms' annual accounts are voluntarily filed in XBRL, suggesting that regulatory commitment and efforts as well as market forces of supply and demand for structured financial information are likely to be important determinants for the widespread use of XBRL(Dunne et al. 2013).[2]

Finally, the XBRL taxonomy in Belgium has a standardized structure that avoids specific extensions. To conduct our empirical tests, we use a data set containing 912firm-year observations of Belgian private firms from Datastream database between 2002 and 2014.

Our comparative results indicate that XBRL filers in Belgium have experienced savings in audit costs as measured by audit fees paid to external auditors. In particular, XBRL use is negatively associated with audit fees, which are, in turn, positively associated with firm size.

Our study makes several contributions to the literature. First, it extend XBRL literature by providing initial and timely evidence that voluntary XBRL adoption is associated with lower audit fees. To date, the limited empirical evidence on XBRL entirely focuses either on firm-specific determinants of XBRL adoption in a public firm setting or on the economic consequences of XBRL adoption on Audit fees (Shan and Troshani 2014; Shan et al. 2015; Judy Beckman et al. 2016).

Second, to our knowledge, ours is the first study to examine the effect of XBRL on audit fees in European countries especially in Belgium.

Third, the acceptance and implementation of XBRL around the world has grown considerably during the last few years. Our results also might be relevant for regulators and other parties involved in developing and implementing XBRL-enabled information value chains for business reporting purposes of listed and non-listed firms.

The rest of the paper is organized as follows: Section 2 presents a background and literature review on the Belgian XBRL environment and develops the hypotheses; Section 3 discusses the Research design; Section 4 describes the empirical results and discusses some additional analyses. Finally, Section 5 concludes.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

XBRL Business Reporting Language in Belgium

XBRL is an electronic markup language for reporting financial information. Each financial and non-financial item in reports is enclosed by XBRL tags that contain semantic information of the item and describe the meaning of it(Cohen 2004). Basically, XBRL will provide a standard way to electronically and automatically prepare, publish, exchange and extract financial statements. XBRL also marks information with predefined attributes, the so-called "tags" (Premuroso and Bhattacharya 2008; Efendi et al. 2011).XBRL tags are defined and organized using a systematic classification scheme called a taxonomy that defines financial reporting concepts and their relationship as per specific legislation or standards. By separating content from format, XBRL benefits all members of the financial information supply chain by making information exchangeable between different applications and systems and easy to extract, search, and reuse by users (Liu et al. 2017).The AICPA (American Institute of Certified Public Accountants) has kept XBRL in its top ten technologies list for several years now because it provides more flexibility, ease of use and timeliness in financial reporting, something that users of financial statements have been calling for. Business scandals and the following Sarbanes-Oxley Act (SOX) have created an environment where information quality can be improved by the adoption of XBRL (Baldwin and Brand 2011).

XBRL was initiated in 1998 by Charles Hoffman. Since 2001, many XBRL jurisdictions have supported the development of XBRL. China started to assess XBRL adoption as early as 2002. In 2004, China was the first country in the world to formally require XBRL for all public companies' financial reporting (Kernan 2008). Subsequently, numerous countries also joined in as the early adopters.

In this context, among the first European countries that adopted XBRL financial reporting concepts is Belgium. The administrative entity of the National Bank of Belgium and the Central Balance Sheet Office, are responsible for the distribution of financial information. In 2004, the National Bank of Belgium decided to introduce XBRL for business reporting purposes in order to create an efficient and flexible filing process, simplify maintenance and support, and create a standard data format to enable easy exchange and efficient analysis by market participants (Kaya and Pronobis 2016). Starting in April 2007, Belgian non-financial companies now have the option to prepare and file their financial statements in XBRL[3]. Since 2010, in the website of the National Bank of Belgium, the XBRL filings are available to the general public for download. Anyway, during the loan application process, banks can request XBRL filings and firms can supply financial information to banks through private channels. Ball and Shivakumar (2005) also argue that private firms "are less likely to use public financial statements in contracting with lenders," but rather communicate with banks on a more private basis. This is in line with the statements by ArnoldEsser (ING Bank) above that firms can directly provide their XBRL filings to banks.

In Belgium, the introduction of XBRL were involved by many parties across the information supply chain. Essentially, the interactive XBRL data platform has been created as a non-profit institution on the initiative of eight bodies plays a key role for which financial reporting. Among these bodies, four are closely related to companies obliged to provide data: The Institute of Chartered Accountants and Tax Consultants, the Professional Institute of Accredited Accountants and Tax Advisers, the Institute of Company Auditors and the Belgian Bankers' Association which also use key data. The State is

represented by the Federal Public Service Finance. The three other promoters may be considered as "regulators", particularly, the Banking, Finance and Insurance Commission (BFIC), the National Bank (NBB) and the Commission for Accounting Standards. From this side, Belgium is firmly establishing an international trend in respect of using XBRL as an open standard for the exchange of financial data.

Moreover, the high demand by banks for structured data in XBRL show that the Belgian Bankers' Association played a dominant role among the promoters of XBRL. If market forces of demand by banks are high, firms are likely to have incentives to provide financial disclosures in XBRL because ex-ante the expected benefits of favorable loan contracting terms are more pronounced. In case of non-disclosure in XBRL, banks may even react negatively and impose nontrivial costs to non-adopters (Blankespoor et al. 2014). So, the high adoption rates in Belgium suggest that market forces of supply and demand for structured financial information, coupled with the regulatory commitment by the National Bank of Belgium, are likely to be important determinants for the widespread use of XBRL.

In the Belgian GAAP taxonomy, all elements are defining by each specific tag in the XBRL report. Hence, in the balance sheet and income statement, the totality of quantitative information is tagged individually, in contrary of the U.S. GAAP taxonomy[4]. Thus, in the Belgian XBRL taxonomy, the accounting and valuation policies or the accountant report are tagged as ''block-text.''[5]

Moreover, the XBRL taxonomy in Belgium has a standardized structure that avoids specific extensions. Recent studies by (Debreceny et al. 2010; Vasarhelyi et al. 2012) point out that standardization of XBRL filings can enhance the cross-sectional comparability of financial data with respect to the specific needs of those who are receiving and analyzing the files (e.g., banks and tax authorities).[6] Nevertheless, prior literature has also raised some concerns regarding the data quality of XBRL filings. The study of (Debreceny et al. 2010) show that one quarter of the filings of 400 large U.S. corporations in the first round of mandatory submissions to the SEC contained errors. Typical errors were missing or wrong monetary fact values.

In conclusion, filing fees for financial statements in Belgium, in XBRL are lower by 35% compared to filing fees for traditional formats. Thus, the decision of some private firms to adopt XBRL stems from a combination of higher benefits and lower costs of public filing relative to firms that do not adopt XBRL.[7]

Related Literature and Hypotheses Development
Theoretical Underpinning

This study is underpinned by agency theory, according to which a firm consists of a nexus of contracts between its principals (i.e. owners of economic resources, including shareholders) and its agents (i.e. managers who are responsible for using and controlling these resources) (Jensen and Meckling 1976). Agency theory suggests that, as long as the goals of the principal and agent are aligned, the agent will make decisions that maximize the goals of the principal. However, when the goals of the principal and agent diverge and the agent has the opportunity to act in his/her self-interest (i.e., has relevant information that the principal lacks, referred to as ''information asymmetry''), this information asymmetry can generate an "adverse selection" problem that impairs the principal's ability to determine whether agents are, in fact, acting in the best interests of the firm (Jensen and Meckling 1976). Additionally, agent will make decisions that maximize his/her self-interest over the principal's interests (Sarens and Abdolmohammadi 2011; Jensen and Meckling 1976; Booth and Schulz 2004) which can be manifested in the form of excessive use of perquisites, asset misappropriation and enhancement of salary (Christie and Zimmerman 1994; Rediker and Seth 1995). Taken together, these problems give rise to agency costs, which the principal attempts to mitigate by establishing monitoring processes such as external auditing (Francis and Wilson 1988). Additionally, agents may face the "moral hazard" (Scapens 1985) of acting against their principals' interests whilst attempting to maximize their own wealth (Sarens and Abdolmohammadi2011) which can be manifested in the form of excessive use of perquisites, asset misappropriation, and enhancement of salary (Rediker and Seth 1995). Taken together, these problems give rise to agency costs which principals attempt to mitigate by establishing monitoring processes such as auditing (Francis and Wilson 1988). Moreover, whilst agency theory suggests that highly leveraged

companies are likely to disclose more information in order to satisfy the needs of the debt holders in order to reduce investor uncertainty and borrowing costs (Pauly et al. 2002), debt holders might be concerned about wealth transfers to shareholders(Smith and Warner 1979) since managers may favor the interests of the shareholders to the detriment of the debt (Francis and Wilson1988). Consequently, debt holders include restrictive covenants in their contracts, the presence of which can increase agency costs.

Auditors have the responsibility to verify and ensure that agents act according to the principal's best interests (Helliar et al. 1996; Nikkinen and Sahlström 2004; O'sullivan 2000). Auditors accomplish this responsibility by monitoring and verifying the actions undertaken by management through financial reporting, internal controls, and risk management (Sarens et al. 2009) thereby fulfilling a policing function as part of the regulatory processes in financial reporting (Alleyne et al. 2013). The value of external auditing results from the expectation or probability that an auditor will detect and/or report significant breaches in the financial statements produced by the firm's management (e.g. material omissions or misstatements) and accounting systems (e.g. inadequate internal controls) (Dopuch and Simunic 1982; DeAngelo 1981; Francis 2004).

Jensen and Meckling (1976, p. 329) claim that the "existence and size of the agency costs depend on the nature of [agent] monitoring costs". Leventis et al. (2011, p. 113) also argue that "a specific and measurable agency cost" is captured by audit fees. Specifically, a reduction in audit fees signals that agency costs are reduced (Leventis et al. 2011). For example, auditors are likely to spend more time inspecting managers' activities where agency problems are suspected (Dopuch and Simunic 1982; Nikkinen and Sahlström 2004; Leventis et al. 2011).

XBRL Impact on Audit Fees

We argue that auditing of financial statements can be facilitated by increased financial reporting transparency, which can be enhanced by XBRL. Whilst transparency represents the extent to which a company provides complete and fair disclosure of clear, relevant, reliable and timely information about its business activities (Roohani et al. 2009; Zhang et al. 2007), the aim of auditing is to independently verify the financial statements provided by management (O'sullivan 2000). It constitutes a 'policing' function which is part of the regulatory processes in financial reporting (Alleyne et al. 2013).

Proponents XBRL argue that XBRL can have a positive impact on the audit by reducing its costs and increasing the efficiency of auditing processes (Pinsker and Li 2008; Troshani and Lymer 2010). It can affect greater corporate transparency (Scannell and Solomon 2006) whilst reducing the cost of compiling financial information and streamlining internal and external financial reporting for companies. Additionally, XBRL offers the interchangeability since it can be reused in various formats, including HTML, PDF, MS Excel and distributed easily on the Internet which allows to reduce the asymmetry of information (Roohani et al. 2009). In turn, this reporting process can facilitate the process of internal and external audit (Premuroso and Bhattacharya 2008) in relation to the identification and correction of material omissions and anomalies (Khurana and Raman 2004) resulting in savings in audit fees (Leventis et al. 2011).

The mechanisms by which XBRL can reduce audit fees operate at the auditor level in three ways. First, XBRL improves access to and analysis of financial information in financial statements by auditors by facilitating data gathering, integration, and sharing between audit clients (i.e. auditees) and auditors(Ye et al. 2008; Gao 2011; Xiao et al. 2004; Ragothaman 2012; Jimei et al. 2013; Boyle et al. 2014; Shan and Troshani 2014; Han and Liu 2011).For example, audit data can be offered as a whole electronically to auditors at the beginning of the audit process which addresses piece-meal data access inefficiencies that characterize traditional audit processes (Jimei et al. 2013; Brands 2013). By standardizing the data format, XBRL creates data access efficiencies that were not previously available to auditors who may have had access to financial data electronically but had to undertake manual retrieval of the data to overcome the lack of interchangeability issues affecting firm data typically available in different formats (e.g. MS Excel spreadsheets, MSWord documents, PDF, and HTML).

Second, because XBRL enables financial data to be captured at a much more granular level with "detail tagging" (PWC,2011) for each disclosure item, it facilitates the work of auditors by supporting

computerized auditing processes (Bizarro and Garcia 2010; Eccles and Krzus 2010). This enables the automatic validation of calculated numbers or compliance with disclosure checklists (Bizarro and Garcia 2010). XBRL also improves analysis, enhances audit trails and reduces spread sheet proliferation (Bizarro and Garcia 2010).

Third, XBRL facilitates the audit confirmation process involving the collection of evidence from third parties that corroborates relevant assertions about a firm's account balances, transactions and disclosures (Janvrin and Mascha 2010).Thus, whilst XBRL can facilitate auditing allowing auditors to integrate auditing of internal controls of financial reporting with auditing of financial statements which can result in significant savings including reducing both audit engagement costs and costs of manually performing substantive internal control tests (Rezaee 2009).

Based on the above-mentioned claims, in addition to the emerging evidence of the benefits of XBRL (see e.g. (Boyle et al. 2014; Brands 2013; La Rosa and Caserio 2013; Holzinger 2013), the main motivation of our study is to empirically investigate whether XBRL does in fact reduce agency costs, resulting in lower audit fees (Leventis et al. 2011). We deliberately focus our attention on publicly listed firms and auditing fees paid to external auditors, which is particularly important given the potential agency costs that can arise as a direct result of the separation of firm ownership and management (Francis, 2004). Based on these arguments, we, thus, hypothesize that:

H1: Ceteris paribus, audit fees are reduced because of implementation of XBRL.

Audit Fees and Firm Size

Prior studies reveal a significant correlation between audit fees and firm size, though with mixed results (Simunic 1980; Wallace 1984; Firth 1985; Casterella et al. 2004; Fleischer and Goettsche 2012; Fung et al. 2012). For instance, some studies have found that audit fees are inversely related to firm size (Simunic 1980; Wallace 1984) which is attributed to a firm's accounting information systems and internal audit functions. Specifically, they suggest that the correlation between firm size and audit fees is influenced by a firm's accounting systems and internal audit functions. Larger firms usually benefit from better accounting systems and more efficient internal audit functions than their smaller counterparts, allowing external auditors to utilize the work carried out by internal auditors resulting in reduced audit fees. Thus, large firms can facilitate external auditing while also enabling external auditors to use the work carried out by internal auditors to reduce their audit fees. Large firms also have stronger bargaining power than small firms, which enables them to increase the scale discounts on audit fees (Casterella et al. 2004; Fung et al. 2012).

In opposition, other studies have found that a positive relationship exists between audit fees and firm size (e.g.(Firth 1985; Fleischer and Goettsche 2012) which is attributed to the inherent complexity (Firth 1985), risk(Firth 1985),and the political visibility of larger firms relative to smaller firms (Premuroso and Bhattacharya 2008). The increasing complexity of accounts in large firms can make it more difficult for external auditors to audit and detect fraud (Firth 1985). External auditors may also charge large firms a premium when they perceive the audit to be risky (Khadaroo 2005; Reynolds and Francis 2000). Risk can be driven by potential litigation costs and the loss of goodwill (Firth1985).Also, larger firms are more likely to receive more public attention since they are more politically prominent than smaller firms (Meek et al. 1995; Marston and Polei 2004; Premuroso and Bhattacharya 2008). Consequently, larger firms often respond to this public scrutiny pressure by increasing high-quality information disclosure. Such information needs to be audited by external auditors resulting in potentially higher audit fees. Thus, we hypothesize:

H2: Ceteris paribus, audit fees are positively related with firm size.

RESEARCH DESIGN

Data

The following analyses are based on non-financial Belgian private firms over the period from 2002 to 2014(see figure1). We retrieve our data using the Datastream database version of 2015. As shown in Table 1, The Datastream database holds 147 firms for which information is available for the period under examination. After removing missing data, financial institutions and insurance companies, the final data set consists of 76 firms over the sample period. Since Datastream does not indicate whether a firm files annual accounts in XBRL, we hand-collected data on XBRL adoption status from the homepage of the Central Balance Sheet Office of the National Bank of Belgium. Audit fees, and governance variables were extracted manually from the annual reports available on the websites of companies.

The sample includes observations from different industries: 61% manufacturing industrials, 19% retail, 10% transportation and warehousing, 5% public administration and 5% construction.

Model Development

The regression model used to examine the effect of XBRL on audit fees (H1) and the effect firm size on audit fees in Belgium (H2) is represented as follows:

$$AUDITFEES = \alpha_0 + \alpha_1 XBRL + \alpha_2 SIZE + \alpha_3 IFRS + \alpha_4 BIG4$$
$$+ \alpha_5 TOBINSQ + \alpha_6 DERATIO + \alpha_7 \Delta SALES + \alpha_8 \Delta EPS + \alpha_9 BDINDP + \alpha_{10} SBSIZE$$
$$+ \alpha_{12} ROA + \gamma_j \sum_{j=1}^{12} Years_i + n_k \sum_{k=1}^{11} Industry + \varepsilon_i$$

Dependent Variable

Prior studies have commonly used audit fees as a proxy of audit cost in firms, (O'sullivan 2000; Boo and Sharma 2008; Leventis et al. 2011; Fleischer and Goettsche 2012)Elder et al., 2009, Zaman et al., 2011). Following these studies, we use the natural logarithm of total audit fees (AUDITFEES) paid by company in fiscal year t as the dependent variable.

Independent Variables

The independent variables comprise firm size (FIRMSIZE) and XBRL. Prior studies have widely used firm size as a proxy for examining its relationship with audit cost (Abbott et al. 2006; Premuroso and Bhattacharya 2008; Lai and Krishnan 2009). Consistent with prior research, in this study, we measure firm size (FIRMSIZE) as the natural logarithm of total assets of company i at the end of fiscal year t. Following Premuroso and Bhattacharya (2008), XBRL is a dichotomous variable, which measure whether a company files its financial statements in XBRL format, that is, it is coded as 1if the company is an XBRL filer, 0 otherwise.

Control Variables

Consistent with prior related research, we define the control variables as follows. According to(Liu et al. 2011; Judy Beckman et al. 2016), IFRS is a dichotomous variable that measures whether financial statements are prepared in accordance with IFRS, i.e., coded as 1 when companies lodge their financialstatements for the years post-IFRS convergence, i.e., 2007 onwards, 0 otherwise for the years prior to IFRS convergence.

The debt-to-equity ratio (DERATIO) is measured as the ratio of long-term debt to total equity (Seetharaman et al. 2002);change of earnings per share (ΔEPS) is computed as the difference between EPS at year t and EPS at year t–1 (e.g. Chen and Zhang, 2010); change of sales ratio (ΔSALES) is calculated as the difference between sales at year t and sales at year t–1, divided by sales at year t–1 (Houqe et al. 2012); Tobin's Q (TOBINSQ) represents a market performance indicator and is computed as the ratio of the market value of stock and the book value of debt divided by the book value of total

assets(Shan and Troshani 2014);Big 4 auditor (BIG4) is a dummy variable, coded as 1 if the firm is audited by a big-4 auditor, and 0 otherwise (e.g. Premuroso and Bhattacharya 2008); year dummies represent the dummy variables that reflect the 2002–2014 period in Belgium; and industry dummies are based on the two-digit US Standard Industry Classification (SIC) and represent 11 industries: agriculture, forestry and fishing; construction; finance; insurance and real estate; mining; public administration; retail trade; services; transportation and communication; electric, gas and sanitary; wholesale trade and manufacturing.

Prior studies indicate that corporate governance factors influence firms' financial reporting quality and audit fees (Cohen et al. 2004; Larcker and Richardson 2004). For example, Cohen et al. (2004) argue that corporate governance plays an important role in ensuring the quality of the financial reporting process. Larcker and Richardson (2004) include corporate governance variables to examine their effects of audit fees. Similarly, (Shan and Troshani 2014) investigates whether audit quality is affected by internal governance mechanisms. Accordingly, we extend our model (i.e. Model 1) with two corporate governance factors of board characteristics as control variables. Consistent with prior literature these factors are i) board independence (BDINDP), and ii) supervisory board size (SBSIZE). BDINDP is measured as the proportion of the number of independent directors to the total number of directors on the board (Larcker and Richardson, 2004), whereas SBSIZE represents the total number of supervisors serving on the supervisory board (Judy Beckman et al. 2016).

RESULTS AND DISCUSSION

Descriptive Statistics and Univariate Analysis

Table 1 shows the overview of the percentage of XBRL adopters in relation to the number of firm year observations for our sample from 2002 to 2014. The number of companies voluntarily adopting XBRL rapidly increases over time, indicating the success of XBRL implementation. The high percentage of XBRL adopters also suggests that firms are indeed able to discipline their clients to provide XBRL disclosures (Blankespoor 2014). In 2014, more than 80% of sample firms file their financial statements in XBRL. Further, Table 2 shows that firm-year observations have been increasing over time.

TABLE 1
VOLUNTARY ADOPTION OF XBRL

Year	Number of firms	% of XBRL adopter
2006	22	28,95
2007	35	46,05
2008	49	64,47
2009	57	75
2010	56	73,68
2011	56	73,68
2012	58	76,32
2013	59	77,63
2014	61	80,26
Total	76	100

Table 2 shows descriptive statistics for the main variables collected (see Appendix A for further details). We winsorize all variables at the 1 and 99-percentile. The mean for audit fees before (after) the adoption of XBRL is 12.241 (12.102), while the median is 12.355 (11.934) with a range of 11.184 to 13. 172.The mean (median) for firm size is 12.662(12.391) and12.770(12.504) for there- XBRL and post-XBRL respectively;

The mean for the change of EPS before (after) the adoption of XBRL is 0.269 (0.003) and the mean (median) for the change of sales ratio is 0.061(0.034) and 0.054 (0.264) for the pre- XBRL and post-XBRL respectively. The mean (median) for the long-term debt to equity ratio is 0.510(0.352) and 0.479(0.268) for the pre- XBRL and post-XBRL respectively. The mean (median) for Tobin's Q, the market performance indicator, is 0.257 (0.250) and 0.236 (0.224) for the pre- XBRL and post-XBRL respectively.

Concerning the characteristics of the board, we find that the Board of Directors of the firms in our sample has a mean size of 10 members before and after XBRL. The proportion of independent directors before (after) the XBRL adoption is on average 41.89% (41.31%).

TABLE 2
DESCRIPTIVE STATISTICS

	Before-XBRL						Post-XBRL					
	N	Mean	Q1	Q2	Q3	SD	N	Mean	Q1	Q2	Q3	SD
AUDITFEES	283	12.240	11.184	12.354	13.172	1.443	393	12.102	11.225	11.933	12.915	1.270
XBRL	494	0	0	0	0	0	418	1	1	1	1	0
SIZE	461	12.662	11.279	12.391	14.278	2.004	414	12.770	11.468	12.504	14.097	1.685
IFRS	494	0.692	0	1	1	0.462	418	1	1	1	1	0
BIG4	494	0.773	1	1	1	0.191	418	0.665	0	1	1	0.472
TOBINSQ	423	0.257	0.125	0.250	0.372	0.178	400	0.236	0.101	0.224	0.331	0.169
DERATIO	460	0.510	0.055	0.352	0.751	0.876	414	0.479	0.050	0.268	0.705	0.778
ΔSALES	449	0.061	-0.045	0.034	0.127	0.277	405	0.054	-0.053	0.264	0.111	0.320
ΔEPS	405	0.269	-0.2	0	0.42	3.102	387	0.003	-0.42	0	0.62	4.683
BDINDP	279	0.418	0.333	0.4	0.5	0.168	392	0.413	0.307	0.380	0.5	0.155
SBSIZE	279	9.716	7	9	11	2.874	392	9.400	7	9	11	3.042
ROA	449	3.308	1.41	4.51	8.64	19.669	410	4.164	1.56	4.26	7.51	11.775

Notes: AUDITFEES = natural logarithm of audit fees; FIRMSIZE = natural logarithm of value of total assets at the end of fiscal year; DERATIO = long-debt to total equity; ΔEPS = change of EPS, $EPS_t - EPS_{t-1}$; ΔSALES = change of sales ratio, $(SALES_t - SALES_{t-1}) / SALES_{t-1}$; TOBINSQ = Tobin's Q, market value of stock and book value of debt divided by book value of total assets; BIG4 = Big 4 auditor, coded 1 if the firm is audited by a Big4 auditor, 0 otherwise; BDINDEP = board independence, the proportion of independent directors to all directors on the board; SBSIZE = the number of members on the supervisory board; ROA = return on assets.

Multivariate Analyses

We use the pooled ordinary least square (OLS) regression estimation technique in this study. To estimate regression coefficients without bias, the following procedures are carried out. First, all continuous variables are winsorized at the 1st and 99th percentiles to moderate the possible effects of extreme outliers. Second, to consider the potential issue of multicollinearity in our regression model, we compute Pearson correlation matrices for the US and Japanese data sets separately. As shown in Table 3, there are no correlation coefficients between pairs of independent variables that are greater than the critical value of 0.80.

Table 4 provides the regression results of the multivariate model to examine the impact of independent variables and the effect of XBRL on audit fees. It reveals high adjusted R2 of 0.1119, 0.172 and 0.1690 for Models 1, 2 and 3, respectively, which we regress progressively. Model 1 contains the independent and control variables; Model 2 adds the year effect; Model 3 includes both year and industry effects. The Wald chi2 for all models are significant which indicate the AUDITFEES dependent variable is well explained by the independent and control variables in our model.

As far as H1 is concerned, the coefficient for XBRL variable of model 2 and Model 3 in Table 3 are statistically significant (t = -3.11, p < 0.001 in Mode 2; t =-3.44, p < 0.001 in Model 3). While XBRL has no significant impact on audit fees in Model 1 (t = -0.71, p> 0.1 in Model 1) that can be concluded that the variables of the year and industry affect XBRL. Thus, H1 is supported in model 2 and model 3. This finding confirms that XBRL adoption benefits firms in reducing their audit fees. In relation to this particular finding, Rezaee (2009) argues that financial statements in XBRL format facilitate and enhance internal control effectiveness and efficiency and thus reduce relevant costs, including those for verification, substantive tests and audit engagement.

Our second hypothesis (H2) states that firm size is positively associated with firm audit fees. The coefficient for SIZE variable of all models in Table 3 are statistically significant (t =6.18, p < 0. in Model 1; t = 5.77, p < 0.001 in Model 2; t = 5.53, p < 0.001 in Model 3). Thus, H2 is supported. This finding suggests that larger firms incur higher audit fees than smaller firms because the former may have complicated accounts and transactions needing to be audited, higher risk in terms of potential litigation costs and loss of goodwill (Firth, 1985) and higher political costs because of public visibility (Premuroso and Bhattacharya, 2008).

Regarding control variables, we find that IFRS, BIG4 and BDINDP are positively correlated with audit fees, whereas ROA reveals negative associations. Although we find a weak correlation between the SBSIZE and AUDITFEES in model 3 (β = 0.040, t = 1.64, p < 0.1). The other control variables TOBINSQ, DERATIO, ΔSALES and ΔEPS show no statistical effect. Moreover, our results also support year and industry effects.

TABLE 3
COLLINEARITY DIAGNOSTICS

Panel A : Pearson correlation matrix

Variables	XBRL	IFRS	BIG4	TOBINSQ	DERATIO	SIZE	ΔSALES	ΔEPS	BDINDP	SBSIZE	ROA
XBRL	1										
IFRS	0.411***	1									
BIG4	-0.120***	0	1								
TOBINSQ	-0.060*	-0.058*	0.062*	1							
DERATIO	-0.018	-0.027	0.067**	0.410***	1						
SIZE	0.028	0.047	0.527***	0.180***	0.241***	1					
ΔSALES	-0.011	-0.002	0.042	-0.079**	0.006	0.023	1				
ΔEPS	-0.033	-0.016	0.0006	-0.012	-0.012	-0.025	0.067*	1			
BDINDP	-0.017	0.044	0.120***	-0.025	-0.079**	0.101**	-0.056	-0.033	1		
SBSIZE	-0.052	-0.035	0.294***	0.210***	0.162***	0.626***	-0.018	-0.015	-0.125***	1	
ROA	0.026	-0.018	0.143***	-0.156***	0.063*	0.240***	0.173***	0.090**	-0.014	0.124***	1

Notes: AUDITFEES = natural logarithm of audit fees; FIRMSIZE = natural logarithm of value of total assets at the end of fiscal year; DERATIO = long-debt to total equity; ΔEPS = change of EPS, $EPS_t - EPS_{t-1}$; ΔSALES = change of sales ratio, $(SALES_t - SALES_{t-1}) / SALES_{t-1}$; TOBINSQ = Tobin's Q, market value of stock and book value of debt divided by book value of total assets; BIG4 = Big 4 auditor, coded 1 if the firm is audited by a Big4 auditor, 0 otherwise; BDINDEP = board independence, the proportion of independent directors to all directors on the board; SBSIZE = the number of members on the supervisory board; ROA = return on assets.
* if $p < 0.1$; ** if $p < 0.05$; *** if $p < 0.01$ (two-tailed p-values are used in determining significance)

TABLE 4
REGRESSION RESULTS

Independent		Model 1		Model 2		Model 3	
Variable	Signe	β	t	β	T	β	t
Intercept		5.771	9.20***	4.501	9.49***	5.204	5.45***
XBRL	- (H1)	-0.055	-0.76	-0.262	-3.11***	-0.302	-3.44***
SIZE	+(H2)	0.354	6.18***	0.327	5.77***	0.327	5.53***
IFRS		0.875	5.58***	0.976	3.96***	1.070	3.69***
BIG4		0.712	2.91***	0.717	3.00***	0.642	2.76***
TOBINSQ		0.192	0.58	0.303	0.93	0.436	1.29
DERATIO		-0.045	-1.00	-0.086	-1.52	-0.069	-1.48
ΔSALES		-0.013	-0.13	-0.021	-0.02	-0.030	-0.28
ΔEPS		0.002	0.35	0.002	0.35	0.001	0.27
BDINDP		0.887	3.03***	0.809	2.80***	0.789	2.69***
SBSIZE		0.019	0.81	0.035	0.196	0.040	1.64*
ROA		-0.015	-3.97***	-0.012	-3.23***	-0.011	-2.87***
Years		-		Yes		Yes	
Industry		-		-		Yes	
R2		0.1119		0.172		0.1690	
Wald chi2		165.21***		209.45***		217.35***	
observations		591		591		591	

Notes: AUDITFEES = natural logarithm of audit fees; FIRMSIZE = natural logarithm of value of total assets at the end of fiscal year; DERATIO = long-debt to total equity; ΔEPS = change of EPS, $EPS_t - EPS_{t-1}$; ΔSALES = change of sales ratio, $(SALES_t - SALES_{t-1}) / SALES_{t-1}$; TOBINSQ = Tobin's Q, market value of stock and book value of debt divided by book value of total assets; BIG4 = Big 4 auditor, coded 1 if the firm is audited by a Big4 auditor, 0 otherwise; BDINDEP = board independence, the proportion of independent directors to all directors on the board; SBSIZE = the number of members on the supervisory board; ROA = return on assets.

* if $p < 0.1$; ** if $p < 0.05$; *** if $p < 0.01$ (two-tailed p-values are used in determining significance).

Model1: $AUDITFEES = \alpha_0 + \alpha_1 XBRL + \alpha_2 SIZE + \alpha_3 IFRS + \alpha_4 BIG4 + \alpha_5 TOBINSQ + \alpha_6 DERATIO + \alpha_7 \Delta SALES + \alpha_8 \Delta EPS + \alpha_9 BDINDP + \alpha_{10} SBSIZE + \alpha_{11} ROA + \varepsilon_i$

Model2: $AUDITFEES = \alpha_0 + \alpha_1 XBRL + \alpha_2 SIZE + \alpha_3 IFRS + \alpha_4 BIG4 + \alpha_5 TOBINSQ + \alpha_6 DERATIO + \alpha_7 \Delta SALES + \alpha_8 \Delta EPS + \alpha_9 BDINDP + \alpha_{10} SBSIZE + \alpha_{11} ROA + \gamma_j \sum_{j=1}^{12} Years_i + \varepsilon_i$

Model 3: $AUDITFEES = \alpha_0 + \alpha_1 XBRL + \alpha_2 SIZE + \alpha_3 IFRS + \alpha_4 BIG4 + \alpha_5 TOBINSQ + \alpha_6 DERATIO + \alpha_7 \Delta SALES + \alpha_8 \Delta EPS + \alpha_9 BDINDP + \alpha_{10} SBSIZE + \alpha_{11} ROA + \gamma_j \sum_{j=1}^{12} Years_i + n_k \sum_{k=1}^{11} Industry + \varepsilon_i$

Additional Analyses

We conduct a variety of additional tests that include by examining the impact of the adoption of XBRL on audit fees according to company size through two business groups (Group 1: small firms and Group 2: large firms). The results show that the coefficient of XBRL (-4.43) was significantly negative for large companies in Belgium. So, the adoption of XBRL in Belgium reduces audit fees for large firms while there is no significant impact of XBRL on audit fees for small firms. Accordingly, this significant association suggests that large firms are the beneficiaries of XBRL adoption because larger firms are likely to have more human and financial resources to support XBRL implementations relative to smaller firms. It follows that larger firms are more likely to incorporate XBRL into their business reporting processes (than their smaller counter parts), which in turn can make their auditors more likely to benefit from XBRL use resulting in reduced audit costs. However, we note that the SIZE variable has a significant positive effect on audit fees than in small firms, which explains why small firms incur higher audit fees.

As for the control variables, we find that in the large IFRS companies, BIG4, BDINDP and SBSIZE are positively correlated with audit fees, whereas ROA reveal negative associations, while the DERATIO debt ratio negatively correlated with Audit fees than in small businesses. The other control variables ΔSALES ΔEPS, TOBINSQ reveal have no impact on audit fees.

By way of conclusion, this additional analysis highlights the effect of firm size on the relationship between XBRL and audit fees while comparing this effect in two groups of firms.

The results of the tests carried out are summarized in Table 5.

TABLE 5
ADDITIONAL TESTS

Independent variable	G1		G2	
	B	t	B	t
Intercept	1.118	1.62*	7.914	5***
XBRL	0.008	0.10	-0.649	-4.23***
SIZE	0.714	8.07***	0.059	0.55
IFRS	0.579	1.26	1.454	3.75***
BIG4	0.499	2.16**	1.195	2.27**
TOBINSQ	0.788	2.28**	0.403	0.72
DERATIO	-0.133	-2.14**	-0.034	-0.56
ΔSALES	-0.026	-0.32	0.128	0.57
ΔEPS	0.007	1.39	-0.004	-0.34
BDINDP	-0.381	-1.22	0.880	1.91**
SBSIZE	-0.029	-0.96	0.062	1.78*
ROA	-0.011	-3.63***	-0.022	-2.56***
Years	yes		Yes	
Industry	yes		Yes	
R2	0.4736		0.2039	
Wald chi2	-		100.11***	
Observations	249		325	

Notes: * if $p < 0.1$; ** if $p < 0.05$; *** if $p < 0.01$ (two-tailed p-values are used in determining significance).

CONCLUSION

The objective of this study was to analyze the impact of the voluntary adoption of XBRL on audit fees by using evidence from companies listed in Belgium. There is paucity of research concerning the effect of XBRL on audit fees, and investigating their joint use in firms is important as they can have offsetting impacts on audit fees(Kim et al. 2013).

The results clearly indicate that the XBRL adoption among Belgian firms associates with significantly reduced audit fees. Specifically, we find that XBRL has a main negative effect on audit fees, which are, in turn, positively associated with firm size where larger firms benefit more than small firms.

Although XBRL is expected to bring significant benefits for financial reporting internationally, there are increasing calls in the literature from both academics and practitioners for empirical evidence in response to the increasing rhetoric about its espoused benefits (Liu et al. 2014; Premuroso and Bhattacharya 2008; Roohani et al. 2009). A key implication of our study is that XBRL financial reporting is beneficial for both firms and banks when XBRL is strongly promoted by market participants and well

implemented in the financial reporting environment. Further, quality checks of XBRL filings and a standardized fixed format of the XBRL taxonomy are likely to facilitate the decrease in information processing costs. In particular, our study appears to be the first to examine the effect of XBRL on audit fees in European context. Our study also can offer evidence to auditing practitioners that XBRL can reduce auditing costs and therefore encourage auditing of XBRL filings. Additionally, with auditing costs being reduced as a result of XBRL, auditors can reconsider the allocation of scarce internal auditing resources to other financial reporting activities after XBRL is introduced (Helliar et al. 1996).

Finally, our findings have broader implications as increased financial reporting transparency through XBRL use can improve the credibility of firms and mitigate information asymmetry between management and shareholders, potentially resulting in an overall improvement of investors 'confidence.

As others, this study also suffers from several limitations. This study focused assessment of the impact of XBRL on the audit fees of listed companies in Belgium, which may or may not be generalizable to other economies. For example, to improve the generalization of our results, further research can be conducted to confirm (or refute) whether our findings apply to other economies such as the United Kingdom, the Netherlands, Singapore and Korea where XBRL were adopted. In addition, since our study does not consider how audit processes are influenced by XBRL, future research could explore how XBRL affects the scope of the traditional audit function and how internal control activities are conducted. In addition, Future research could also examine the extent to which XBRL contributes to the standardization and convergence of international auditing practices. Finally, XBRL is continuously developed and improved (Li et al. (2015)). Future research can study its influence with more recent data.

ENDNOTES

1. See http://www.nbb.be/DOC/BA/XBRL/Pub/XBRL_a_velvet_revolution.pdf.
2. In other European countries such as the UK, the diffusion of XBRL is at early stage and not widespread. Therefore, Dunne et al. (2013, p. 167) recommend that ''greater regulatory commitment is now needed to create an impetus for XBRL.''
3. Thus, financial statements as of the end of the fiscal year 2006 were the first that firms could file in XBRL format.
4. In the current U.S. GAAP taxonomy, all narrative information of non-numeric disclosure items have the text block item attribute ''non num: text Block Item Type.''
5. Further, while in the U.S. the XBRL mandate does not include earnings releases on Form 8-K or the Management Discussion & Analysis (MD&A), XBRL filings in Belgium are full standard financial statements and do not present a limited amount of information compared to traditional disclosures.
6. In other countries, such as the U.S., firms may extend the taxonomy with individual extension elements. These extensions can be firm, sector as well as country-specific (e.g., Boritz and No, 2008; Debreceny et al., 2011).
7. We note that the implementation of XBRL in the financial reporting environment is associated with costs. Stantial (2007) outlines the prices for tagging software, but also the occurrence of significant learning curve effects. Cost savings can also result from rising efficiency, i.e., through a reduction of data redundancy and through the declining costs of bookkeeping (Pinsker and Li, 2008).

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