The Effects of IFRS Adoption on Tax Expense and its Information Content: Canadian Evidence

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This paper examines whether tax expense and its information content have changed after Canadian firms adopted IFRS in 2011. Inspired by the concept of orthogonalization, this paper proposes a new measure for incremental information content to mitigate the multicollinearity among highly correlated accounting variables. The main analysis and robustness tests show that tax expense and its information content have not changed significantly during the transition to IFRS in Canada, while the average effective tax rate increased by 1.5 percent for the post-IFRS period.

INTRODUCTION

Starting from January 1, 2011, Canadian publicly accountable enterprises and government business entities are required to prepare their financial statements under International Financial Reporting Standards (IFRS) instead of prior Canadian Generally Accepted Accounting Principles (CGAAP). In terms of the impact of IFRS adoption on tax related accounts, prior research has failed to provide consistent evidence. On one hand, some studies (Haverals, 2007; Karampins and Hevas, 2013) indicate that IFRS increased effective tax rates and reduced book-tax conformity. On the other hand, Chludek (2011) shows that investors did not react to the new information included in tax accounts for the post-IFRS period. In this paper, I examine whether tax expense and its information content have changed upon mandatory IFRS adoption in Canada. I use the matched sample periods of 2003-2005 versus 2011-2013 in this study for the following reasons: (1) the economic conditions measured by GDP growth are very similar for the two periods; (2) the corporate tax rates for the matched sample periods follow a very similar pattern; (3) this setting mitigates the impact of the financial crisis starting from 2007 on the results.

In this study, first, I develop a new measure for incremental information content based on the concept of orthogonalization, following the three steps outlined in Section 3.1.2. As shown by the results, this new measure isolates the contribution of tax expense to future profitability by using residual tax expense without correlation with pre-tax book income to address the concern of multicollinearity.

Second, I collect a sample of Canadian firms adopting IFRS in 2011 from Compustat, with 187 firms and 451 observations for the pre-IFRS period from 2003 to 2005, and 187 firms with 288 observations for the post-IFRS period between 2011 and 2013.

Third, I perform two robustness tests. The first one is replacing the new measure with the current measure in Ayers et al. (2009) to see whether the results from the main analysis still hold. In the second robustness test, I hand collect reconciliation statements between IFRS and CGAAP to verify the findings from the main analysis.

The results show that the reported tax expense is lower and less volatile under IFRS than CGAAP; the overall effective tax rate is 1.5 percent higher for the post-IFRS period. However, in a statistical sense, tax expense and its information content have not increased significantly after Canadian firms adopted IFRS in 2011.

The two robustness tests show that (1) the results from the main analysis hold when the proposed new measure is replaced by the current measure in Ayers et al. (2009); (2) the second robustness test that rules out confounding effects supports the findings from the main analysis regarding the impact of IFRS adoption on tax expense.

This paper contributes to accounting research in two ways. First, it introduces a new measure for incremental information content to improve the current measure in Ayers et al. (2009). The new approach addresses the concern regarding the multicollinearity among accounting variables. This research design has immediate implications for investment researchers as well as accounting practitioners in equity analysis, earnings forecasts and capital markets. Second, to the best of my knowledge, this paper is the first study regarding the impact of IFRS adoption on tax expense and its information content, and will be meaningful for the ongoing debates about potential IFRS adoption or convergence in the United States.

The rest of this paper is organized as follows. Section 2 provides the literature review and proposes two research questions. Section 3 presents a new measure for incremental information content, data and results. In section 4, I perform two robustness tests. In section 5, I summarize the paper and offer future research directions.

LITERATURE REVIEW AND RESEARCH QUESTION DEVELOPMENT

Effect of IFRS Adoption on Tax Expense

Since 2005, IFRS has been adopted in the European Union and several studies have investigated the impact of IFRS adoption on tax related accounts. Haverals (2007) documents a large impact of 3.8-14.6 percent from an IFRS-based tax accounting on the effective tax rate of Belgian companies using the European Tax Analyzer, a multi-period forward looking program. The paper also shows that the use of IFRS as a tax base would increase the corporate effective tax rates in all EU member countries from 3.3 percent to 10.1 percent.

McAnally, McGuire and Weaver (2010) study the impact of IFRS adoption on equity-based compensation, and find that IFRS yields lower deferred tax assets and recognized tax benefits for about two-thirds of the option grants and more volatile reported tax items, and that IFRS tax items predict future cash flows more accurately than those under U.S. GAAP, using pro forma analyses through a sample of 1,673 publicly traded U.S. firms.

In terms of the market reaction to IFRS adoption, Horton and Serafeim (2010) investigate the market reaction to, and value-relevance of, information contained in the disclosures required by IFRS, and find that earnings adjustments attributed to the impairment of goodwill, share-based payments, and deferred taxes are incrementally value-relevant.

Chludek (2011) examines the value relevance of deferred tax disclosures under IFRS using a sample of German firms, and reveals that investors generally do not take into account the information embedded in deferred taxes when assessing firm value, except for large net deferred tax assets, and that about 70 percent of the deferred tax balance persists and deferred tax assets reversed on a more timely basis than deferred tax liabilities.

In order to gain insights on the driving force behind the effect of IFRS adoption, Kager, Schanz and Niemann (2011) suggest that the most important differences between IFRS and tax reporting are related to intangibles and provisions, and that book values reported on IFRS balance sheets are generally higher than tax values, except for inventories.

Istrate (2012) highlights that 85 percent of the 61 listed entities on the Bucharest Stock Exchange revalued buildings for tax reasons, and that the accelerated method of depreciation was more often used for financial reporting purposes after IFRS entered into Romanian accounting.

On the earnings management side, Karampinis and Hevas (2013) investigate whether the adoption of IFRS in Greece affected tax-induced incentives for financial earnings management, and find that IFRS adoption reduced book-tax conformity and attenuated the manipulation of discretionary accruals.

For the earnings forecasts under IFRS, Atwood, Cao, Drake and Myers (2012) examine whether income tax disclosures measured by the ranked ratio of taxable income (minus taxes)-to-net income (i.e., the tax-book ranking) under IFRS or U.S. GAAP is useful for predicting changes in future earnings and cash flow, using 51,999 firm-year observations from 35 countries for 1993 to 2010. The paper finds that the positive association between the tax-book ranking and changes in future earnings is significantly greater for the IFRS sample than for the U.S. GAAP sample.

Overall, prior research has provided conflicting results regarding the effect of IFRS adoption on tax accounts. On one hand, IFRS adoption increased effective tax rates (Haverals, 2007), reduced book-tax conformity and attenuated earnings management (Karampins and Hevas, 2013); on the other hand, investors did not react to the new information in tax accounts under IFRS (Chludek, 2011).

Therefore, the extent to which IFRS adoption has affected tax expense is ultimately an empirical question and the analysis above leads to the first research question:

RQ1: *Has Tax expense changed upon mandatory IFRS adoption in Canada?*

Prior Research into Income Taxes and Future Earnings

There are only a few prior studies focusing on the relation between income taxes and future earnings. Lev and Nissim (2004) first use the ratio of tax-to-book income to predict earnings growth, and find that the taxable income information about future earnings is incremental to that in accruals and cash flows. As discussed in Lev and Nissim (2004), the ratio of tax-to-book income capturing the differences between GAAP and tax codes may predict future earnings growth even in the absence of earnings or tax management.

Further to Lev and Nissim (2004), Kim, Koester and Lim (2014) show that revenue-expense mismatching plays a role in explaining the tax fundamental's ability to predict earnings growth, and that the tax fundamental is more strongly associated with future earnings growth for firms with larger revenue-expense mismatching, using U.S. publicly traded firms over the last four decades.

Hanlon (2005) investigates the role of book-tax differences in indicating the persistence of earnings, and concludes that firm-years with larger book-tax differences have less persistent earnings. The underlying assumption of the study is that the difference between pre-tax financial reporting earnings and taxable income (i.e., book-tax differences) reveals the quality of earnings measured by earnings persistence, because taxable income is less subject to manipulation than book income due to scrutiny from tax authorities.

Blaylock, Shevlin and Wilson (2012) take a further step to investigate why book-tax differences serve as a useful signal of earnings persistence indicated in Hanlon (2005), and find that firms with large positive book-tax differences from upward earnings management (tax avoidance) exhibit lower (higher) earnings and accruals persistence, in line with Hanlon's (2005) conjecture that taxable income is of higher quality than book income.

Offering an alternative explanation to the findings from Hanlon (2005), Drake (2013) finds that controlling for firm life cycle weakens the relation between larger book-tax differences and lower earnings persistence, because different economic events that firms encounter at various life cycle stages are reflected in taxable income versus book income inconsistently.

Building on Lev and Nissim (2004), Ayers et al. (2009) further examine whether taxable income is a useful measure in evaluating firm performance, and suggest that the relative and incremental information content of estimated taxable income to book income are lower for high tax-planning firms and higher for low earnings quality firms. They note that because managers have incentives to report higher book income for financial reporting purposes and lower taxable income for tax purposes, taxable income could be a less manipulated performance measure for financial statement users.

Extending Ayers et al. (2009), Thomas and Zhang (2014) examine the valuation of tax expense and argue that substantial variation in the coefficients on tax expense documented in prior valuation studies is caused by the omission of expected future profitability. The paper re-examines the results from Ayers et al. (2009) and shows that the two quality measures (i.e., effective tax rates and absolute abnormal accruals) become insignificant after controlling for other confounding variables or using a relatively clean sample removing negative or extreme values of pre-tax book income and estimated taxable income, which demonstrates the importance of rigorous research design in accounting studies.

Dhaliwal, Kaplan, Laux and Weisbrod (2013) find the recognition of the valuation allowance for deferred tax assets provides incremental information about the persistence of accounting losses by using tax categories such as Good News-Valuation Allowance and Good News-Taxable Income.

The above prior research regarding the association between income taxes and future earnings consistently shows that the tax component contains information content about future earnings.

Prior Earning Forecast Research

Fama and French (2000) first use a simple cross-sectional partial adjustment regression model to predict change in profitability (i.e., earnings before interest and extraordinary items but after taxes scaled by total assets). In the model, the dependent variable is one-year-ahead change in profitability and explanatory variables include current period change in profitability, the deviation of profitability from its expected value determined by the market-to-book ratio, a dividend payer dummy variable and dividend-to-book value of common equity.

Fairfield and Yohn (2001) apply the DuPont scheme to a forecasting context and use changes in asset turnover and profit margin to forecast one-year-ahead change in return on net operating assets. The study illustrates that ratio disaggregation can be used to improve the forecast accuracy of future profitability.

Extending their previous work, Fama and French (2006) introduce another model to predict future profitability using lagged profitability, accruals, book-to-market ratio, dividends-to-book equity ratio, asset growth and market capitalization (i.e., price times shares outstanding) as explanatory variables.

In order to calculate the implied cost of capital widely used in the capital market literature, Hou et al. (2012) propose a new cross-sectional model to forecast future earnings, and indicate that the earnings forecasts generated by the new model are superior to analysts' forecasts, using a large sample of firms over 1968-2008. The predictors included in the paper are total assets, dividend payment, a dummy variable for dividend payers, and a dummy variable for firms with negative earnings and accruals. The paper forecasts dollar earnings instead of profitability (i.e., earnings scaled by total assets) commonly used in prior studies.

Extending Hou et al. (2012), Li and Mohanram (2014) present two new models (i.e., the EP model based on persistence in earnings and the RI model based on residual income) to generate earnings forecasts, and show that the two new models outperform the one proposed by Hou et al. (2012). In the EP model, lagged earnings, negative earnings dummy and the interaction term are included as independent variables; lagged book value and accruals are added to the RI model as extra explanatory variables in addition to the three predictors included in the EP model.

Gerakos and Gramacy (2013) provide a comprehensive review of regression-based earnings forecasts, and conclude that (1) the models using OLS and lagged net income produce more accurate forecasts; (2) a simpler model leads to a better prediction; (3) winsorizing predictors and using short histories improve results when forecasting scaled net income. The paper compares five earnings forecasting models: (1) random walk; (2) lagged net income as a predictor; (3) lagged net income and negative net income dummy as predictors; (4) lagged total assets, dividends, accruals, net income, dividends payer dummy variable and negative net income dummy variable as explanatory variables; and (5) the six predictors from the fourth model plus current assets, accounts payable, cash and cash equivalents, cost of goods sold, short term debt, long term debt, inventory, current liabilities, total liabilities, receivables, sales, shareholders' equity, tax expense, advertising, extraordinary items and discontinued operations, interest expense, research and development, and sales, general & administrative expenses, and market value of equity as independent variables.

The above literature review demonstrates that, except for Gerakos and Gramacy (2013) including tax expense in their earnings forecasting model as a predictor, previous studies rarely use tax expense to predict future profitability. In addition, the information content of tax expense beyond pre-tax book income has never been examined in prior research. In this paper, I fill this void by adopting a new approach to explore the use of tax expense in a forecasting context and propose the second research question:

RQ2: *Has the Information Content of Tax expense changed upon mandatory IFRS adoption in Canada?*

RESEARCH DESIGN AND RESULTS

RESEARCH METHOD

Current Measure of Incremental Information Content

In terms of information content, Ayers et al. (2009) estimate the relative and incremental information content of estimated taxable income to pre-tax book income using the adjusted R^2s from the following regressions:

$R_{jt} = \gamma_0 + \gamma_1 \Delta TI_{jt} + \upsilon_{jt}$ (a3),

$R_{jt} = \gamma_0 + \gamma_1 \Delta PTBI_{jt} + \upsilon_{jt}$ (a4),

$R_{jt} = \gamma_0 + \gamma_1 \Delta PTBI_{jt} + \gamma_2 \Delta TI_{jt} + \upsilon_{jt}$ (a6).

Where:

R_{jt} = the buy-and-hold market-adjusted return to security *j* over the 16-month return window starting at the beginning of fiscal year *t* and ending 4 months after the end of fiscal year *t*;

ΔTI_{jt} = the difference in estimated taxable income scaled by the market value of equity at the beginning of the fiscal year for firm *j* from year *t-1* to year *t*;

$\Delta PTBI_{jt}$ = the difference in pre-tax book income minus minority interest, scaled by the market value of equity at the beginning of the fiscal year for firm *j* from year *t-1* to year *t*.

New Measure

Similar to Ayers et al. (2009), I measure the information content of tax expense using the following models:

$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + e_{t+1}$ (1)

$PTBI_{t+1} = \gamma_0 + \gamma_1 IT_t + e_{t+1}$ (2)

$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + \gamma_2 IT_t + e_{t+1}$ (3)

Where:

$PTBI_t$ (Pre-Tax Book Income) = pre-tax book income scaled by total assets in year *t*;

IT_t (Tax Expense) = tax expense scaled by total assets in year *t*.

In Ayers et al. (2009), the relative information content is measured by the ratio of the adjusted R^2 from (a3) to the adjusted R^2 from (a4). As pointed out by Raedy (2009), because the test statistic is a function of the difference in the ratios between the comparing samples, it is difficult to interpret the results from regressions, using the current measure of relative information content in Ayers et al. (2009). A higher ratio for low earnings quality firms could be driven by the lower information content of pre-tax book income (i.e., the denominator) when the informativeness of estimated taxable income remains unchanged (i.e., the numerator), which puts the support for its H2 in question.

Ayers et al. (2009) measure incremental information content by the difference in the adjusted R^2 from (a6) and the adjusted R^2 from (a4). The paper uses a changes specification (i.e., changes in estimated taxable income and pre-tax book income) in regressions (a6) and (a4) to mitigate correlated omitted variables and heteroscedasticity. However, the correlation between the two independent variables is not taken into consideration (e.g., no correlation table is included in the paper). Panel B of Table 4 in Thomas

and Zhang (2014) shows that ΔPTI_t (change in pre-tax book income per share) and ΔTAX_t (change in tax expense per share) are highly correlated at 0.63. Because the two studies both use U.S. firms from Compustat, and estimated taxable income is derived from tax expense and the top U.S. statutory tax rate, changes in estimated taxable income and pre-tax book income could be highly correlated too, as observed in Panel B of Table 7 from Thomas and Zhang (2014).

For this paper, because $PTBI_t$ and IT_t are highly correlated with each other, IT_t needs to be converted into two uncorrelated components: one shares the information with pre-tax book income, and the other contains incremental content beyond pre-tax book income reflecting the differences between accounting rules and tax code. Separating the two components can be accomplished by regressing IT_t on $PTBI_t$, and the residuals represent the component that has not been explained by $PTBI_t$. This research method called orthogonalization has been used in several prior studies (Mansi, Maxwell and Miller, 2004; Fortin, 2007). In Mansi et al. (2004), the authors examine the relation between auditor characteristics (quality and tenure) and the cost of debt financing. Because auditor characteristics are highly correlated with credit ratings (i.e., another control variable), the paper orthogonalizes credit ratings to auditor characteristics, and uses the residuals from the regression of credit ratings on auditor size, tenure, and other control variables to replace credit ratings as an independent variable in their main analysis. Similar to Mansi et al. (2004), I use residuals from the regression of current period tax expense on current period pre-tax book income to address multicollinearity concerns.

In this paper, I propose a new measure for the information content of tax expense using the following steps:

Step 1: regress tax expense on current period pre-tax book income and calculate residuals denoted as RIT_t;

$$IT_t = \gamma_0 + \gamma_1 PTBI_t + e_t$$

Step 2: regress one-year-ahead pre-tax book income on the residuals from step 1 (i.e., RIT_t) and current period pre-tax book income;

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + \gamma_2 RIT_t + \varepsilon_{t+1} \quad (4)$$

Step 3: regress one-year-ahead pre-tax book income on current period pre-tax book income;

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + u_{t+1}$$

Where:

$PTBI_t$ (Pre-Tax Book Income) = pre-tax book income scaled by total assets in year t;

IT_t (Tax Expense) = tax expense scaled by total assets in year t.

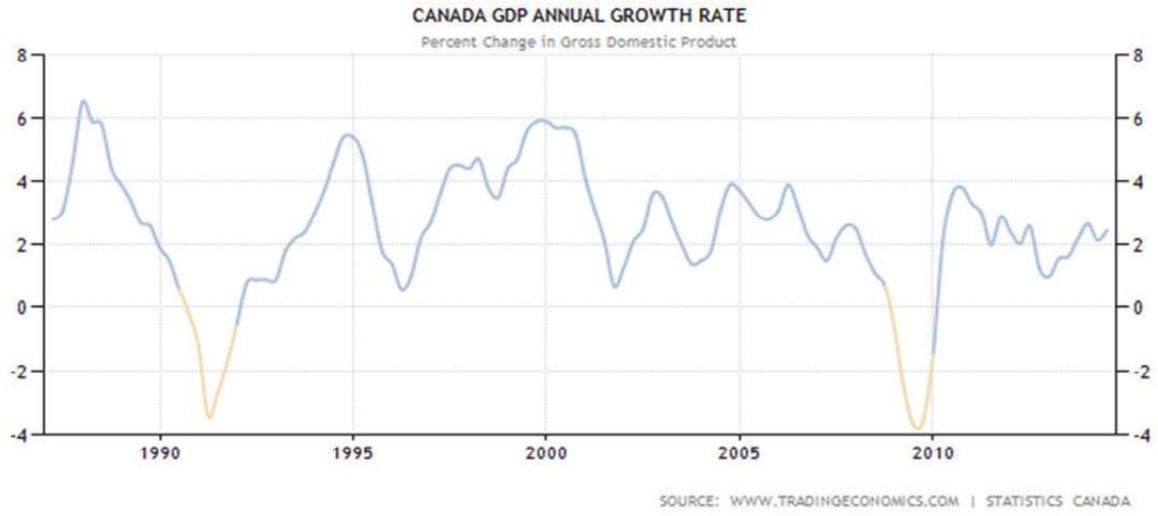
If the coefficient on RIT_t is significantly different from zero, it is considered that tax expense contains incremental information content about future profitability beyond pre-tax book income and the magnitude of incremental information content is measured by the difference in the adjusted R^2s from steps 2 and 3. The advantage of this approach is that there is no correlation between two independent variables.

Sample Selection and Variable Measurement

Starting with 2,329 Canadian firms in the 2011 fiscal year from Compustat based on country code — incorporation, I collect all firm-years from 2003 to 2005 for the pre-IFRS period and those between 2011 and 2013 for the post-IFRS period to conduct a matched sample analysis for Compustat-based variables. I eliminate 604 financial services firms (SIC code 6000-6999), 93 firms adopting U.S. GAAP in 2011, 222 firms adopting IFRS after 2011, 48 firms adopting IFRS before 2011, 688 firms without at least 6 years (i.e., 2007-2012) of accounting history, and 487 firms reporting negative or zero tax expense for the pre-IFRS period and the post-IFRS period. These restrictions result in a sample of 187 firms and 451 observations for the pre-IFRS period, and 187 firms with 288 observations for the post-IFRS period. I winsorize all financial variables at the top and bottom 1 percent to mitigate the effect of outliers on the results.

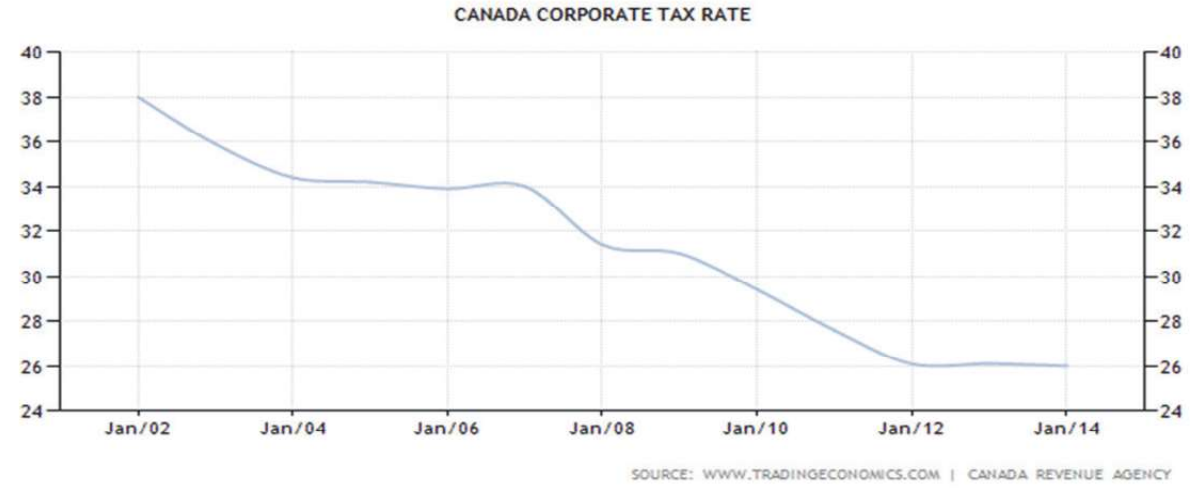
The graph (see Figure 1) below shows that the macroeconomic conditions in Canada measured by GDP annual growth rates from 2002 to 2006 are very similar to those of the post-IFRS period. I select 2003 to 2005 as the matched sample period for this study to mitigate the impact of the financial crisis starting from 2007 and the confounding effect of economic conditions on the results.

FIGURE 1



A second graph (see Figure 2) below demonstrates that Canadian corporate tax rates from 2011-2013 followed a very similar pattern to that from 2003-2005, a slightly higher corporate tax rate in the first year and relatively flat rates for the rest of the three years, suggesting that the results from the two matched sample periods will not be driven by the variation of corporate rates within the sample period.

FIGURE 2



RESULTS

DESCRIPTIVE STATISTICS

I present descriptive statistics of the variables in Table 1. The median $PTBI_t$ is 9.2 percent (7.6 percent) under CGAAP (IFRS), indicating that the profitability reported under IFRS is lower than that under CGAAP. IT_t has a median value of 2.4 percent (2.1 percent) and standard deviation of 2.8 percent (2.5 percent) under CGAAP (IFRS), showing that tax expense scaled by total assets is lower and less volatile for the post-IFRS period. Because $PTBI_t$ is 17.4 % lower under IFRS and IT_t only decreases 12.5% for the post-IFRS period, the overall effective tax rate calculated using the median IT_t divided by $PTBI_t$ is 26.1 percent for the pre-IFRS period and 27.6 percent for the post-IFRS period, suggesting a 1.5 (i.e., 27.6-26.1) percent increase in the effective tax rate under IFRS, consistent with the finding from Haverals (2006) showing a 3.3 percent to 10.1 percent tax hike for all EU member countries for the post-IFRS period. Considering the general trend of decreasing statutory corporate tax rates in Canada over the last 10 years (i.e., approximately 36% in 2003 vs. 28% in 2011), the effect of IFRS adoption on the effective tax rate is expected to be more severe than a moderate 1.5 percent increase if statutory corporate tax rates remain the same for both sample periods.

TABLE 1
DESCRIPTIVE STATISTICS

Variables	Mean	Standard Deviation	Minimum	Median	Maximum
Pre-IFRS Period					
$PTBI_{t+1}$	0.081	0.007	−0.715	0.093	0.386
$PTBI_t$	0.086	0.129	−0.536	0.092	0.418
IT_t	0.030	0.028	0.000	0.024	0.141
RIT_t	0.000	0.023	−0.062	−0.004	0.171
Post-IFRS Period					
$PTBI_{t+1}$	0.046	0.130	−0.475	0.062	0.454
$PTBI_t$	0.067	0.154	−0.979	0.076	0.393
IT_t	0.027	0.025	0.001	0.021	0.132
RIT_t	0.000	0.022	−0.034	−0.007	0.115

Notes: This table reports descriptive statistics for variables used in this study. $PTBI_{t+1}$ is one-year-ahead pre-tax book income scaled by total assets in year t, $PTBI_t$ is current period pre-tax book income scaled by total assets in year t, IT_t is current period tax expense scaled by total assets in year t, RIT_t is residuals from $IT_t = \gamma_0 + \gamma_1 PTBI_t + e_t$. Calculations of each variable are provided in the Appendix.

Pearson Correlation

The Pearson correlation between variables is presented in Table 2. For both sample periods, $PTBI_t$ is highly correlated with IT_t at 0.575 to 0.447, suggesting that multicollinearity is a concern for multivariate analysis without controlling for the correlation between independent variables, calling for a refinement to the current measure used in Ayers et al. (2009).

TABLE 2
PEARSON CORRELATION MATRIX

	$PTBI_{t+1}$	$PTBI_t$	IT_t	RIT_t
Pre-IFRS Period				
$PTBI_{t+1}$	1			
$PTBI_t$	0.587	1		
IT_t	0.410	0.575	1	
RIT_t	0.089	0.000	0.818	1
Post-IFRS Period				
$PTBI_{t+1}$	1			
$PTBI_t$	0.546	1		
IT_t	0.411	0.447	1	
RIT_t	0.187	0.000	0.895	1

Notes: This table reports the Pearson Correlation Matrix for variables used in this study. $PTBI_{t+1}$ is one-year-ahead pre-tax book income scaled by total assets in year t, $PTBI_t$ is current period pre-tax book income scaled by total assets in year t, IT_t is current period tax expense scaled by total assets in year t, RIT_t is residuals from $IT_t = \gamma_0 + \gamma_1 PTBI_t + e_t$. Calculations of each variable are provided in the Appendix.

Test of RQ1

Using two-sample *t*-test assuming unequal variances, Table 3 shows that the mean tax expense scaled by total assets is 3.01% (2.74%) for the pre-IFRS (post-IFRS) period and the *p* value (two-tail) is 0.17. Therefore, there is no significant difference in tax expense for both sample periods.

TABLE 3
CHANGE IN TAX EXPENSE UNDER IFRS

t-Test: Two-Sample Assuming Unequal Variances

	Pre-IFRS	Post-IFRS
Mean	0.0301	0.0274
Variance	0.0008	0.0006
Observations	451	288
Hypothesized Mean Difference	0	
df	665	
t Stat	1.38	
p (T<=t) one-tail	0.08	
t Critical one-tail	1.65	
p (T<=t) two-tail	0.17	
t Critical two-tail	1.96	

Notes: This table reports change in tax expense under IFRS using two-sample *t*-test assuming unequal variances.

Test of RQ2

Using the difference in adjusted R^2s between models 1 and 4, the incremental information content of tax expense is measured as 0.65 percent for the pre-IFRS period and 3.28 percent for the post-IFRS period, meaning that tax expense provides more information about future profitability under IFRS. However, Table 4 shows that the difference in the coefficient on RIT_t is not significantly different from zero, suggesting that in a statistical sense, the incremental information content of tax expense about future profitability has not increased significantly upon mandatory IFRS adoption in Canada.

TABLE 4
TEST RQ2 BY DIFFERENCE IN COEFFICIENTS USING THE NEW MEASURE

	Pre-IFRS Period		Post-IFRS Period		Difference (Post vs. Pre-IFRS Period)	
	Model 1	Model 4	Model 1	Model 4	Model 1	Model 4
	$PTBI_{t+1}$	$PTBI_{t+1}$	$PTBI_{t+1}$	$PTBI_{t+1}$	$PTBI_{t+1}$	$PTBI_{t+1}$
$PTBI_t$	0.687***	0.687***	0.462***	0.462***	−0.225	−0.225
RIT_t		0.587***		1.108***		0.521
Adjusted R^2	34.35%	35.00%	29.52%	32.80%		
Difference in adjusted R^2		0.65%		3.28%		
# of observations	451	451	288	288		

Notes: This table tests RQ2 by difference in coefficients using the new measure proposed in this study. $PTBI_{t+1}$ is one-year-ahead pre-tax book income scaled by total assets in year t, $PTBI_t$ is current period pre-tax book income scaled by total assets in year t, IT_t is current period tax expense scaled by total assets in year t, RIT_t is residuals from $IT_t = \gamma_0 + \gamma_1 PTBI_t + e_t$. Calculations of each variable are provided in the Appendix. *, **, and *** indicate statistical significance at 10 percent, 5 percent and 1 percent confidence levels.

Models:

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + e_{t+1} \quad (1)$$

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + \gamma_2 RIT_t + e_{t+1} \quad (4)$$

There are two potential explanations for this finding: (1) there is no significant change in tax expense itself during the transition to IFRS, as shown in Table 3, and/or (2) the incremental information content of tax expense is relatively small for both sample periods (i.e., 0.65 percent for the pre-IFRS period and 3.28 percent for the post-IFRS period).

ROBUSTNESS TESTS

Test of RQ2 Using the Current Measure

I also test RQ2 using the current measure proposed by Ayers et al. (2009) and the results are similar to those using the new measure (see Table 5), which means that the findings about RQ2 from the main analysis still hold after changing the measure for information content.

TABLE 5
TEST RQ2 USING THE CURRENT MEASURE in AYERS ET AL. (2009)

	Pre-IFRS Period		Post-IFRS Period	
	Model 1	Model 3	Model 1	Model 3
	$PTBI_{t+1}$	$PTBI_{t+1}$	$PTBI_{t+1}$	$PTBI_{t+1}$
Intercept	0.022*** (3.12)	0.010 (1.21)	0.015*** (2.14)	−0.010 (−1.06)
$PTBI_t$	0.687*** (15.38)	0.614*** (11.30)	0.462*** (11.01)	0.383*** (8.36)
IT_t		0.587*** (2.33)		1.108*** (3.87)
Adjusted R^2	34.35%	35.00%	29.52%	32.80%
Difference in adjusted R^2		0.65%		3.28%
# of observations	451	451	288	288

Notes: This table tests RQ2 by difference in coefficients using the current measure proposed in Ayers et al. (2009). $PTBI_{t+1}$ is one-year-ahead pre-tax book income scaled by total assets in year t, $PTBI_t$ is current period pre-tax book income scaled by total assets in year t, IT_t is current period tax expense scaled by total assets in year t, RIT_t is residuals from $IT_t = \gamma_0 + \gamma_1 PTBI_t + e_t$. Calculations of each variable are provided in the Appendix. *, **, and *** indicate statistical significance at 10 percent, 5 percent and 1 percent confidence levels. t-statistics in parentheses.

Models:

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + e_{t+1} \quad (1)$$

$$PTBI_{t+1} = \gamma_0 + \gamma_1 PTBI_t + \gamma_2 IT_t + e_{t+1} \quad (3)$$

Test RQ1 Using Reconciliation Statements

As firms adopting IFRS for the first time are required to provide at least one year of comparative information restated to IFRS, it results in two sets of financial statements reported under IFRS and CGAAP for the same period (e.g., January 1 to December 31, 2010), which provides a perfect setting to investigate the impact of IFRS adoption on firms' financial statements because economic fundamentals of

those firms were kept the same for year 2010 and confounding effects other than accounting standard change can be ruled out.

In order to verify the findings from the main analysis, I randomly select five companies from the following thirteen industries: business services, construction materials, electronic equipment, machinery, non-metallic mining, petroleum and natural gas, pharmaceutical product, precious metals, retail, telecommunication, transportation, utilities and wholesale, which represent the key contributors to the Canadian economy.

I first sort all the companies adopting IFRS in 2011 by industry group according to the Fama and French 48 industry classification, then use the random number generator function in Excel to select five companies from each industry. For those 65 firms in the sample, I download their 2010 and 2011 financial statements from www.sedar.com (i.e., the official site that provides access to most public securities documents filed by Canadian companies), then hand-collect the financial data reported under CGAAP (IFRS) from the 2010 (2011) financial statements.

For descriptive statistics, I winsorize all financial variables at the top and bottom 5 percent to mitigate the effect of outliers on the results. The reason for 5% rather than 1% winsorization rate is that there are generally 3 outliers at the top and/or bottom for each variable. For the 65 firms, if 1% winsorization rate is applied, which means that only one outlier on each side can be adjusted, it will result in findings that are highly driven by outliers.

Table 6 compares effective tax rate reported under CGAAP versus IFRS (see Appendix for notation). The means and medians of effective tax rates have increased upon mandatory IFRS adoption in Canada.

TABLE 6
DESCRIPTIVE STATISTICS (KEY FINANCIAL RATIOS)

	Mean	**Standard Deviation**	**Minimum**	**25%**	**Median**	**75%**	**Maximum**
Under CGAAP							
Effective Tax Rate	0.185	0.148	0	0	0.242	0.304	0.424
Under IFRS							
Effective Tax Rate	0.191	0.135	0	0.018	0.246	0.306	0.363

Notes: This table reports descriptive statistics for effective tax rate in this study. Calculation of effective tax rate is provided in the Appendix.

Table 7 uses Wilcoxon signed-rank test for equality of matched pairs. For effective tax rate, a similar number of companies have been affected negatively and positively, and the change in effective tax rate is not significant.

The second robustness test supports the findings from the main analysis that IFRS adoption has resulted in an increase in effective tax rates, but in a statistical sense, the impact is not significant.

TABLE 7
WILCOXON SIGNED-RANK TESTS ON KEY FINANCIAL RATIO

	Sign of Changes			**Statistical Tests**	
	Positive	Negative	No Change	Z statistic	*p*-value (two-tailed)
Effective Tax Rate	26	23	16	0.688	0.491

Notes: This table reports Wilcoxon Signed-Rank tests for effective tax rates in this study. Calculation of effective tax rates is provided in Appendix.

CONCLUSION

In this study, I propose a new measure for incremental information content to address the concern of multicollinearity embedded in the current measure in Ayers et al. (2009), and examine the impact of IFRS adoption on tax expense and its information content. Building on the concept of orthogonalization, the new measure incorporates residual tax expense in the regression to mitigate the correlation between pre-tax book income and tax expense.

While the effective tax rate of Canadian firms increased about 1.5 percent on average for the post-IFRS period, the overall information content of tax expense has not changed significantly due partially to the fact that tax expense itself did not change dramatically after the transition to IFRS.

Some potential caveats of this study are (1) the sample size is relatively small for the post-IFRS period due to the limited data availability since 2011 and (2) the model proposed only includes a single tax account as an additional explanatory variable as a result of the scope of this paper.

Future research is suggested to focus on incorporating more tax accounts in forecasting models with the attempt to control for multicollinearity among variables.

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APPENDIX

VARIABLE DEFINITIONS

Variables	Definitions
$PTBI_{t+1}$	One-year-ahead pre-tax book income scaled by total assets in year *t*
$PTBI_t$	Current period pre-tax book income scaled by total assets in year *t*
IT_t	Current period tax expense scaled by total assets in year *t*
RIT_t	Residuals from $IT_t = \gamma_0 + \gamma_1 PTBI_t + e_t$
Effective Tax Rate	Income taxes / income from continuing operations before income taxes