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The Effects of IFRS Adoption on Tax Avoidance in Europe

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This study investigates how mandatory adoption of International Financial Reporting Standards (IFRS) affects tax avoidance in Norway, Switzerland, and the member states of the European Union with civil-law origin. We find that tax avoidance increases significantly after mandatory adoption of IFRS. The results of additional tests indicate that temporary book-tax differences increase significantly after mandatory IFRS adoption. Our empirical results also indicate that relative to German-origin countries, the magnitude of temporary book-tax differences becomes significantly larger in French- and Scandinavian-origin countries following mandatory IFRS adoption. Moreover, we find that after mandatory IFRS adoption, tax avoidance and temporary book-tax differences significantly increase for countries with large differences between domestic accounting standards and IFRS.

Key Words: tax avoidance, international financial reporting standards, mandatory adoption.

Introduction

Tax laws are the main drivers of accounting systems in European countries with a civil law tradition (Joos & Lang, 1994). Thus, the level of book-tax conformity in these countries already was high before they adopted International Financial Reporting Standards (IFRS). Since 2005, exchange-listed firms in member states of the European Union (EU), Norway and Switzerland have been required to prepare their consolidated financial statements in accordance with IFRS. IFRS are more independent of tax reporting considerations than are the national accounting standards of countries with a civil law tradition (Hung & Subramanyam, 2007). Following mandatory IFRS adoption, the nonconformity between financial and tax reporting may have increased. Indeed, Schön (2005), for example, finds that differences between book and taxable income do increase due to the adoption of IFRS.

This nonconformity between financial and tax reporting, said to have been growing after mandatory IFRS adoption, motivates our study. Managers' ability to engage in aggressive financial and tax reporting behavior derives in part from the extent of book-tax differences (Frank, Lynch, & Rego, 2009). We conjecture that the increasing gap between IFRS and national tax rules gives managers an incentive to pursue aggressive tax avoidance strategies. That unintended consequences on tax avoidance

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may incur after mandatory IFRS adoption is important to both tax regulators in Europe and the researchers which investigate the effects of IFRS adoption. Accordingly, we investigate the effect of mandatory IFRS adoption on tax avoidance in Norway, Switzerland, and the EU countries with civil-law origin tradition. Our results indicate that the extent of tax avoidance increases after the mandatory introduction of IFRS in 2005.

IFRS offer greater flexibility in comparison to the local standards of many EU countries (Callao & Jarne, 2010). Some studies find that mandatory implementation of IFRS leads to an increase in earnings management (Ahmed, Neel, & Wang, 2013; Christensen, Lee, Walker, & Zeng, 2015; Jeanjean & Stolowy, 2008)[1]. Previous studies find that larger temporary book-tax differences are associated with more earnings management (Frank et al., 2009; Phillips, Pincus, & Rego, 2003). Therefore, we conduct additional analyses by examining the effects of mandatory IFRS adoption on temporary book-tax differences. The empirical results indicate that the magnitude of temporary book-tax differences increases after the mandatory IFRS adoption.

Furthermore, we conduct additional analyses within civil-law countries to examine the extent to which their legal culture affects the magnitude of tax avoidance and temporary book-tax differences after mandatory IFRS adoption. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) indicate that legal scholars typically identify three subgroups within the civil law tradition: French, German, and Scandinavian[2]. We find that relative to countries with a German legal tradition, the magnitude of temporary book-tax differences becomes significantly larger in countries with French and Scandinavian legal cultures in the post-IFRS period[3]. We also investigate whether differences between domestic accounting and IFRS in the pre-IFRS period affect tax avoidance and temporary book-tax differences. We find that compared to countries with small differences between domestic accounting standards and IFRS, tax avoidance and temporary book tax differences for countries with large differences between domestic accounting standards and IFRS are smaller in the pre-IFRS period, but larger in the post-IFRS period.

The contributions of this paper are as follows. First, previous studies have examined the quality of accounting information and the economic consequences of IFRS adoption in the EU countries (e.g., Ahmed et al., 2013; Christensen et al., 2015; DeFond, Hu, Hung, & Li, 2011; Hung & Subramanyam, 2007; Karampinis & Hevas, 2011; Li, 2010). Nevertheless, the effects of mandatory IFRS adoption on tax remain unclear (Brüggemann, Hitz, & Sellhorn, 2013). Furthermore, Hanlon and Heitzman (2010) call for more research on the determinants of tax avoidance. We respond to this call by testing the impact of IFRS on tax avoidance. We add to the existing literature by documenting how changes in accounting rules (i.e., mandatory IFRS adoption) affect tax avoidance after controlling for the country- and firm-specific variables prior research has shown to be associated with tax avoidance.

Second, we believe it is important to examine whether tax avoidance behavior changes for firms after government requires them to adopt IFRS. On March 16, 2011, the European Commission released a draft Council Directive on a Common Consolidated Corporate Tax Base (CCCTB) for EU member states. Although in its preliminary stages the debate has focused on the issues of whether and to what extent IFRS could be a starting point for determining tax bases within the EU, the proposed Council Directive does not provide a formal link or reference to IFRS. Be that as it may, an understanding of the impact IFRS has on tax avoidance is important for policy makers charged with designing a set of harmonized

[1] Some prior studies find accounting quality improvement (e.g., Barth, Landsman, Lang, & Williams, 2006; Barth, Landsman, & Lang, 2008; Hung & Subramanyam, 2007) or favorable economic consequences (e.g., Kim, Tsui, & Yi, 2011; Kim & Shi, 2012) accompanying voluntary IFRS adoption. However, many studies find no such improvements for firms forced to adopt IFRS.

[2] La Porta et al. (1998) indicate that laws protecting investors and quality of enforcement vary across French, German, and Scandinavian origin countries.

[3] According to La Porta et al. (1998) and Leuz, Nanda, and Wysocki (2003), Belgium, France, Greece, Italy, the Netherlands and Spain are classified into the French-origin group. Germany and Switzerland are classified as the German-origin group. Demark, Finland, Norway, and Sweden are classified as the Scandinavian-origin group.

tax accounting rules and in determining the methodology for calculating the CCCTB for EU member states.

Third, our study encompasses 12 European countries with civil law instead of only one country. Doing so enables us to investigate the extent to which increases in tax avoidance after mandatory IFRS adoption is country- or region-specific. Many civil-law countries including Taiwan have required or permitted the use of IFRS in recent years. Our results are informative for investors and tax authorities in general in civil-law countries adopting IFRS. Moreover, our results could be a good reference in particular for tax authorities in Taiwan to consider the impact of tax avoidance on tax revenues following mandatory IFRS adoption. Investors in Taiwan can consider whether the possible effects of change in magnitude of temporary book-tax differences when they make investment decisions after mandatory IFRS adoption.

The remainder of this paper is organized as follows. Section 2 reviews the literature and develops our hypothesis. In section 3, we outline the methodology including research models, construction of variables, and data collection. Section 4 presents both descriptive statistics and the results from testing our hypothesis. We conclude with a discussion of the implications derived from our findings in section 5.

Literature Review and Hypothesis

Historically, Continental European civil-law countries are characterized by a strong link between financial reporting and tax laws (Joos & Lang, 1994). Domestic accounting standards have been developed to meet tax purposes. For example, the Greek state has played a dominant role in regulating financial reporting, mostly for tax purposes (Karampinis & Hevas, 2011). Likewise, there was a strong tie between Swedish accounting and taxation (Flower, 1994). In contrast, IFRS are independent of tax reporting considerations (Hung & Subramanyam, 2007). Hence, the difference between book earnings and taxable income increases after mandatory IFRS adoption in civil-law countries. This difference arises because, for instance, IFRS emphasize fair value accounting, while tax accounting follows the realization principle. Whereas revaluation gains for property, plant, and equipment based on accounting adjustments to fair value under IFRS may remain unrealized for years, they generally are not considered taxable in EU countries (Oestreicher & Spengel, 2007)[4]. Karampinis and Hevas (2011) also indicate that Greek tax legislation permits use of the Last-in First-out (LIFO) method, even though IFRS do not. In addition, there are considerable differences in the methods and rates of depreciation between IFRS and individual countries' taxation practice (Oestreicher & Spengel, 2007).

Book-tax differences include not only the magnitude of the mechanical discrepancy between book and tax reporting rules, but also the magnitude of earnings management and tax planning (Chang, Liao, & Lin, 2009; Chen & Tsai, 2006; Chen, 2009; Graham, Raedy, & Shackelford, 2012). IFRS offer greater flexibility in comparison to the local standards of many EU countries (Callao & Jarne, 2010). The subjectivity in applying certain criteria, including fair value and the relaxation of requirements concerning the presentation of financial statements provides openings for discretionary accounting and opportunistic behavior (Callao & Jarne, 2010). Notwithstanding high-quality standards, there is a risk of having relatively low-quality accounting numbers when firms have incentives and opportunities to manipulate their financial statements (Leuz, 2003). Thus, some studies find that mandatory implementation of IFRS leads to an increase in earnings management. Ahmed et al. (2013) find a significant increase in earnings management for mandatory adopters in EU countries compared with a control sample of firms from countries not adopting IFRS. Christensen et al. (2015) discover a modest increase in earnings management for mandatory adopters, but a decrease in earnings management for early adopters in Germany. Jeanjean and Stolowy (2008) show that the pervasiveness of earnings management increases in

[4] Revaluation gains on tangible assets are taxable only in France and Greece (Oestreicher & Spengel, 2007).

France; however, earnings management remains stable in both the United Kingdom and Australia. These studies suggest that accounting quality is likely to be lower after mandatory IFRS adoption, particularly in EU countries with Continental rather than Anglo-American accounting systems.

An increasing gap between IFRS and taxable income resulting from the magnitude of the mechanical discrepancy between IFRS and tax reporting rules as well as earnings management may provide managers opportunities to implement an aggressive tax reporting strategy in order to minimize an entity's tax liability. Accordingly, we conjecture that tax avoidance is higher after mandatory IFRS adoption. The following hypothesis (stated in an alternative form) summarizes our expectation:

H: The magnitude of tax avoidance increases after mandatory IFRS adoption.

Data and Methodology

Sample selection

Research on accounting systems traditionally has differentiated between the Anglo-American common law system and the Continental European civil-law system. Accounting systems in countries with the common law tradition focus on investors' information needs and are largely independent of tax reporting considerations. In contrast, accounting systems in countries with the Continental civil law tradition are both more oriented on other stakeholders and more driven by book-tax conformity. IFRS generally reflect the Anglo-American accounting model prevalent in most English-speaking countries (e.g., the United States, the United Kingdom, and Canada (Doupnik & Perera, 2009: 37)). Compared to the pre-IFRS period, the magnitude of the gap between IFRS and tax laws in common-law countries may change little after adopting IFRS, while the gap between IFRS and tax laws in civil-law countries may become larger. For this reason, we do not include countries with a common law tradition. We only consider civil-law countries. Because institutional factors may affect the magnitude of tax avoidance, we only include non-former communist countries. Furthermore, we only include countries whose sample size is larger than 100 firm-year observations. Therefore, the EU members with a civil law tradition included in our sample countries are Belgium, Denmark, Finland, France, Germany, Greece, Italy, the Netherlands, Spain, and Sweden, as well as non-EU members Norway and Switzerland[5]. We select our sample from all firm-year observations in the Standard & Poor's Compustat Global Vantage database for the years from 2001 through 2009. The statutory tax rates of countries in the sample data are derived from the Organization for Economic Cooperation and Development (OECD) Tax Database.

The original sample included 23,280 non-financial-service firm-year observations. We first removed units of observation that were missing data necessary for our analyses. In addition, we excluded observations both of companies not adopting IFRS after the year 2005 and of units for which only pre- or post-IFRS data were available. Following Atwood, Drake, and Myers (2010), we also removed all firm-year observations with negative or zero pre-tax income because these firms have no tax liability and thus have no incentives to avoid taxes. Finally, we omitted all 2005 observations to avoid any potentially confounding effects related to the transition year. In the end, these sample selection procedures yielded 7,425 firm-year observations from 12 countries.

Empirical models

In keeping with Hanlon and Heitzman (2010) and Atwood, Drake, Myers, and Myers (2012), we define tax avoidance as the reduction in explicit taxes paid through tax planning that may or may not be considered fraudulent tax evasion. Following Atwood et al. (2012), our measure of tax avoidance (*Taxavoid*) for firm *i* in year *t* is

[5] We include Norway and Switzerland in our sample for the following two reasons: First, Norway and Switzerland are civil-law countries. Second, Norway, a member of the European Economic Area, is committed to following EU Directives, including the mandatory IFRS adoption in 2005. Switzerland listed firms are mandatory to use either IFRS or U.S. standards, while usage of Swiss GAAP has not been permitted since the beginning of 2005.

computed as follows[6]:

$$Taxavoid_{it} = \frac{(PTEBX * TR)_{it} - CTP_{it}}{PTEBX_{it}} \quad (1)$$

where *PTEBX* is pre-tax income before exceptional items for firm *i* in year *t*; *TR* is the statutory corporate income tax rate; and *CTP* is current taxes paid for firm *i* in year *t*.

We hypothesize that tax avoidance is larger after EU-listed firms are required to prepare their financial statements in accordance with IFRS. We therefore test our hypothesis using the following equation including industry and country effects (country and firm subscripts are suppressed)[7]:

$$\begin{aligned} Taxavoid_t = {} & \alpha_0 + \alpha_1 POST_t + \alpha_2 TR_t + \alpha_3 FACTOR_t \\ & + \alpha_4 EVOL_t + \alpha_5 LEV_t + \alpha_6 ROA_t \\ & + \alpha_7 GROWTH_t + \alpha_8 SIZE_t + \alpha_9 RD_t \\ & + \alpha_{10} CHOLD_t + \sum_i \alpha_i INDUSTRY_i \\ & + \sum_j \alpha_j COUNTRY_j + \varepsilon_t \end{aligned} \quad (2)$$

where *Taxavoid* is the tax avoidance measure from equation (1); *POST* is a dummy variable that equals one if a firm-year observation relates to a mandatory post-adoption year, 2006-2009, and zero if it relates to a pre-adoption year, 2001-2004; *TR* is the statutory corporate income tax rate; *FACTOR* represents cross-country institutional factors resulting from factor analysis of variables measuring each country's governmental effectiveness, regulatory quality, rule of law, and control of corruption as developed by Kaufmann, Kraay, and Mastruzzi (2011)[8]; *EVOL* is the standard deviation of pre-tax income divided by total assets for each country-year; *LEV* is leverage measured as total long-term liabilities divided by total assets; *ROA* is pre-tax income before exceptional items divided by total assets; *GROWTH* is the three-year average change in sales revenue; *SIZE* is the natural logarithm of [1 + (firms' assets/median assets for the country-year)][9]; *RD* is research and development expense divided by total assets; and *CHOLD* is the amount of cash and cash equivalents divided by total assets.

The multivariate regression includes several country-level control variables identified by previous research as potentially affecting tax avoidance. Atwood et al. (2012) find that the statutory corporate income tax rate is positively related to tax avoidance. So, we include tax rate (*TR*) as a control variable and expect that the coefficient is positive. We also follow Atwood et al. (2012) in controlling for differences in the cross-sectional variance of pre-tax earnings. That is why our model contains the level of a country's earnings volatility (*EVOL*) as another control variable. We expect that the coefficient on *EVOL* is negative. The magnitude of tax avoidance is affected by a country's institutional factors too. Hence, we use four of the six worldwide governance indicators developed by Kaufmann et al. (2011): government effectiveness, regulatory quality, rule of law, and control of corruption. We find these four variables converge to one significant factor (eigenvalue = 3.688), which explains 92 percent of the variance in the component variable. Accordingly, we extract this principal component (*FACTOR*) and insert it into our model as yet another control variable.

In addition, we control for firm-level variables associated with tax avoidance (e.g., Atwood et al. 2012; Dyreng, Hanlon, & Maydew, 2008; Khurana & Moser, 2013; McGuire, Omer, & Wang, 2012). One such firm-level variable is investment in research and development (*RD*). Dyreng et al. (2008) find that long-run tax avoiders spend more for R&D. Thus, we expect that the coefficient

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[6] Our focus is on the impact of IFRS adoption on tax avoidance. Hence, we compute tax avoidance every year. To compute tax avoidance for a given year *t*, we use the pre-tax earnings of the same year.

[7] We rely on the four-digit Standard Industrial Classification (SIC) code to classify 48 industries based on Fama- French 48 industry classification scheme.

[8] Kaufmann et al. (2011) develop the worldwide governance indicators (WGI). The WGI measure six dimensions of governance: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption. Government effectiveness and regulatory quality are used to measure the capacity of the government to formulate and implement sound policies effectively. Rule of law and control of corruption are used to measure citizens' respect both for the state and for the institutions governing economic and social interactions among them. WGI covers 212 countries and territories for 1996, 1998, 2000, and annually for 2002-2012. Due to the lack of published data for 2001, we substitute data from 2000 for the 2001 data. We also rerun our regressions by using (1) the mean value of 2000 and 2002, and (2) the average from 2002 to 2009 to replace the 2001 data. The results are qualitatively similar.

[9] Size is also measured by the natural logarithm of total assets. We rerun the regression and the results are qualitatively similar.

on *RD* is positive. Two more such variables are firm-level return on assets (*ROA*) and leverage (*LEV*) measures. Prior literature finds that a firm uses less debt financing when it engages in tax sheltering, to the extent that the shelters reduce taxable income (Frank et al., 2009; Graham & Tucker, 2006). However, Atwood et al. (2012) find that tax avoidance increases with leverage. Because findings in extant studies do not suggest a clear relation between leverage and tax avoidance, we have no expectations regarding the sign of coefficient on *LEV*. We include *ROA* to control for the increased incentives and opportunities that profitable firms have to avoid taxes. The previous studies cited above furthermore indicate that firms with stable growth tend to engage in more tax avoidance. Our model therefore uses the variable *GROWTH* to control for firms' growth opportunities. We expect the coefficients on *ROA* and *GROWTH* are positive. Because larger firms generally engage in less tax avoidance (Atwood et al., 2012), the model contains firm size (*SIZE*) as a control variable. We expect the coefficient on *SIZE* is negative.

Results

Descriptive statistics and correlation analyses

Table 1 presents a list of sample countries, the number of firm-year observations per country, the legal origin, and the country mean and median for variables in equation (2). Table 1 indicates that the number of observations per country varies, ranging from 145 observations in Norway to 1,974 observations in Germany. Table 1 also shows that the mean and median level of tax avoidance (*Taxavoid*) is highest in Spain (0.225 and 0.300) and lowest in Switzerland (0.064 and 0.093). Furthermore, the mean and median tax rate level (*TR*) is highest in Germany (0.368 and 0.389) and the lowest in Switzerland (0.227 and 0.213).

FACTOR represents cross-country institutional factors resulting from factor analysis of variables measuring each country's government effectiveness, regulatory quality, rule of law, and control of corruption. Denmark ranks ahead of the other 11 countries on government effectiveness, regulatory quality, rule of law, and control of corruption. Thus, *FACTOR* is the highest in Demark (mean = 1.215 and median = 1.277). Greece has the lowest percentile rank on regulatory quality and control of corruption, while Italy has the lowest percentile rank on government effectiveness and rule of law. *FACTOR* is the lowest in Italy (mean = -2.167 and median = -2.354). The three-year average change in sales revenue (*GROWTH*) is the highest in Norway (mean = 0.808 and median = 0.644) and the lowest in Belgium (mean = 0.376 and median = 0.294).

Table 2 provides descriptive statistics (Panel A) and correlations among the variables (Panel B) for the entire sample. To mitigate the impact of extreme observations, the variables are winsorized at the 1st and 99th percentiles[10]. Panel A shows that the mean value of *POST* is 0.524, indicating that 52.4 percent of our sample belongs to the post-IFRS period. The mean (median) tax avoidance (*Taxavoid*) is 13.0 (19.8) percent of pre-tax earnings. The tax rate (*TR*) is, on average, 32 percent and the median is 33 percent.

Panel B provides Pearson (above the diagonal) and Spearman (below the diagonal) correlations among the variables. For both the Pearson and Spearman correlations, there is a statistically significant, positive correlation between *Taxavoid* and *POST* (two-tailed $p < 0.01$). The relationship indicates that tax avoidance becomes larger after mandatory IFRS adoption. For both the Pearson and Spearman correlations, *TR*, *GROWTH*, and *CHOLD* are significantly and positively correlated with *Taxavoid*. Apparently, tax avoidance is larger when tax rate is higher. Tax avoidance is also larger for firms with higher sales growth and for firms with more cash and cash equivalent. For both the Pearson and Spearman correlations, *FACTOR*, *EVOL*, and *SIZE* are significantly and negatively correlated with *Taxavoid*. It reveals that tax avoidance is lower for firms with larger size. Furthermore, *EVOL* is significantly and negatively correlated with *POST*, revealing that the standard deviation of pre-tax income for each country-year decreases after IFRS adoption.

[10] We also winsorize variables at the 5th and the 95th percentiles. The results are qualitatively similar.

Table 1 Sample size and characteristics by country

Country	Legal-origin	n	Taxavoid	TR	FACTOR	EVOL	LEV	ROA	GROWTH	SIZE	RD	CHOLD
Belgium	**French**	163	0.122 (0.110)	0.357 (0.340)	-0.285 (-0.303)	0.177 (0.175)	0.615 (0.734)	0.082 (0.060)	0.376 (0.294)	0.562 (0.363)	0.092 (0.000)	0.066 (0.039)
Denmark	**Scandinavian**	420	0.087 (0.137)	0.279 (0.280)	1.215 (1.277)	0.516 (0.392)	0.541 (0.573)	0.093 (0.066)	0.484 (0.411)	0.651 (0.509)	0.025 (0.000)	0.076 (0.047)
Finland	**Scandinavian**	484	0.080 (0.094)	0.274 (0.260)	1.083 (1.115)	0.201 (0.203)	0.523 (0.542)	0.093 (0.080)	0.533 (0.389)	0.617 (0.419)	0.031 (0.008)	0.084 (0.053)
France	**French**	1,008	0.152 (0.177)	0.352 (0.354)	-0.442 (-0.385)	0.792 (0.190)	0.554 (0.621)	0.074 (0.059)	0.512 (0.385)	0.737 (0.514)	0.129 (0.000)	0.088 (0.060)
Germany	**German**	1,974	0.156 (0.208)	0.368 (0.389)	0.209 (0.138)	1.295 (0.222)	0.577 (0.604)	0.078 (0.061)	0.505 (0.373)	0.746 (0.501)	0.019 (0.000)	0.110 (0.070)
Greece	**French**	190	0.137 (0.096)	0.312 (0.350)	-1.913 (-1.842)	0.109 (0.100)	0.590 (0.663)	0.077 (0.053)	0.548 (0.451)	0.489 (0.316)	0.002 (0.000)	0.058 (0.019)
Italy	**French**	769	0.077 (0.272)	0.321 (0.330)	-2.167 (-2.354)	0.120 (0.108)	0.612 (0.638)	0.065 (0.053)	0.586 (0.456)	0.637 (0.423)	0.006 (0.000)	0.061 (0.029)
Netherland	**French**	273	0.175 (0.255)	0.315 (0.345)	0.809 (0.747)	1.887 (2.087)	0.590 (0.856)	0.089 (0.080)	0.467 (0.357)	0.495 (0.293)	0.111 (0.000)	0.098 (0.050)
Norway	**Scandinavian**	145	0.096 (0.203)	0.280 (0.280)	0.453 (0.439)	0.526 (0.345)	0.468 (0.305)	0.097 (0.081)	0.808 (0.644)	0.777 (0.564)	0.045 (0.000)	0.121 (0.070)
Spain	**French**	505	0.225 (0.300)	0.334 (0.350)	-0.741 (-1.022)	0.099 (0.105)	0.632 (0.661)	0.071 (0.058)	0.666 (0.573)	0.519 (0.345)	0.001 (0.000)	0.051 (0.026)
Sweden	**Scandinavian**	872	0.121 (0.226)	0.278 (0.280)	0.776 (0.809)	0.790 (0.435)	0.540 (0.558)	0.103 (0.083)	0.606 (0.464)	0.927 (0.719)	0.017 (0.000)	0.102 (0.063)
Switzerland	**German**	622	0.064 (0.093)	0.227 (0.213)	0.779 (0.758)	0.292 (0.209)	0.517 (0.536)	0.085 (0.073)	0.423 (0.343)	0.588 (0.436)	0.018 (0.000)	0.122 (0.095)
Total		7,425										

Note: This table provides the legal-origin, the number of firm-year observations per country, and the country mean and median for variables in equation (2). The median is reported in parentheses. *Taxavoid* = tax avoidance; *TR* =the statutory corporate income tax rate; *FACTOR* = cross-country institutional factors using the results of a factor analysis of the country's government effectiveness, regulatory quality, rule of law, and control of corruption as developed by Kaufmann et al. (2011); *EVOL* = the standard deviation of pre-tax income divided by total assets for each country-year; *LEV* = total long-term liabilities divided by total assets; *ROA* = pre-tax income before exceptional items divided by total assets; *GROWTH* = the three-year average change in sales; *SIZE* = natural logarithm of [1+ (firms' assets/median assets for the country-year)]; *RD* = research and development expenses divided by total assets; *CHOLD* = the amount of cash and cash equivalent divided by total assets.

Table 2 Descriptive statistics and correlation

Panel A: Descriptive statistics for variables					
Variable	Mean	Median	Std	Q1	Q3
Taxavoid	0.130	0.198	0.233	0.002	0.302
POST	0.524	1.000	0.499	0.000	1.000
TR	0.320	0.330	0.052	0.280	0.354
FACTOR	0.000	0.280	1.000	-0.376	0.786
EVOL	0.717	0.219	1.790	0.148	0.392
LEV	0.566	0.588	0.265	0.397	0.733
ROA	0.082	0.064	0.068	0.036	0.107
GROWTH	0.534	0.403	0.604	0.130	0.774
SIZE	0.693	0.482	0.627	0.216	0.983
RD	0.037	0.000	0.169	0.000	0.012
CHOLD	0.092	0.057	0.103	0.024	0.122

Panel B: Correlations among variables											
	Taxavoid	POST	TR	FACTOR	EVOL	LEV	ROA	GROWTH	SIZE	RD	CHOLD
Taxavoid		0.325***	0.048***	-0.028**	-0.070***	0.011	0.098***	0.041***	-0.065***	0.022*	0.070***
POST	0.343***		-0.322***	-0.078***	-0.253***	-0.019	0.103***	0.069***	-0.009	0.034***	0.166***
TR	0.127***	-0.336***		-0.281***	0.195***	0.093***	-0.108***	-0.014	0.022*	0.038***	-0.081***
FACTOR	-0.142***	-0.060***	-0.433***		0.114***	-0.089***	0.123***	-0.047***	0.055***	0.009	0.111***
EVOL	-0.148***	-0.250***	-0.024**	0.511***		0.014	-0.034***	-0.061***	0.043***	0.011	-0.014
LEV	0.037***	-0.028**	0.109***	-0.122***	-0.083***		-0.159***	-0.029**	-0.069***	0.198***	-0.149***
ROA	-0.005	0.102***	-0.111***	0.144***	0.075***	-0.197***		0.114***	-0.078***	0.050***	0.305***
GROWTH	0.043***	0.093***	-0.037***	-0.053***	-0.054***	-0.021*	0.150***		-0.053***	-0.025**	0.056***
SIZE	-0.117***	-0.008	0.009	0.046***	0.086***	-0.001	-0.048***	-0.013		-0.097***	-0.215***
RD	-0.010	0.155***	-0.113***	0.173***	0.072***	-0.023**	0.117***	-0.002	0.068***		0.066***
CHOLD	0.060***	0.218***	-0.133***	0.150***	0.116***	-0.160***	0.239***	0.042***	-0.181***	0.147***	

Note: This table presents summary statistics (Panel A) and correlations among the variables (Panel B) for the entire sample. POST = a dummy variable that equals one if a firm-year observation relates to a mandatory post-adoption year, 2006-2009, and zero if it relates to a pre-adoption year, 2001-2004. All remaining variables are described in Table 1. Pearson correlations are reported above the diagonal and Spearman correlations are reported below the diagonal. ***, **, and * represent significant level at 1%, 5%, and 10% (two-tailed test).

Univariate Analyses

Table 3 presents comparisons of the variables in the pre- and the post-IFRS periods. It shows that *Taxavoid* is significantly larger in the post-IFRS than in the pre-IFRS period (t-statistic = 29.278, two-tailed $p < 0.01$). The median level of tax avoidance is 0.263 in the post-IFRS period, which is significantly higher than the median value of 0.047 in the pre-IFRS period (Wilcoxon Z-value = 29.532, two-tailed $p < 0.01$). Hence, our results indicate that the magnitude of tax avoidance significantly increases after mandatory IFRS adoption. We also find that the mean and median tax rates (*TR*) are significantly lower in the post-IFRS than in the pre-IFRS period (t-statistic = -29.449, Wilcoxon Z-value = -28.936, two-tailed $p < 0.01$). Although tax rates are lower in the post-IFRS period, the magnitude of tax avoidance significantly increases. These results suggest that besides the tax rate, other factors such as IFRS adoption may affect tax avoidance. Moreover, the mean and median value of *ROA*, *GROWTH*, *RD*, and *CHOLD* are significantly higher in the post-IFRS period (all with two-tailed $p < 0.01$). The mean and median value of *EVOL* is significantly lower in the post-IFRS period than in the pre-IFRS period (t-statistic = -21.531, Wilcoxon Z-value = -21.543, two-tailed $p < 0.01$). The results reveal that the magnitude of earnings variance within a country declines after mandatory IFRS adoption.

Table 3 Univariate comparison of variables between pre- and post-IFRS periods

	Mean		Median			
	Pre-IFRS	**Post-IFRS**	**t-statistics**	**Pre-IFRS**	**Post-IFRS**	**Wilcoxon Z-test**
Taxavoid	0.050	0.202	29.278***	0.047	0.263	29.532***
TR	0.337	0.304	-29.449***	0.350	0.302	-28.936***
EVOL	1.192	0.285	-21.531***	0.259	0.209	-21.543***
LEV	0.571	0.561	-1.628	0.594	0.584	-2.382**
ROA	0.074	0.089	9.023***	0.059	0.069	8.766***
GROWTH	0.490	0.574	5.999***	0.363	0.441	8.766***
SIZE	0.699	0.687	-0.811	0.493	0.470	-0.711
RD	0.031	0.043	2.923***	0.000	0.000	13.347***
CHOLD	0.074	0.108	14.606***	0.042	0.071	18.796***
n	3,535	3,890		3,535	3,890	

Note: All variables are described in Table 1. Pre-IFRS = the period between 2001 and 2004. Post-IFRS = the period between 2006 and 2009. ***, **, and * represent significant level at 1%, 5%, and 10% (two-tailed test).

Multivariate Analyses

In Table 4, we report results from equation (2)[11]. The variance inflation factors (VIFs) of all the variables are far below the generally accepted threshold of 10. The coefficient on *POST* in the full sample is statistically significant and positive (t-statistic = 29.65, $p < 0.01$). This outcome indicates that, after controlling for country- and firm-specific variables, tax avoidance following IFRS-adoption is significantly larger than in the pre-adoption period. It thus supports our hypothesis.

With respect to the control variables, the coefficient on *TR* is significant and positive (t-statistic = 8.20, $p < 0.01$), which is consistent with that of Atwood et al. (2012). It indicates that firms engage in more tax avoidance when corporate tax rates are higher. In keeping with Rego (2003) and political costs theory (Zimmerman,

[11] We use two-tailed tests to examine whether all variables are significantly different from zero and then we discuss the positive or negative effects of the variables on tax avoidance according to our hypothesis and the findings of prior literature.

Table 4 Regression results for the impact of mandatory IFRS adoption on tax avoidance

Variables	Full Sample (n = 7,425)		Mandatory Adopters(n =5,484)	
	(1)		(2)	
	coefficients	t-statistics	coefficients	t-statistics
Constant	-0.283	-5.93***	-0.345	-5.97***
POST	0.195	29.65***	0.199	25.47***
TR	0.938	8.20***	1.075	7.55***
FACTOR	0.073	4.89***	0.068	4.21***
EVOL	-0.001	-0.36	0.000	0.12
LEV	0.015	1.46	0.020	1.80*
ROA	0.258	6.47***	0.261	5.60***
GROWTH	0.004	1.98**	0.003	1.56
SIZE	-0.026	-5.58***	-0.023	-3.96***
RD	-0.034	-2.18**	-0.045	-2.74***
CHOLD	-0.004	-0.13	0.002	0.06
Industry effect	Yes		Yes	
Country effect	Yes		Yes	
Adj. R^2	0.170		0.170	
F-statistics	30.793***		23.027***	

Note: This table provides the regression results from equation (2). We use two-tailed tests for all variables. The dependent variable is *Taxavoid*. *POST* = a dummy variable that equals one if a firm-year observation relates to a mandatory post-adoption year, 2006-2009, and zero if it relates to a pre-adoption year, 2001-2004; All remaining variables are described in Table 1. ***, **, and * represent significant level at 1%, 5%, and 10%.

1983), the negative coefficient on *SIZE* (t-statistic = -5.58, $p < 0.01$) shows that larger firms are less inclined to avoid taxes in order to reduce potential political costs. The coefficient on *ROA* is significantly positive (t-statistic = 6.47, $p < 0.01$), indicating that tax avoidance is higher for firms with higher pre-tax return on assets. Consistent with prior research (Atwood et al. 2012; Rego, 2003; Wilson, 2009), this result indicates that more profitable firms, which have incentives to reduce taxes, engage in more tax avoidance. The coefficient on *GROWTH* is significantly positive (t-statistic = 1.98, $p = 0.048$). It shows that firms with higher sales growth engage in more tax avoidance, consistent with Atwood et al. (2012). Yet, contrary to prior research that finds a positive relation between R&D expenditure and tax avoidance (Dyreng et al., 2008), the coefficient on *RD* is significant and negative (t-statistic = -2.18, $p = 0.030$). A plausible explanation for this finding is that R&D spending can generate additional research and development tax credits, which reduce the effective tax rate. Hence, firms increasing their R&D expenses may face lower tax rates and so have few incentives to pursue aggressive tax avoidance strategies. The coefficient on *EVOL* is not significantly negative, which is inconsistent with the finding of Atwood et al. (2012).

Presumably, early adopters decide to comply with IFRS voluntarily after considering the related costs and benefits, while late adopters switch to IFRS when regulations require them to do so (Li, 2010). In particular, some mandatory adopters implement IFRS "more in name" after mandatory IFRS adoption (Daske, Hail, Leuz, & Verdi, 2013). Voluntary adopters' incentives to avoid taxes therefore may differ from mandatory adopters'

motivations. Thus, we exclude the subsample of voluntary adopters and re-run the regression analyses. The results for the mandatory-adopter subsample in model (2) are similar to the findings for the full sample.

Because we employ a longitudinal database containing 12 countries over eight years, cross-sectional parameter estimates may be subject to omitted variable bias. To address this problem, we use unbalanced panel data for sensitivity analyses. In keeping with results from the Hausman test, we use a random-effects model. The untabulated results indicate that the coefficient on *POST* in the full sample is statistically significant and positive (t-statistic = 33.59, $p < 0.01$). We then exclude the subsample of voluntary adopters and re-run the panel data analyses. The results for the mandatory-adopter subsample are similar to the findings for the full sample. Thus, our results are quite robust.

Additional Analyses

Investigating the relationship between temporary book-tax differences and mandatory IFRS adoption

IFRS offer greater flexibility in comparison to the local standards of many EU countries (Callao & Jarne, 2010). The subjectivity in applying certain criteria, including fair value and the relaxation of requirements concerning the presentation of financial statements provides openings for discretionary accounting and opportunistic behavior (Callao & Jarne, 2010). Some studies find that mandatory IFRS implementation leads to an increase in earnings management (Ahmed et al., 2013; Christensen et al., 2015; Jeanjean & Stolowy, 2008). Previous studies find that temporary book-tax differences are associated with more earnings management (Frank et al., 2009; Phillips et al., 2003). Thus, we examine the impact of mandatory IFRS adoption on temporary book-tax differences using the following equation including industry and country effects (country and firm subscripts are suppressed):

$$\begin{aligned} Temp_t = {} & \alpha_0 + \alpha_1 POST_t + \alpha_2 TR_t + \alpha_3 FACTOR_t \\ & + \alpha_4 EVOL_t + \alpha_5 LEV_t + \alpha_6 ROA_t \\ & + \alpha_7 GROWTH_t + \alpha_8 SIZE_t + \alpha_9 RD_t \\ & + \alpha_{10} CHOLD_t + \sum_i \alpha_i INDUSTRY_i \\ & + \sum_j \alpha_j COUNTRY_j + \varepsilon_t \end{aligned} \quad (3)$$

where *Temp* = [(Total income taxes − current income taxes)/tax rate]/pretax income before exceptional items[12].

Table 5 presents results from equation (3)[13]. The coefficient for the post-IFRS period (*POST*) in the full sample is statistically significant and positive (t-statistic = 22.08, $p < 0.01$). The result demonstrates that mandatory IFRS adoption indeed has a significant impact on increases in temporary book-tax differences. With respect to the control variables, the coefficient on *TR* is significant and negative (t-statistic = -3.01, $p < 0.01$). The coefficient on *EVOL* is significantly positive (t-statistic = 2.43, $p = 0.015$), indicating that temporary book-tax difference is higher when the level of cross sectional earnings variance within a country is higher. Furthermore, the statistically significant, positive coefficients on *LEV* and *ROA* indicate that firms with higher leverage and more profits have larger temporary book-tax differences (t-statistic = 4.25 and 8.07, respectively, $p < 0.01$). The negative coefficient on *SIZE* shows that larger firms have fewer temporary book-tax differences (t-statistic = -2.64, $p < 0.01$). The results for the mandatory-adopter subsample in model (2) are similar to the findings for the full sample.

To examine the sensitivity of our findings, we rerun regression (3) using another measure of temporary book-tax difference computed as ((Deferred taxes/tax rate) /

[12] Although there is an item for deferred taxes (TXDI) in the Compustat Global Vantage Database, it shows that nearly 50 percent of our sample observations have no deferred taxes. That seems unlikely. On checking directly with an expert at Pricewaterhouse Coopers in Frankfurt, she mentioned that companies in Germany have accounting options permitting them not to disclose any deferred taxes at all, if their deferred tax assets exceed their deferred tax liabilities. Thus, instead of relying exclusively on data obtained from this Database, for the deferred tax item, we compute temporary book-tax differences based on the textbook concept of deferred taxes, Hanlon (2005), and Khurana and Moser (2013).

[13] We use two-tailed tests to examine whether all variables are significantly different from zero and then we discuss the positive or negative effects of the variables on temporary book-tax differences.

Table 5 Regression results for the impact of mandatory IFRS adoption on temporary book-tax difference

Variables	Full Sample (n = 7,425)		Mandatory Adopters(n =5,484)	
	(1)		(2)	
	coefficients	t-statistics	coefficients	t-statistics
Constant	0.268	2.28**	0.167	1.17
POST	0.359	22.08***	0.374	19.35***
TR	-0.850	-3.01***	-0.601	-1.70*
FACTOR	0.048	1.30	0.059	1.47
EVOL	0.009	2.43**	0.012	0.78
LEV	0.105	4.25***	0.022	2.40**
ROA	0.794	8.07***	0.821	7.09***
GROWTH	-0.001	-0.24	0.003	0.53
SIZE	-0.030	-2.64***	-0.009	-0.62
RD	-0.028	-0.72	-0.042	-1.01
CHOLD	-0.169	-2.44**	-0.122	-1.44
Industry effect	Yes		Yes	
Country effect	Yes		Yes	
Adj. R^2	0.126		0.127	
F-statistics	21.920***		16.553***	

Note: This table provides the regression results from equation (3). We use two-tailed tests for all variables. *Temp* = [(Total income taxes- current income taxes)/tax rate]/pretax income before exceptional items. The dependent variable is *Temp*. All remaining variables are described in Tables 1 and 4. ***, **, and * represent significant level at 1%, 5%, and 10%.

pretax income before exceptional items). One potential problem with this measure is that nearly 50 percent of our sample observations have no deferred taxes (*TXDI*) in the Compustat Global Vantage Database. The untabulated results indicate that the coefficient on *POST* is significantly positive in the full sample (t-statistics = 4.34, $p < 0.01$). The coefficient on *POST* is also significantly positive in the sample with mandatory adopters (t-statistics = 4.20, $p < 0.01$). The results therefore are qualitatively similar to ones shown in Table 5.

Investigating the role of legal origins in explaining the effects of IFRS adoption

La Porta et al. (1998) indicate that legal scholars typically identify three subgroups within the civil law tradition: French, German, and Scandinavian. They also note that legal origins are important for laws regarding creditors, shareholder rights and private property rights as well as a country's level of bank and stock market development. We therefore conjecture that legal origins may influence managers' incentives to undertake an aggressive strategy to reduce taxes.

We compare average tax avoidance and average temporary book tax differences in three legal-origin groups. The two-tailed t-statistic results shown in Panels A and B of Table 6 indicate that the average magnitude of tax avoidance (0.004) and temporary book-tax differences (0.056) are lowest in Scandinavian-origin countries in the pre-IFRS period. The Scandinavian-origin countries have the lowest level of tax avoidance in the post-IFRS period. In contrast, the German-origin countries exhibit signify-cantly lower levels of temporary book-tax differences than

Table 6 Results for comparison of tax avoidance and temporary book-tax differences in different legal origin countries

Panel A: Comparison of tax avoidance in different legal origin countries			
	Pre-IFRS period	**Post-IFRS period**	**t-statistics**
French-origin	0.080 (n = 1,496)	0.212 (n = 1,412)	15.53***
German-origin	0.046 (n = 1,158)	0.205 (n = 1,438)	18.09***
Scandinavian-origin	0.004 (n = 881)	0.184 (n = 1,040)	18.51***
Panel B: Comparison of temporary book-tax differences in different legal origin countries			
French-origin	0.133 (n = 1,496)	0.505 (n = 1,412)	19.03***
German-origin	0.096 (n = 1,158)	0.406 (n = 1,438)	15.91***
Scandinavian-origin	0.056 (n = 881)	0.520 (n = 1,040)	18.36***

Panel C: Regression results				
	Full Sample (n = 7,425)		**Mandatory Adopters (n =5,484)**	
	Taxavoid (1)	**Temp (2)**	**Taxavoid (3)**	**Temp (4)**
Constant	-0.286 (-11.16)***	0.110 (1.74)*	-0.288 (-7.57)***	0.237 (2.53)**
POST	0.192 (21.02)***	0.316 (14.09)***	0.182 (12.98)***	0.257 (7.47)***
FRENCH	0.078 (7.99)***	0.031 (1.29)	0.073 (5.84)***	0.005 (0.15)
FRENCH*POST	-0.004 (-0.36)	0.054 (1.82)*	0.008 (0.51)	0.098 (2.49)**
SCANDINAVIAN	-0.007 (-0.62)	-0.039 (-1.47)	-0.012 (-0.77)	-0.095 (-2.58)***
SCANDINAVIAN*POST	-0.002 (-0.17)	0.128 (3.98)***	0.009 (0.55)	0.184 (4.41)***
TR	0.880 (14.58)***	-0.238 (-1.60)	0.871 (9.29)***	-0.569 (-2.47)**
FACTOR	0.043 (10.21)***	-0.007 (-0.70)	0.044 (9.70)***	-0.006 (-0.52)
EVOL	-0.001 (-0.52)	0.010 (2.68)***	-0.001 (-0.60)	0.011 (2.15)**
LEV	0.019 (1.88)*	0.098 (3.99)***	0.025 (2.26)**	0.102 (3.71)***
ROA	0.270 (6.71)***	0.758 (7.68)***	0.279 (5.91)***	0.774 (6.68)***
GROWTH	0.004 (2.30)**	-0.001 (-0.22)	0.004 (1.81)*	0.003 (0.49)
SIZE	-0.026 (-5.82)***	-0.019 (-1.73)*	-0.025 (-4.47)***	0.000 (0.03)
RD	-0.046 (-2.94)***	-0.012 (-0.31)	-0.059 (-3.58)***	-0.026 (-0.65)

Table 6 Results for comparison of tax avoidance and temporary book-tax differences in different legal origin countries (continue)

Panel C: Regression results				
	Full Sample (n = 7,425)		Mandatory Adopters (n =5,484)	
	Taxavoid (1)	Temp (2)	Taxavoid (3)	Temp (4)
CHOLD	-0.009 (-0.31)	-0.137 (-1.98)**	-0.014 (-0.41)	-0.083 (-0.98)
Industry effect	Yes	Yes	Yes	Yes
Adj. R^2	0.161	0.125	0.158	0.128
F-statistics	33.230***	24.948***	24.261***	19.280***

Note: Panel A of this table reports the analysis of tax avoidance in different legal origin countries by period for the full sample, constructed using the mean value. Panel B reports the analysis of temporary book-tax differences in different legal origin countries by period for the full sample, constructed using the mean value. Panel C presents the regression results. We use two-tailed tests for all variables. The dependent variable in columns (1) and (3) is *Taxavoid*. The dependent variable in columns (2) and (4) is *Temp*. In our sample, Belgium, France, Greece, Italy, the Netherlands, and Spain are classified into the French-origin group. Germany and Switzerland are classified as the German-origin group. Demark, Finland, Norway, and Sweden are classified as the Scandinavian-origin group. *FRENCH* = a dummy variable that equals one if a firm belongs to French-origin countries and zero otherwise. *SCANDINAVIAN* = a dummy variable that equals one if a firm belongs to Scandinavian-origin countries and zero otherwise. All remaining variables are defined in Table 1 and Table 4. The t value is reported in parentheses. ***, **, and * represent significant level at 1%, 5%, and 10%.

French- and Scandinavian-origin countries in the post-IFRS period. Moreover, the average magnitude of tax avoidance and temporary book-tax differences significantly increases in all sample countries, regardless of the three subgroups' differing legal traditions (all with two-tailed $p < 0.01$). Among them, though, the increased magnitude of tax avoidance (0.004 in the pre-IFRS period versus 0.184 in the post-IFRS period) and temporary book-tax differences (0.056 in the pre-IFRS period versus 0.520 in the post-IFRS period) is largest in the Scandinavian-origin countries in the post-IFRS period.

We then run regressions like equations (2) and (3), but add two more dummy variables (*FRENCH* and *SCANDINAVIAN*), indicating French and Scandinavian legal origins, respectively, as instrumental variables[14]. We also include two interaction terms (*FRENCH*POST* and *SCANDINAVIAN*POST*) in the regressions. Panel C of Table 6 displays the results of two-tailed tests for all variables. The coefficients on *FRENCH*POST* and *SCANDINAVIAN*POST* in column (1) are negative and not statistically significant (t-statistic = -0.36, p = 0.72; t-statistic = -0.17, p = 0.87, respectively), while the coefficients on *FRENCH*POST* and *SCANDINAVIAN *POST* in column (2) are positive and significant (t-statistic = 1.82, p = 0.07; t-statistic = 3.98, $p < 0.01$, respectively). These findings suggest that relative to German-origin countries, the magnitude of temporary book-tax differences in French- and Scandinavian-origin countries increases significantly more after mandatory IFRS adoption. We also exclude the subsample of voluntary adopters and re-run the regression analyses. The results for the mandatory-adopters subsample shown in columns (3) and (4) are similar to the findings for the full sample.

Investigating the role of differences between domestic accounting standards and IFRS in the effects of IFRS adoption

[14] We try to control country effects by separating sample into different groups. Table 6 groups countries based on legal origin. Table 7 groups countries based on the extent of differences between domestic accounting standards and IFRS.

Differences between domestic accounting standards and IFRS in the pre-IFRS period vary across countries. To the extent greater differences between domestic accounting standards and IFRS result in more variation in the information reflected in firms' financial statements (Ashbaugh & Pincus, 2001), we conjecture that the degree to which domestic accounting standards differ from IFRS may affect the managerial incentives to avoid taxes.

We use the mean score of Bae, Tan, and Welker (2008) to separate our sample into two subsamples ('small-difference' and 'large-difference' groups)[15,16] and use t-tests to examine the differences in means between the two subsamples. Comparing the two rows in Panel A of Table 7 reveals that the average magnitude of tax avoidance for the 'large-difference' group is significantly lower than for the 'small-difference' group in the pre-IFRS period (0.045 versus 0.126, t-statistic = 4.83, two-tailed $p < 0.01$). In contrast, the average magnitude of tax avoidance for the 'large-difference' group is significantly higher than for the 'small-difference' group in the post-IFRS period (0.203 versus 0.176, t-statistic = -1.88, two-tailed $p = 0.06$). Furthermore, comparing the two columns in Panel A shows that average magnitudes of tax avoidance in both the 'small-difference' and the 'large-difference' groups are significantly larger in the post-IFRS period than in pre-IFRS period. Panel B indicates that temporary book-tax differences (*Temp*) are significantly lower for the 'large-difference' group in the pre-IFRS adoption period (t-statistic = 2.96, two-tailed $p < 0.01$), while the magnitude of temporary book-tax differences is not significantly higher for the 'large-difference' group after the mandatory IFRS adoption (t-statistic = -1.36, two-tailed $p = 0.17$).

One plausible reason for the results in Panels A and B is that countries with large differences between domestic accounting standards and IFRS in the pre-IFRS period may have relatively higher book-tax conformity. Pre-existing high book-tax conformity inevitably weakens, and thus tax avoidance and temporary book-tax differences increase after mandatory IFRS adoption. Although the average magnitude of tax avoidance and temporary book tax differences in both groups significantly increases in the post-IFRS period, the increase in magnitude is larger for the 'large-difference' group.

We also run regressions like equations (2) and (3) but add one more dummy variable, *LARGE*, which equals one if the score of differences between domestic accounting standards and IFRS is larger than the mean score in Bae et al. (2008), and equal zero otherwise. We also add the interaction term *POST*LARGE*. The results of two-tailed tests for all variables are shown in Panel C of Table 7. The coefficients on *POST*LARGE* are significantly positive in model (1) (t-statistic = 4.14, $p < 0.01$) and model (2) (t-statistic = 3.49, $p < 0.01$). These results indicate that book-tax conformity in countries with large differences between domestic accounting standards and IFRS in the pre-IFRS period is comparatively higher than it is in countries with small differences between domestic accounting standards and IFRS. Pre-existing high book-tax conformity seems to weaken for countries with large differences; thus, managerial incentives to engage in aggressive tax reporting strategies appear to increase after IFRS adoption. Consequently, tax avoidance and temporary book-tax differences increase in the post-IFRS period. Mandatory IFRS adoption thus may have larger impacts on countries whose accounting differences are large in the

[15] Bae et al. (2008) calculate the differences between a country's domestic accounting standards and IFRS based on 21 key accounting rules. For each of the 21 accounting rules, a score of 1 or 0 is assigned where 1 indicates a difference and 0 none. A total score, ranging from 0 to 21, is derived for each country in their sample of 49 countries. Higher values indicate more discrepancies between a country's local GAAP and IFRS. The mean score of 49 countries presented in Bae et al. (2008) is 9.

[16] IAS are based on a conceptual framework similar to the ones of common law countries (Barth et al., 2008: 476). Prior literature indicates that the differences between IFRS and accounting standards in common law countries are smaller than those in civil law countries (e.g., Ball, 2006; Barth et al., 2008; Barth, Landsman, Lang, & Williams, 2012; Devalle, Onali, & Magarini, 2010). The 49 sample countries in Bae et al. (2008) include the two different traditions of Anglo-American common law and the Continental civil law. Thus, we think that it is appropriate to use the mean score of Bae et al. (2008) to distinguish which country belongs to 'large difference' or 'small difference' groups. In addition, because all our sample countries are civil-law countries, we calculate the mean score (mean = 10.3) of the civil-law countries presented in Bae et al. (2008) and use this score to separate countries in our sample to either the 'large difference' or the 'small difference' group. The results turn out to be the same; that is, no countries in our sample switch groups as a result of using different mean scores.

pre-IFRS period than on countries whose accounting differences are small. Finally, we exclude the subsample of voluntary adopters and re-run the regression analyses. The results for the mandatory-adopter subsample shown in models (3) and (4) are similar to the findings for the full sample.

Table 7 Results for comparison of tax avoidance and temporary book-tax differences in 'large-difference' and 'small-difference' groups

Panel A: Comparison of tax avoidance between 'small-difference' and 'large-difference' groups in pre- and post-IFRS periods			
	Pre-IFRS period	**Post-IFRS period**	**t-statistics**
small-difference	0.126 (n = 239)	0.176 (n = 179)	2.30**
large-difference	0.045 (n = 3,296)	0.203 (n = 3,711)	29.74***
t-statistics	4.83***	-1.88*	
Panel B: Comparison of temporary book-tax differences between 'small-difference' and 'large-difference' groups in pre- and post-IFRS periods			
small-difference	0.205 (n = 239)	0.415 (n = 179)	3.67***
large-difference	0.094 (n = 3,296)	0.475 (n = 3,711)	30.63***
t-statistics	2.96***	-1.36	

Panel C: Regression results with 'large-difference' and 'small-difference' groups				
Variables	**Full Sample (n = 7,425)**		**Mandatory Adopters (n =5,484)**	
	Taxavoid (1)	**Temp (2)**	**Taxavoid (3)**	**Temp (4)**
Constant	-0.166 (-6.31)***	0.264 (4.10)***	-0.204 (-6.29)***	0.314 (3.94)***
POST	0.096 (4.46)***	0.188 (3.58)***	0.099 (4.46)***	0.161 (2.97)***
LARGE	-0.082 (-5.55)***	-0.126 (-3.49)***	-0.079 (-5.17)***	-0.134 (-3.58)***
POST*LARGE	0.091 (4.14)***	0.188 (3.49)***	0.090 (3.98)***	0.217 (3.89)***
TR	0.887 (15.99)***	-0.325 (-2.39)**	0.962 (12.64)***	-0.511 (-2.74)***
FACTOR	0.013 (4.47)***	-0.025 (-3.62)***	0.015 (4.76)***	-0.026 (-3.41)***
EVOL	-0.001 (-0.97)	0.011 (3.17)***	-0.002 (-0.79)	0.015 (2.98)***
LEV	0.014 (1.43)	0.097 (3.96)***	0.022 (2.01)**	0.102 (3.74)***
ROA	0.274 (6.84)***	0.804 (8.21)***	0.280 (5.96)***	0.824 (7.17)***
GROWTH	0.004 (2.15)**	-0.001 (-0.12)	0.004 (1.75)*	0.003 (0.56)
SIZE	-0.028 (-6.24)***	-0.020 (-1.76)*	-0.026 (-4.67)***	-0.000 (-0.00)
RD	-0.020 (-1.33)	0.002 (0.05)	-0.037 (-2.28)**	-0.017 (-0.42)

Table 7 Results for comparison of tax avoidance and temporary book-tax differences in 'large-difference' and 'small-difference' groups (continue)

Panel C: Regression results with 'large-difference' and 'small-difference' groups				
Variables	**Full Sample (n = 7,425)**		**Mandatory Adopters (n =5,484)**	
	Taxavoid (1)	**Temp (2)**	**Taxavoid (3)**	**Temp (4)**
CHOLD	-0.039 (-1.41)	-0.194 (-2.86)***	-0.044 (-1.29)	-0.146 (-1.75)*
Industry effect	Yes	Yes	Yes	Yes
Adj. R2	0.154	0.123	0.151	0.127
F-statistics	33.034***	25.806***	24.072***	19.950***

Note: In Panels A and B of Table 7, we use mean score of Bae et al. (2008) to separate our sample into two subsamples ('small-difference' and 'large-difference' groups). The mean summary score in Bae et al. (2008) is 9. Samples whose summary scores of differences are equal to or smaller than 9 are classified as the 'small-difference' group. Samples whose summary scores of differences are larger than 9 are classified as the 'large-difference' group. Panel A presents the analysis of tax avoidance for 'small-difference' group versus 'large-difference' group by period for the full sample, constructed using the mean value. Panel B presents the analysis of temporary book-tax differences for 'small-difference' group versus 'large-difference' group by period for the full sample, constructed using the mean value. Panel C presents the regression results. We use two-tailed tests for all variables. The dependent variable in columns (1) and (3) is *Taxavoid*. The dependent variable in columns (2) and (4) is *Temp*. *LARGE* = a dummy variable that equals one if a firm-year observation for countries in 'large-differences' group and zero otherwise. All remaining variables are defined in Table 1 and Table 4. The t value is reported in parentheses. ***, **, and * represent significant level at 1%, 5%, and 10%.

Conclusion

The EU countries adopted IFRS for all their exchange-listed companies in 2005. Consequently, it is important for both regulators and investors to understand the impact of IFRS adoption on tax avoidance. The objective of this study is to examine how mandatory adoption of IFRS in European countries with civil law tradition affects tax avoidance. In additional tests, we examine whether the mandatory IFRS adoption affects temporary book-tax differences. Furthermore, we examine the extent to which legal origins as well as differences between domestic accounting standards and IFRS affect tax avoidance and temporary book-tax differences.

Our results indicate that EU enterprises engage in more tax avoidance after mandatory IFRS adoption. We also find that the magnitude of temporary book-tax differences increases significantly after mandatory IFRS adoption. Relative to countries with a German-origin legal tradition, the magnitude of temporary book-tax differences have significantly larger increases in countries with French- and Scandinavian-origin legal traditions after mandatory IFRS adoption. We find that compared to countries with small differences between domestic accounting standards and IFRS, tax avoidance and temporary book tax differences for countries with large differences between domestic accounting standards and IFRS are smaller in the pre-IFRS period, but larger in the post-IFRS period.

Our results are of interest to academics involved in research on international accounting harmonization and the determinants of tax avoidance. We extend prior research, which generally focuses on the effects of IFRS on earnings quality, transparency, and comparability by providing evidence that IFRS affect the extent to which

firms avoid taxes and the magnitude of temporary book-tax differences. Our research also may be relevant to international and national institutions involved in the regulatory process (e.g., the European Commission, the European Financial Reporting Advisory Group, the International Accounting Standards Board and tax authorities). In particular, our study should interest tax policymakers in civil-law countries such as Taiwan concerned about declining corporate tax revenue because the results provide evidence that tax avoidance and temporary book-tax differences increase after mandatory IFRS adoption.

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採用國際財務報導準則對歐洲國家租稅規避之影響

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本研究以挪威、瑞士以及大陸法體系之歐盟國家為樣本，檢視強制採用國際財務報導準則對租稅規避的影響。實證結果顯示，強制採用國際財務報導準則後，租稅規避顯著增加。在增額測試中，本研究發現強制採用國際財務報導準則後，暫時性財稅差異顯著增加。此外，增額測試結果顯示，在強制採用國際財務報導準則後，相對於德國法系國家，法國法系及斯堪地那維亞法系國家之暫時性財稅差異顯著增加；而本國會計準則與國際財務報導準則差異大之國家，其租稅規避及暫時性財稅差異則顯著增加。

關鍵字：租稅規避、國際財務報導準則、強制採用。

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