The Effect of IFRS Adoption on the Predictive Ability of Aggregate Accruals for Economic Growth

by

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Dissertation submitted in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy in Business Administration
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ABSTRACT

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Abstract

Using aggregate-level difference-in-differences analysis across 34 countries, I find that the extent to which aggregate accruals predict change in Gross Domestic Product (GDP) is greater for countries that adopted International Financial Reporting Standards (IFRS) than for countries that did not. I do not find a similar change in the predictive ability of aggregate cash flows following IFRS adoption. IFRS adoption also enables aggregate accruals to better predict a component of GDP (corporate profits) and factors related to GDP change (change in corporate investment and unemployment rate). The results are more pronounced for adopting countries with greater differences between local accounting standards and IFRS and for adopting countries with stronger enforcement. These findings support the view that IFRS adoption improves the measurement and recognition of firms' fundamentals, and suggest that a change in accounting standards can reduce imperfections in accounting measurements of real output from business activities. These inferences have implications for accounting standard setters, users of financial statements, and policy-makers interested in understanding and predicting macroeconomic activity.

Dedication

For my family, especially my mother Soon Hee Park.

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1. Introduction

In this study, I evaluate the role of accounting standards in altering imperfections in accounting measurement that are common to all firms in an economy (hereafter, common or systematic measurement error), by examining whether mandatory adoption of international financial reporting standards (IFRS) improves the predictive ability of country-level aggregate accruals for economic growth (one-year-ahead GDP change). I do so in two steps. I first show analytically that changes in the predictive ability of aggregate accruals for one-period-ahead GDP change after a change in accounting standards can be used to infer whether the new accounting standards alter the common error inherent in the financial reporting system in measuring firms' true economic performance. I then provide empirical findings that suggest IFRS adoption reduces this common error.

My motivation for this study is to examine the effect of a wholesale change in accounting standards on the common measurement error in accruals. Understanding this effect is important because it has implications for the role of accounting standards in affecting systematic information risk in an economy, as suggested by previous research (Zhang, 2013).[1] To capture the effect of IFRS adoption on the common measurement error,

[1] Insofar as the common measurement error in accruals affects all firms in an economy, it can introduce systematic information risk (Zhang, 2013).

I analyze two country-level aggregate outcomes, aggregate accruals and one-period-ahead GDP change, because accruals reflect forward-looking information about real economic activity and, in principle, common measurement error and country-level aggregate outcomes vary at the economy level.[2]

To assess the effect of IFRS adoption on the common measurement error in financial reporting, I analyze the predictive ability of aggregate accruals, as opposed to the predictive ability of aggregate cash flows. My analysis is predicated on the view that accounting standards do not affect the ability of cash flows to measure underlying economic performance on a periodic basis, because cash flows are determined by underlying economic activities, not by the provisions of financial reporting standards. In contrast, a change in accounting standards can affect measurement and recognition imperfections in accruals, specifically the ability of accruals to capture the fundamentals of real economic activity at both the firm-level and the aggregate-level. That is, new accounting standards, especially standards that require recognition of previously unrecognized assets and liabilities, can affect both systematic imperfections common to

[2] Examining the effect of IFRS adoption on measurement imperfections common to all firms in an economy is not practicable at the firm level because firm-level results cannot distinguish whether the effect of IFRS adoption is due to a change in the common error, in the idiosyncratic error, or both. At the aggregate level, the effect from idiosyncratic error is minimized or removed, revealing the effect of IFRS adoption on the common error. In addition, my study sheds light on the effects of a change in accounting standards on all firms, rather than on an average single firm, with implications for systematic information risk (Zhang, 2013). From the perspective of investors who hold well-diversified portfolios, effects of changes in accounting standards do not matter if a change of accounting standards does not affect the properties of aggregate earnings because diversified investors are sensitive only to systematic effects, not to effects from variations in firm-level properties.

most or all reporting firms that apply a given set of standards, and idiosyncratic imperfections that vary with firm-specific reporting practices.[3]

The accounting for defined benefit pension arrangements illustrates the two types of reporting imperfections. Prior to IFRS adoption, local accounting standards in jurisdictions such as Finland, Greece, and Italy permitted pay-as-you-go accounting, which did not require firms to calculate the projected benefit obligations for defined benefit pension arrangements. Therefore, there was no meaningful measurement of pension expense. In contrast, under IAS 19, IFRS require firms to report previously unrecognized defined benefit pension expense, including service cost, interest cost, expected return on plan assets, and amortization of actuarial gains and losses. The accounting under IAS 19 requires that management estimate a number of required inputs and amounts, for example, discount rates. To the extent that pay-as-you-go is a conceptually inferior measurement of pension expense, the adoption of IFRS, specifically IAS 19, reduces accruals imperfections common to all reporting firms and causes firms to

[3] Because accounting standards give rise to an economy-wide factor that affects all firms in an economy, the common measurement error that varies at the economy level is more likely to be amenable to correction by changing accounting standards (Gao and Verrecchia, 2012). The idiosyncratic measurement error that varies by firms' reporting practices is more likely to be amenable to correction by changing implementation, rather than by changing accounting standards. That is, the idiosyncratic measurement error can be affected by various non-accounting-standard factors including managers' abilities and implementation decisions, firms' governance structures, business models, information environment, or managers' own incentives, which are less likely affected by changing accounting standards. Stated in another way, when accounting standard setters change accounting standards, they are more likely to affect common measurement error than idiosyncratic measurement error.

report amounts more in line with fundamentals. By contrast, firm-specific measurement errors arise because managers vary in their ability to interpret and implement new accounting standards. With regard to IAS 19, estimates of key parameters such as discount rates may be less or more precise depending on managers' differential abilities and implementation decisions. This measurement imperfection is idiosyncratic to specific firms.[4]

Prior research that examines the effects of IFRS adoption does not typically analyze these two potentially separable effects, particularly with regard to accruals.[5] The effects of IFRS adoption reported by previous research could stem from how IFRS adoption alters accruals imperfections common to all firms, alters imperfections due to firm-level reporting practices, or both. Thus, the effects of IFRS adoption, as inferred from firm-level analysis, could be driven by changes in systematic imperfections, changes in idiosyncratic imperfections, or both. Under the assumption that idiosyncratic estimation errors are independently distributed among firms (e.g., some firms overestimate, and

[4] Across-firm correlations in errors in estimating discount rates would constitute part of the common error associated with applying IFRS. My design is agnostic about the specific source and nature of common errors.

[5] Prior research provides mixed evidence on whether IFRS adoption enhances reporting quality, as measured by, for example, the contemporaneous correlation between accruals and cash flows or the magnitude of signed accruals. Barth et al. (2008) find increased reporting quality among firms that voluntarily adopted IAS/IFRS, whereas Ahmed et al. (2013) and Christensen et al. (2015) find decreased reporting quality among firms that mandatorily adopted IFRS. Capkun et al. (2016) find decreased reporting quality regardless of the nature of firms' IFRS adoption. These mixed results are puzzling given that IFRS have been described as "high quality" standards compared to local accounting standards (as evidenced by the IASC's Improvements Project and IOSCO's endorsement), and there is consistent evidence on positive effects of IFRS adoption on capital market outcomes such as liquidity and cost of capital (Daske et al., 2008). The puzzling results could be due to increased idiosyncratic imperfections offsetting reduced systematic imperfections after IFRS adoption or vice versa.

some underestimate discount rates in the calculation of pension expense), the aggregation approach I use can purge the impact of idiosyncratic imperfections, thus isolating the potential impact of IFRS adoption on reporting imperfections that are common to all reporting firms (e.g., the error from not reporting an accrual-based measure of pension expense at all). Put another way, relative to predecessor country-specific reporting, which also contains common and idiosyncratic errors, the aggregation design enables me to infer whether IFRS adoption reduces common measurement imperfections. If it does, my analytical analysis, described in section 2.1, suggests that the predictive ability of aggregate accruals for one-period-ahead GDP change would improve after IFRS adoption.

I use accounting, market, and macroeconomic data from 34 countries from 1991 to 2011 to test for effects of IFRS adoption on the measurement and recognition of firms' fundamentals, as measured by a change in the informativeness of current period aggregate accounting accruals for future GDP change. By informativeness, I mean the reduction of imperfections in the accruals recognized by applying a given set of accounting standards, with respect to the ability of accruals to capture forward-looking information about real economic activity. I focus on GDP change because it is unaffected

by IFRS and is the most comprehensive measure of a country's economic activity.[6] Corporate earnings are part of GDP (e.g., at least 10 percent worldwide; McKinsey and Company 2015) and explain a significant portion of variability in GDP change (e.g., up to 40 percent in the U.S.; Konchitchki and Patatoukas 2014a). In Europe, a report by the European Central Bank indicates that "the sources of listed firms' revenues mirror, to some extent, the composition of GDP" and both nominal corporate earnings and GDP change fluctuate in a similar way (ECB 2007, p. 43-44). Using five countries (France, Germany, Japan, the U.K., and the U.S.) over the period 1983-1997, Guenther and Young (2000) also show that differences in the characteristics of a country's financial accounting standards, due to differences in legal systems and the demand for accounting information, affect the relation between aggregate earnings and GDP change.

I conduct my main empirical analysis at the country-year level. The fact that countries adopted IFRS in different years (i.e., staggered timing) enables me to employ an aggregate-level difference-in-differences analysis. Specifically, I compare the

[6] Based on my reading of GDP calculations for my sample countries (e.g., Handbook of System of National Accounts (2008) from United Nations and the World Bank's Data Methodologies), I do not find any evidence that the measurement of GDP change is affected by changes in accounting standards. I use GDP data from the World Bank, which claims that they attempt to present GDP data that are consistent in definition, timing and methods. GDP "is measured consistently in that the technical definition of GDP is relatively consistent among countries" (Kumar et al., 2011, p. 241). For example, over the period 1992 to 2012, the difference in GDP change for the OECD countries according to the old System of National Accounts as compared to GDP change measured according to the latest estimates is within the boundaries of +/− 0.1 percentage point (Van de Ven, 2015). With regard to GDP estimates, they "involve (1) the use of sampling and projection techniques to estimate the number of goods, services, and structures produced, and (2) assigning a value to this output" (Guenther and Young, 2000, p. 63).

correlation between aggregate accruals and one-year-ahead GDP change for 25 adopting countries (the treatment group) before and after the adoption of IFRS (the first difference) with contemporaneous changes in the same correlation for 9 countries that did not adopt IFRS (the control group) in the same year (the second difference). I find an increased correlation between aggregate accruals and one-year-ahead GDP change for the IFRS-adoption group, as compared to the non-adoption group, in the post-adoption period. This effect is robust to controlling for macroeconomic indicators and country- and year-fixed effects, and is not sensitive to the weighting scheme (i.e., value-weighted and equal-weighted accruals show qualitatively similar results). Specifically, a one-standard-deviation increase in aggregate accruals is associated with a 1.8 to 2.3 percentage point increase in one-year-ahead nominal GDP change for a IFRS-adopting country compared to a non-adopting country in the post-IFRS period.[7]

In additional analyses, I find that the improved predictive ability of aggregate accruals for GDP change comes from the improved predictive ability of accruals for one-year-ahead aggregate earnings and cash flows, which form part of GDP as corporate profits, and for one-year-ahead change in corporate investment and unemployment rate,

[7] I focus on nominal GDP change because accounting earnings, accruals, and cash flows are not adjusted for inflation in most countries, and because nominal GDP, which weights both output and prices, attracts attention from the media and investors. For example, a monetary policy of targeting nominal GDP change to keep nominal income on a smooth path has long been discussed by economists (e.g., Hayek 1935; Hall and Mankiw 1994; Bernanke and Mishkin 1997). Investment (financial) analysts also advocate nominal GDP because focusing on nominal GDP helps smooth real output fluctuations, especially in adverse economic conditions (e.g., in recessions, real outputs fall and prices tend to adjust more slowly; Goldman Sachs Global ECS Research 2011; O'brien 2012).

factors related to GDP change. Consistent with these findings, I also find that aggregate accruals' explanatory ability for the variance of one-year-ahead aggregate cash flows is increased after IFRS adoption.[8] Finally, the main results are more pronounced for adopting countries with greater differences between local Generally Accepted Accounting Principles (GAAP) and IFRS and for adopting countries with stronger enforcement. These results imply that IFRS adoption enables aggregate accruals to better reflect firms' underlying fundamentals, particularly with regard to one-period-ahead production of goods and services, relative to IFRS-adopting countries' previous reporting standards.

An alternative explanation for my results is that the improved predictive ability of aggregate accruals for one-year-ahead GDP change stems from changes in economic fundamentals that coincide with IFRS adoptions. For example, the timing of IFRS adoption may be endogenous if countries adopt IFRS when they expect fundamentals to be more predictable. If that were the case, I should also find an increased predictive ability of aggregate cash flows for GDP change. However, I find no evidence that the predictive ability of aggregate cash flows for one-year-ahead GDP change increases after IFRS adoption. Inferences are similar when using a component of GDP (corporate profits) and factors related to GDP change (change in corporate investment and unemployment rate).

[8] By explanatory ability, I mean statistical explanatory power or r-squared in a regression framework.

There is also no change in aggregate cash flows' explanatory ability for the variance of one-year-ahead aggregate cash flows before and after IFRS adoption. Based on the view that the ability of aggregate cash flows to reflect fundamentals is not affected by accounting standards, these findings suggest that the improved predictive ability of aggregate accruals for GDP change is less likely related to changes in economic fundamentals and more likely due to the impact of better measurement and recognition of economic fundamentals under IFRS.

My results make three distinct and related contributions. First, I provide evidence that a change in accounting standards can reduce inherent-to-the-standards measurement imperfections in accruals that affect most (or all) firms that apply those standards. Specifically, my results support the view that mandatory changes in reporting standards affect the ability of aggregate accruals to capture forward-looking information about real economic activity. This evidence supports the importance of reporting standards, as distinct from firm-specific implementation decisions in applying standards, in the provision of information with economy-wide implications. Stated another way, the results of this study are consistent with Zhang's (2013) theoretical conjecture, in that my results imply that accounting standards, and changes in standards, play a role in the amount of, and changes in, systematic information risk in an economy.

Second, my study complements research that investigates the effects of IFRS adoption. My study distinguishes between systematic imperfections (i.e., common error)

and idiosyncratic imperfections (i.e., idiosyncratic error) inherent in measurements obtained from applying a given set of accounting standards. My research design enables me to isolate the effect of IFRS adoption on common financial reporting errors in the adopting country. My results suggest that IFRS adoption improves accounting quality, in particular, by reducing systematic imperfections in the measurement of accruals.

Finally, my study contributes to the growing literature that examines the information in aggregate earnings. My results point to accounting standards as an economy-wide factor that can improve the association between the accrual component of aggregate earnings and one-period-ahead GDP change. Although the relation between aggregate earnings and GDP change has been documented (e.g., Konchitchki and Patatoukas 2014a; 2014b), research has not examined the role of accounting standards in this relation, in particular, whether a change in accounting standards improves the informativeness of aggregate accruals, in terms of the ability of aggregate accruals to capture real economic activities. My analyses focus on the accrual component of aggregate earnings, not earnings *per se*, because the application of accounting standards, and a change in these standards, would be expected to affect accruals, not cash flows. My findings therefore suggest that IFRS adoption improves the macroeconomic information contained in aggregate accruals by improving the ability of aggregate accruals to capture the economy-wide non-cash component of real activity. The forward-looking information about aggregate fundamentals reflected in aggregate accruals has implications for policy

and resource allocation decisions (Ball et al., 2008; Ball et al., 2009; Zhang, 2013), including firms' production, investment and employment decisions (Konchitchki and Patatoukas 2014a; Kothari et al., 2015; Jorgensen et al., 2012; Kalay et al., 2016).

The paper is organized as follows. Section 2 describes the conceptual framework for my analysis and related literature. Section 3 describes the sample construction and research design. Section 4 presents the main results. Additional analyses are described in Section 5, and Section 6 concludes.

2. Conceptual Framework and Related Literature

2.1 Conceptual Framework

I use a simple analytical framework to present my predictions about the effects of a mandatory change in accounting standards on aggregate accruals' predictive ability for one-period-ahead GDP change. Consider a publicly traded firm i in country c whose (unobservable) true economic profitability $X_{c,i,t+1}$ is determined by a first-order autoregressive (AR(1)) process,

$$X_{c,i,t+1} = \beta X_{c,i,t} + \epsilon_{c,i,t+1}$$

where $\epsilon_{c,i,t+1} \sim N(0, \sigma^2_{\epsilon_{c,i}})$ and $\beta > 0$ is the true underlying parameter. We observe a reported accounting performance metric $y_{c,i,t}$ (e.g., accounting earnings), a noisy indicator of $X_{c,i,t}$. That is,

$$y_{c,i,t} = X_{c,i,t} + \varepsilon_{c,i,t}$$

where $\varepsilon_{c,i,t}$ is independent of $X_{c,i,t}$ and $\epsilon_{c,i,t+1}$. The measurement error ($\varepsilon_{c,i,t}$) consists of: (1) $\eta_{c,t}$, imperfections in measurement common to all firms that apply the same accounting standards; and (2) $\delta_{i,t}$, imperfections in measurement idiosyncratic to a firm's reporting practices, including random errors in accruals. These two types of measurement errors cause imperfections in the ability of earnings to capture true economic activity:

$$\varepsilon_{c,i,t} = \eta_{c,t} + \delta_{i,t}$$

where $\eta_{c,t} \sim N(0, \sigma^2_{\eta_{c,t}})$, $\delta_{i,t} \sim N(0, \sigma^2_{\delta_{i,t}})$, and $COV(\delta_i, \delta_j) = 0 \; \forall \; i \neq j$. Based on the view that a change in accounting standards affects the measurement of accruals, not cash flows, I assume that the cash flow component of earnings is not subject to measurement error induced by accounting standards, and that measurement error in earnings with respect to $X_{c,i,t}$ is entirely in accruals.

I use this framework to consider: (1) firm-level analysis to infer the effects of a change in accounting standards on the accounting performance metric $y_{c,i,t}$ and (2) aggregate analysis to infer the effects of a change in accounting standards on the economy-wide accounting performance metric $\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}$.

Case 1: Firm-level analysis to infer the effects of a change in accounting standards on the accounting performance metric

One approach to examine the effects of a change in accounting standards is to regress firm-specific one-period-ahead stock return, earnings, or cash flows, as proxies for true economic profitability, on the accounting performance metric $y_{c,i,t}$ before and after the change. That is, $X_{c,i,t+1} = \beta X_{c,i,t} + \varepsilon_{c,i,t+1} \Rightarrow X_{c,i,t+1} = \beta(y_{c,i,t} - \eta_{c,t} - \delta_{i,t}) + \varepsilon_{c,i,t+1}$ given that $y_{c,i,t} = X_{c,i,t} + \eta_{c,t} + \delta_{i,t}$. In an errors-in-variables framework, measurement errors in the independent variable cause the estimated slope coefficient $\hat{\beta}$ to be biased towards zero (attenuation bias). A change in the estimated coefficient $\hat{\beta}$ after a change in accounting standards could be due to the effects of the standards on

imperfections common to all firms $\eta_{c,t}$ and/or imperfections idiosyncratic to firm-level reporting practices $\delta_{i,t}$.[9] Firm-level analysis therefore provides results that are consistent with three interpretations: the effects of a change in accounting standards could stem from how that change (1) alters accruals imperfections common to all firms, (2) alters imperfections from firm-level reporting practices, or (3) both.

Case 2: Aggregate analysis to infer the effects of a change in accounting standards on the economy-wide (aggregated) accounting performance metric

Given that $y_{c,i,t} = X_{c,i,t} + \eta_{c,t} + \delta_{i,t}$, the aggregation process (i.e., aggregating firm-specific accounting metrics) yields the following equation:

$$\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c} = \frac{\sum_{i=1}^{N_c} X_{c,i,t}}{N_c} + \eta_{c,t} + \frac{\sum_{i=1}^{N_c} \delta_{i,t}}{N_c}$$

As the number of firms in a country, N_c, increases, the variance of the firm-specific errors ($\frac{\sum_{i=1}^{N_c} \delta_{i,t}}{N_c}$) approaches zero, meaning that for an economy with many firms, the firm-specific measurement error $\delta_{i,t}$ is (nearly) averaged out. An aggregate analysis can then proceed as follows:

$$X_{c,i,t+1} = \beta X_{c,i,t} + \epsilon_{c,i,t+1}$$

$$\Leftrightarrow \frac{\sum_{i=1}^{N_c} X_{c,i,t+1}}{N_c} = \beta \frac{\sum_{i=1}^{N_c} X_{c,i,t}}{N_c} + \frac{\sum_{i=1}^{N_c} \epsilon_{c,i,t+1}}{N_c} \quad (1)$$

[9] The variances of $\eta_{c,t}$ and $\delta_{i,t}$ are unobservable.

Using GDP change at t+1 ($GDPG_{c,t+1}$) as a proxy for the true economic profitability of listed firms in a country c, ($\frac{\sum_{i=1}^{N_c} X_{c,i,t+1}}{N_c}$),[10] and $\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c} = \frac{\sum_{i=1}^{N} X_{c,i,t}}{N_c} + \eta_{c,t}$, equation (1) can be rewritten as follows:[11]

$$GDPG_{c,t+1} = \beta\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c} - \eta_{c,t}\right) + \frac{\sum_{i=1}^{N_c} \epsilon_{c,i,t+1}}{N_c} = \beta\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right) + v$$

where the aggregate measurement error $v \equiv -\beta\eta_{c,t} + \frac{\sum_{i=1}^{N_c} \epsilon_{c,i,t+1}}{N_c}$. From this equation, it can be shown that $COV\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}, v\right) = -\beta\sigma^2_{\eta_{c,t}} \neq 0$ (see Part 1 of Appendix B). This result implies that the covariance between the covariate ($\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}$) and the aggregate measurement error (v) is determined by the variance of the common measurement error ($\sigma^2_{\eta_{c,t}}$). That is, the greater the variance of the common measurement error ($\sigma^2_{\eta_{c,t}}$), the more severe is the attenuation bias in the estimated coefficient ($\hat{\beta}$).

[10] The idea is that the higher the collective true economic profitability of the listed firms is, the higher is the GDP change. This idea is consistent with approaches in Hirshleifer et al. (2009) and Kang et al. (2010) in their regressions of aggregate stock returns (as a proxy for true economic profitability of listed firms) on aggregate accruals and aggregate cash flows.

[11] I use GDP as an indicator for economy-wide production-based outcomes, rather than other macro indicators such as aggregate stock market returns. GDP captures a primitive aspect of fundamental economic activities because it is a calculated measure of the change in wealth in a country, whereas stock market returns capture both the change in economic activities and investors' understanding and expectations of such a change, and the measurement of GDP is unaffected by accounting standards. Stated another way, stock returns are affected by the degree of market efficiency and investors' expectations, and can be potentially affected by changes in accounting standards. In contrast, GDP change reflects changes in current production and demand in the economy (from the last period), allowing me to examine the relation between aggregate accruals and the aggregate economy without complicating the analysis with investors' expectations, which do not always align with the state of the economy (Shiller, 2014). In addition, although the correlation coefficient between GDP change and one-period-lagged equal-weighted (value-weighted) stock returns is 0.31 (0.21), the correlation coefficient between GDP change and current period equal-weighted (value-weighted) stock returns is 0.03 (0.04). Therefore, it is unclear whether results using GDP change would be similar to results using aggregate stock returns. Nonetheless, in untabulated analyses, I obtain qualitatively similar results when I use current-period aggregate stock returns, instead of one-period-ahead GDP change, as a dependent variable.

The OLS estimator for β converges in probability (i.e., $p\lim\hat{\beta}_{OLS}$) as shown in equation (2). The operator $p$lim can be construed as showing the result of estimating β in a large sample (see Part 2 of Appendix B):

$$p\lim\hat{\beta}_{OLS} = \frac{COV\left(GDPG_{c,t+1}, \frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)}{VAR\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)} = \beta\left(1 - \frac{\sigma_{\eta_{c,t}}^2}{VAR\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)}\right) \quad (2)$$

Let the denominator of the equation (2) be:

$$\sigma_{\bar{X}_c}^2 \equiv VAR\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right) = \frac{1}{N_c^2(1-\beta^2)}\sum_{i=1}^{N_c}\sigma_{\epsilon_{c,i}}^2 + \sigma_{\eta_{c,t}}^2 \quad (3)$$

From equations (2) and (3), it can be shown that when N_c is large,

$$\hat{\beta}_{OLS} \sim \beta\left(1 - \frac{\sigma_{\eta_{c,t}}^2}{\sigma_{\bar{X}_c}^2 + \sigma_{\eta_{c,t}}^2}\right) = \beta\left(1 - \frac{\sigma_{\eta_{c,t}}^2}{2\sigma_{\eta_{c,t}}^2 + \frac{1}{N_c^2(1-\beta^2)}\sum_{i=1}^{N_c}\sigma_{\epsilon_{c,i}}^2}\right)$$

Details are in Part 3 of Appendix B. Because the signal-to-total-variance ratio or the attenuation factor $\left(1 - \frac{\sigma_{\eta_{c,t}}^2}{\sigma_{\bar{X}_c}^2+\sigma_{\eta_{c,t}}^2}\right) = \left(\frac{\sigma_{\bar{X}_c}^2}{\sigma_{\eta_{c,t}}^2+\sigma_{\bar{X}_c}^2}\right)$ lies between 0 and 1, and because the last term of the denominator $(\frac{1}{N_c^2(1-\beta^2)}\sum_{i=1}^{N_c}\sigma_{\epsilon_{c,i}}^2)$ does not vary over time, the attenuation bias on the estimated coefficient $\hat{\beta}$ is affected over time only by a change in the variance of the common measurement error $(\sigma_{\eta_{c,t}}^2)$. Specifically, a first-order derivative of the signal-to-total-variance ratio with respect to $\sigma_{\eta_{c,t}}^2$ shows that the higher the variance of the common measurement error $\eta_{c,t}$, the more severe is the attenuation bias in the estimated coefficient $\hat{\beta}_{OLS}$ (i.e., $\hat{\beta}_{OLS} < \beta$) (see Part 4 of Appendix B). Therefore, after a change in

accounting standards, a change in the estimated coefficient $\hat{\beta}$ from a regression of GDP change on the aggregate accounting performance metric ($\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}$) can identify the extent to which the new accounting standards affect reporting imperfections common to all reporting firms, which I measure as the variance of the common measurement error ($\sigma^2_{\eta_{c,t}}$).

This leads to the following prediction: *If mandatory IFRS adoption reduces the variance of reporting imperfections common to all firms in an economy, as compared to the variance resulting from applying local accounting standards, the estimated coefficient* $\hat{\beta}$ *will be greater after IFRS adoption, as compared to before IFRS adoption (i.e.,* $\hat{\beta}_{POST-IFRS} > \hat{\beta}_{PRE-IFRS}$*).*

I assume that the common error arises from the characteristics of accounting standards, either directly or indirectly, and that the variance of the common measurement error is affected by a change in accounting standards, because an accounting standard is an economy-wide factor that affects all firms in an economy and, by definition, the common error can be altered only by an economy-wide factor (Gao and Verrecchia, 2012). Here is an example of a direct effect of a change in accounting standards using defined benefit pension arrangements. Prior to IFRS adoption, many countries—including Finland, Greece, and Italy—permitted pay-as-you-go accounting for pension expense, which is essentially cash-basis accounting. After IFRS adoption, IAS 19 requires firms to estimate pension expense on an accrual basis. To the extent accrual-basis accounting is conceptually superior to cash-basis accounting, the difference in the

ability of accruals versus cash flows to capture the true economic cost of pension expense is an example of a direct effect of a change in accounting standards on the common error. That is, before IFRS adoption, there was no meaningful measurement of defined benefit pension obligations and related pension expense, whereas after IFRS adoption, the accrual-basis measurement of defined benefit pension obligations and related expense reduces noise in the common error in terms of reflecting true economic profitability, reducing the variance of the common error. An example of an indirect effect of a change in accounting standards on the common error would be across-firm correlation in errors in estimating discount rates for pension expense, which would constitute part of the common error associated with implementing IAS 19. This type of indirect effect of accounting standards operates through managers' implementation decisions, which are in turn affected by incentives.

Although I do not specify the source and nature of common errors, I consider what happens when some of the common error arises from shared incentives across firms in an economy, rather than solely from direct effects of accounting standards. There are two cases to consider. First, if some of the common error arises from shared incentives but the variance of this portion of the common error does not change with IFRS adoption, then the incentive effect does not matter for my study because any change in the variance of the common error can be attributed to accounting standards.

Second, if some of the common error arises from shared incentives and the variance of this portion of the common error changes after IFRS adoption, then a change in the variance of the common error after IFRS adoption cannot be attributed to the adoption of different accounting standards *per se*. In this case, however, I expect the common error arising from shared incentives would work against my alternative hypothesis, which states that IFRS adoption reduces the variance of the common error inherent in the financial reporting system in measuring firms' true economic performance. For example, if a new accounting standard induces all managers to manipulate earnings upward, that systematic upward bias in earnings or accruals would be part of the common error. In this case, the result of the common incentive would be an increase in the variance of the common error because the incentive-induced behavior would make financial reporting outcomes including earnings and accruals more opaque. That is, a systematic incentive would increase the noise in the common error, with regard to its ability to reflect true economic profitability, thereby increasing the variance of the common error, working against finding a result under the alternative hypothesis.

2.2 Related Literature

While research supports the existence of positive capital market consequences of voluntary or mandatory IFRS adoption, research on the financial reporting outcomes of IFRS adoption shows mixed evidence. For example, Landsman et al. (2012) show that after mandatory IFRS adoption, the information content of earnings (measured by

abnormal returns and trading volume around earnings announcements) improved, and Daske et al. (2008) document increased market liquidity and reduced cost of capital for both voluntarily adopting firms and mandatorily adopting firms, although results are more pronounced for the former group. With regard to financial reporting outcomes, Barth et al. (2008) report that the quality of financial reporting outcomes, measured by the contemporaneous correlation between accruals and cash flows or the volatility of earnings scaled by the volatility of cash flows, improves after voluntary IAS/IFRS adoption. In contrast, Ahmed et al. (2013) and Christensen et al. (2015) find decreased reporting quality (using measures similar to Barth et al.'s) among firms that mandatorily adopted IFRS. "These two sets of findings appear to be at odds," given that positive capital market effects are assumed to occur because IFRS adoption causes better reporting quality (Bruggemann et al., 2013, p.2).

In the context of this mixed evidence, my analytical framework delineates two potentially separable effects on financial reporting outcomes after IFRS adoption (i.e., effects on systematic imperfections and effects on idiosyncratic imperfections). Previous research has not considered these two effects separately. I conjecture that the mixed evidence could be due to a reduction of systematic imperfections being offset by an increase in idiosyncratic imperfections or vice versa, depending on the characteristics of firms examined in previous firm-level studies. The objective of my aggregate analysis is

to examine the effects of IFRS adoption on accounting numbers that are less affected or unaffected by firm-specific factors.[12]

Research at the firm-level indicates that the accrual component of earnings captures firm performance better than the cash flow component (e.g., Dechow 1994). In particular, Barth et al. (2001, 2016) show that accruals predict future cash flows because accruals capture information about management's expected future investments in operating assets, in addition to future cash receipts and cash payments related to past transactions. In other words, firm-level accruals contain forward-looking information about firm-level real economic activities (e.g., investment).

Whether accruals aggregated across listed firms in an economy provide forward-looking information about aggregate real activities is an empirical question. Although accounting information aims to reflect the effects of a reporting entity's real activities, aggregating the amounts across entities may not result in a faithful representation of total activity in the corporate sector (Concepts Statement No.2, FASB 1980, par. 71).[13] Also,

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[12] It is unreasonable to assume that managers' incentives are entirely firm-specific. However, it seems reasonable to assume that all managers have a common incentive to increase their compensation. This common incentive does not, however, result in a single directional prediction with regard to the effect on earnings. That is, some managers may prefer income-increasing accruals management (e.g., to beat analysts' consensus EPS forecast), while other managers may prefer income-decreasing accruals management (e.g., big bath). Also, it is hard to believe that such common incentives change drastically around IFRS adoptions. Finally, in Table 12, I find no evidence that an increase in substantive enforcement (the indicator variable used in Christensen et al. (2013)) affects the predictive ability of aggregate accruals for one-year-ahead GDP change.

[13] In contrast to the conjecture made in the FASB's conceptual framework, prior studies including Konchitchki and Patatoukas (2014a; 2014b) show evidence that aggregate accounting earnings are a good proxy for corporate profits, predict GDP change up to 4 quarters ahead, and explain significant variation in one-period-ahead GDP change (up to 40 percent).

prior research suggests that firm-level associations do not necessarily hold at the aggregate level (Ball and Sadka, 2015). For example, Kothari et al. (2006) show that the well-documented positive relation between firm-level earnings surprises and stock returns does not hold at the aggregate-level; rather, aggregate earnings surprises are negatively associated with aggregate stock market returns. They also find no evidence of post-earnings announcement drift in aggregate returns. In addition, at the firm level, there is evidence that the level of accruals is a negative cross-sectional predictor of (abnormal) stock returns (Sloan, 1996) and that the level of cash flows is a positive cross-sectional predictor of returns (Desai et al., 2004; Pincus et al., 2007). However, Hirshleifer et al. (2009) document opposing findings using aggregate data. That is, they show that aggregate accruals positively predict aggregate stock returns and aggregate cash flows negatively predict aggregate stock returns. In light of this stream of research, whether effects of accounting standards at the firm-level also apply at the aggregate level is an empirical question.

With regard to GDP or Gross National Product (GNP) forecasting, the literature appears to disagree on whether GDP or GNP follows a random walk and is therefore not predictable. From a theoretical side, standard real business cycle (RBC) models typically conjecture that GDP or GNP is close to a random walk if the process for technology innovation is a random walk. These models traditionally assume that the process for technology innovation corresponds to the Solow residual as the measure of short-term

technological progress in the data, which itself looks similar to a random walk (Cogley and Nason, 1995).[14] However, one of the key criticisms of RBC models is that the Solow residual is poorly measured. If the Solow residual measures what RBC models purport it should measure, then the residual should be uncorrelated with world oil price movements, the political party of the incumbent president, and military spending. Yet, it is correlated with all three (Hall, 1989).

Empirically, over-time changes in GDP or GNP are not visually similar to a random walk; the (log) change of GDP or GNP on a quarterly or annual basis has some positive serial correlation. For example, Cochrane (1988) shows that about one-third of the variance of yearly GNP growth rates is related to the innovation variance of the random walk component of GNP, suggesting a significant portion of GNP growth is predictable. Perron (1989) also shows that a test using U.S. real GDP data from 1909 to 1970 rejects the stochastic trend hypothesis in favor of the deterministic alternative. More recently, Ben-David and Papell (1995) find that tests based on a sample of 16 countries over 1870 to 1989 strongly reject the stochastic trend hypothesis in favor of a deterministic trend without any breaks.[15]

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[14] Specifically, the RBC models posit that the long run path of an economy is mainly guided by real factors such as technological changes and that aggregate economic output including GDP and GNP can be characterized by permanent productivity shocks resulting from technological changes that are assumed to be randomly generated every observation period.

[15] The 16 countries are similar to my sample countries and include Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Norway, Sweden, Switzerland, the Netherlands, the U.K., and the U.S.

Using tests based on more data, the weight of the evidence suggests that GDP or GNP growth contains a significant predictable component; that is, it can be predicted using other macro indicators. For example, Ang et al. (2006) show that the yield curve, defined as the difference between the 5-year zero coupon bond rate and the 3-month Treasury bill rate, predicts the log of U.S. GDP growth up to 4 quarters ahead. Using 9 countries including Australia, Canada, Germany, Italy, Japan, Switzerland, the Netherlands, the U.K., and the U.S., Liew and Vassalou (2000) find that the profitability of investing based on the High-Minus-Low (HML) factor and the Small-Minus-Big (SMB) factor predicts one-period-ahead GDP growth.

The link between aggregate accounting information and the macroeconomy is analyzed by Konchitchki and Patatoukas (2014a) who find that aggregate accounting earnings growth is informative for next-period GDP growth, incremental to other macroeconomic indicators including Treasury yields, term spreads, stock market returns, contemporaneous GDP growth, and the current-period consensus forecast of one-period-ahead GDP growth. Konchitchki and Patatoukas (2014b) also find that firm-level accounting profitability aggregated across the 100 largest firms (by market capitalization) has predictive ability for one-quarter-ahead GDP growth. Nallareddy and Ogneva (2017) find that earnings dispersion predicts errors in GDP estimates from the Bureau of Economic Analysis. These studies use aggregate earnings or dispersion, or aggregate profit margins as their main predictor, and do not analyze which component of aggregate

earnings (aggregate accruals or aggregate cash flows, or both) has predictive ability. Also, in contrast to these studies that investigate the attributes of aggregate earnings *per se*, I use the accrual component of aggregate earnings as a proxy for the unobservable economic performance that the accounting system measures with error to investigate whether a change in accounting standards affects economy-wide imperfections in accounting measurement.

My study is related to research by Guenther and Young (2000), Zhang (2013), and Lin and Nienhaus (2015).[16] Using five countries (France, Germany, Japan, the U.K., and the U.S.) over the period 1983-1997, Guenther and Young (2000) find evidence that differences in the characteristics of a country's financial accounting standards affect the contemporaneous relation between aggregate earnings and GDP change. They find that aggregate earnings of U.K. and U.S. firms are more closely related to underlying economic activity (measured by GDP change) than aggregate earnings of French and

[16] Jorgensen et al. (2011) also examine whether changes in accounting standards affect the relation between aggregate earnings and macro-indicators by investigating the contemporaneous relation between aggregate earnings and both aggregate stock returns and GDP growth before and after the inception of the FASB as the U.S. accounting standard setter. Using about 200 firms in the pre-FASB period and about 1000 firms in the post-FASB period from 1953 to 2006, they find no evidence that the contemporaneous relation has changed with the inception of the FASB. Nor did they find that informational properties of aggregate earnings (e.g., asymmetric timeliness or smoothness) have changed after the FASB began setting U.S. GAAP in 1973. My study differs from Jorgensen et al. in that I focus on the effects of a wholesale change in accounting standards on aggregate accruals, not earnings *per se*, based on the view that systematic imperfections in accruals measurements are most likely to be affected by changes in accounting standards. Also, my analytical framework suggests examining the predictive ability of aggregate accruals for one-period-ahead economic activity, rather than the contemporaneous relation between aggregate earnings and economic activity, based on the view that accruals are estimates of current as well as future supply and demand. Finally, in contrast to Jorgensen et al., Zhang (2013) provides theoretical evidence that imperfections in accounting measurement do not diversify away at the aggregate level. My findings are consistent with Zhang's theoretical conjecture.

German firms, for example, due to differences in the demand for accounting information, legal systems, and the degree of book-tax conformity.

Zhang (2013) demonstrates theoretically that insofar as improvements in accounting standards can reduce systematic accounting measurement errors, the resulting improvements in information quality lower firms' costs of capital, thus spurring investment and other activities that trigger an expansion in the real economy. Using German firms with reporting choices among IFRS, German GAAP, and U.S. GAAP, Lin and Nienhaus (2015) show that IFRS-adopting firms have lower risk premiums relative to firms that choose to report using either German GAAP or U.S. GAAP.

Evidence on whether an improvement in accounting standards can reduce systematic accounting measurement errors (the necessary condition for accounting standards to affect systematic risk in Zhang (2013)) is lacking. I use a cross-country sample to study the effects of IFRS adoption, and provide results of cross-country analyses, as opposed to single country analyses. Furthermore, IFRS adoption is a discrete event, while changes in local accounting standards are frequent, making it hard to find a benchmark period free from accounting standard changes. The range of institutional settings in my 34-country sample permits comparisons in the strength of the relation between IFRS adoption and aggregate accruals' ability to predict GDP change based on, for example, the distance between local GAAP and IFRS.

3. Sample and Research Design

3.1 Sample and Data Description

I collect accounting and market data from Thomson Reuter's Datastream Advance database (accounting data from WorldScope and market statistics from Datastream) during 1991-2011 for firms with December fiscal year-ends.[17] I obtain annual GDP data from the World Bank and other macro indicator variables from the World Bank, the Organization for Economic Co-operation and Development (OECD), and the International Monetary Fund (IMF). Variable descriptions are in Appendix A.

I require firm-year observations to have the necessary income statement and balance sheet data to calculate accruals and cash flows, and to have stock market capitalization data as of the beginning of each year t to calculate value-weighted averages of aggregate accounting variables. Following Christensen et al. (2013), I exclude cross-listed firms in IFRS-adopting countries that follow U.S. GAAP, and any country with fewer than 50 firms and fewer than 500 firm-year observations in the sample period.[18] Aggregate-level variables are estimated using 188,972 firm-year observations from 34

[17] "The December fiscal-year end requirement avoids temporal misspecification due to different reporting and different cumulation periods of annual earnings" (Sadka and Sadka, 2009, p. 91).

[18] The results are not sensitive to restricting the sample to countries with more than 25, 75, or 100 firms and/or 300 firm-year observations. Also, the results are not sensitive to the exclusion of China, Japan, or the U.S.

countries, of which 25 adopted IFRS during the period 2003 through 2011. Table 1 reports the frequency of observations and the year of IFRS adoption by country.[19]

Table 1: Sample by Country

COUNTRY	N	%	IFRS	COUNTRY	N	%	IFRS
AUSTRALIA	1,207	0.64	2005	MALAYSIA	5,420	2.87	N/A
AUSTRIA	938	0.50	2005	MEXICO	2,152	1.14	N/A
BELGIUM	1,664	0.88	2005	NETHERLANDS	2,731	1.45	2005
BRAZIL	3,924	2.08	2010	NORWAY	2,533	1.34	2005
CANADA	9,433	4.99	N/A[20]	PERU	965	0.51	N/A
CHILE	2,277	1.20	2009	PHILIPPINES	1,523	0.81	2005
CHINA	16,330	8.64	N/A	POLAND	2,043	1.08	2005
DENMARK	1,693	0.90	2005	PORTUGAL	618	0.33	2005
FINLAND	1,801	0.95	2005	SINGAPORE	3,630	1.92	2003
FRANCE	8,783	4.65	2005	SOUTH KOREA	12,235	6.47	2011
GERMANY	8,218	4.35	2005	SPAIN	2,034	1.08	2005
GREECE	3,263	1.73	2005	SWEDEN	4,277	2.26	2005
HONG KONG	5,559	2.94	2005	SWITZERLAND	2,775	1.47	2005
INDONESIA	3,372	1.78	N/A	THAILAND	4,927	2.61	N/A
ISRAEL	2,917	1.54	2008	TURKEY	2,349	1.24	2006
ITALY	3,215	1.70	2005	UNITED KINGDOM	9,886	5.23	2005
JAPAN	3,521	1.86	N/A	UNITED STATES	50,759	26.86	N/A
				TOTAL	188,972	100	

Table 1 presents the frequency of firm-year observations (N), the percentage of a country's firm-year observations relative to total observations (%) and the year of IFRS adoption by country (IFRS). For the non-adopting countries, IFRS is set to non-adopter (NA).

3.2 Estimation of Aggregate Earnings, Aggregate Accruals, and Aggregate Cash Flows

This section describes the construction of the aggregate accounting variables. My main results use equal-weighted averages of earnings, accruals, and cash flows

[19] My sample observations (188,982 firm-year observations with just under 9,000 unique firms) and my sample period (from 1991 to 2011) are larger and longer than those of most firm-level studies. For example, Atwood et al. (2011) use 58,832 firm-year observations from 33 countries over 2002-2008; Yip and Young (2012) use 2,562 unique firms from 17 countries over 2002-2007; Landsman et al. (2012) use 21,703 firm-year observations (6,067 unique firms) from 28 countries over 2002-2007; Lang et al. (2012) use 97,799 firm-year observations from 46 countries (including countries with less than 100 firm-year observations) over 1991-2007; Ahmed et al. (2013) use 8,155 firm-year observations from 20 countries over 2000-2007; and Christensen et al. (2013) use 613,752 firm-quarter observations (equivalent to 153,438 firm-year observations) over 2001-2009.

[20] Canada adopted IFRS effective 2011 for some entities, and deferred adoption for entities with rate-regulated activities (until 2015) and investment companies (until 2014). Inferences are similar when classifying Canada as an IFRS adoption country as of 2011 or when excluding Canada from the sample.

(EARNING(EW), ACCRUAL(EW), and CASHFLOW(EW), respectively).[21] The following shows the calculation of aggregate accounting variables, by country c and year t:

$$AGGREGATE_{c,t} = \sum_{i=1}^{N_c} \alpha_i \, y_{c,i,t}$$

where $y_{c,i,t} = \left\{ \left(\frac{NIBEX_{c,i,t}}{ATA_{c,i,t}}\right), \left(\frac{ACC_{c,i,t}}{ATA_{c,i,t}}\right), \left(\frac{CF_{c,i,t}}{ATA_{c,i,t}}\right) \right\}$;

α_i = equal-weight or value-weight $\left(\text{by market capitalization}_{c,i,t-1}\right)$;

$ATA_{c,i,t} = \frac{1}{2}(Asset_{c,i,t} + Asset_{c,i,t-1})$;

$NIBEX_{c,i,t}$ = Net income before extraordinary items;

$ACCRUAL_{c,i,t} = \Delta CA - \Delta CL - \Delta CASH + \Delta STDEBT - DEPN$;

$CF_{c,i,t} = NIBEX_{c,i,t} - ACCRUAL_{c,i,t}$;

ΔCA = firm i's change in current assets between year t-1 and t;

ΔCL = firm i's change in current liabilities between year t-1 and t;

$\Delta CASH$ = firm i's change in cash between year t-1 and t;

[21] Analysis of equal-weighted averages of accounting variables is based on the view that small firms' accounting information is as important as big firms' accounting information in terms of reflecting economic activities. Macroeconomic studies suggest that small businesses are the engines of economic growth and job creation, accounting for about half of GDP and employing about half the workforce, for example, in the U.S (Shepherdson, 2013). In particular, smaller firms are more sensitive to economic cycles than bigger firms (Gertler and Gilchrist, 1994). In sensitivity analyses, I use value-weighted averages of earnings, accruals, and cash flows using market capitalization in the beginning of year t (EARNING(VW), ACCRUAL(VW), and CASHFLOW(VW), respectively), consistent with Hirshleifer et al. (2009) and Kang et al. (2010). Following Konchitchki and Patatoukas (2014a; 2014b), I delete firm-year observations in the top and bottom one percentile of each annual cross-section of accruals and cash flows. Results are similar without these deletions or using either lagged total assets or book value of equity as scalars.

ΔSTDEBT = firm i's change in debt classified as current liabilities between year t-1 and t; and

DEPN = firm i's depreciation and amortization expense in year t.

Table 2 presents summary statistics for the variables used in the main analyses. The means of ACCRUAL(EW) and CASHFLOW(EW) are -0.040 and 0.052, respectively, and the means of ACCRUAL(VW) and CASHFLOW(VW) are -0.044 and 0.102, respectively. While the magnitudes of value-weighted variables tend to exceed the magnitudes of equal-weighted variables, magnitudes of value-weighted variables are qualitatively similar to magnitudes reported in Hirshleifer et al. (2009) and Kang et al. (2010).[22]

Table 2: Summary Statistics for Full Sample

	N	MEAN	SD	P5	P25	P50	P75	P95
EARNING(VW)	585	0.058	0.028	0.010	0.037	0.055	0.079	0.111
EARNING(EW)	585	0.013	0.036	-0.072	-0.004	0.019	0.038	0.063
ACCRUAL(VW)	585	-0.044	0.020	-0.080	-0.059	-0.045	-0.031	-0.008
ACCRUAL(EW)	585	-0.040	0.021	-0.078	-0.055	-0.039	-0.027	-0.003
CASHFLOW(VW)	585	0.102	0.032	0.045	0.079	0.102	0.124	0.163
CASHFLOW(EW)	585	0.052	0.035	-0.032	0.033	0.058	0.078	0.102
IFRS	585	0.241	0.428	0.000	0.000	0.000	0.000	1.000
GDPG	585	0.067	0.095	-0.111	-0.002	0.071	0.138	0.229
RETURN(VW)	585	0.138	0.311	-0.348	-0.066	0.143	0.305	0.645
RETURN(EW)	585	0.156	0.359	-0.373	-0.077	0.135	0.345	0.853
INFLATION	585	0.044	0.103	0.001	0.015	0.024	0.038	0.094
T-Bill	585	0.058	0.059	0.008	0.025	0.042	0.068	0.164
TERM	585	0.025	0.064	-0.019	0.002	0.014	0.024	0.118
UNEMPLOYMENT	585	0.015	0.173	-0.200	-0.085	-0.015	0.080	0.333

Table 2 reports summary statistics for the variables used in the main analyses. The sample period covers 1991 to 2011. Variable definitions are in Appendix A.

[22] Hirshleifer et al.'s (2009) and Kang et al.'s (2010) sample are U.S. firms, and Hirshleifer et al.'s sample mean (median) of value-weighted aggregate accruals and aggregate cash flows are -0.044 (-0.044) and 0.199 (0.199), respectively. Kang et al.'s sample mean (median) of value-weighted aggregate accruals and aggregate cash flows are -0.047 (-0.048) and 0.135 (0.116), respectively.

Table 3 shows descriptive statistics of the IFRS-adopter sample separately from those of the non-adopter sample. The indicator variable IFRS varies by country c and year t, so that the non-adopter sample also includes IFRS-adopting country-year observations before IFRS adoption. Tests for differences in means indicate that the two groups' macro-level characteristics are not statistically different at the 5 percent significance level, except for T-Bill and TERM. In particular, the main dependent variable GDPG is not statistically different between IFRS-adopters and non-adopters.

Table 3: Descriptive Statistics of the IFRS-Adopter Sample Compared to Non-Adopter Sample

	Treatment Group (IFRS = 1)				Control Group (IFRS = 0)				Test for Differences in Mean		
VARIABLES	N	MEAN	MEDIAN	SD	N	MEAN	MEDIAN	SD	DIFF	*t*-statistic	*p*-value
EARNING(VW)	141	0.068	0.068	0.026	444	0.054	0.051	0.028	-0.013	-5.054	0.000
EARNING(EW)	141	0.008	0.014	0.037	444	0.014	0.022	0.036	0.006	1.809	0.071
ACCRUAL(VW)	141	-0.042	-0.042	0.018	444	-0.045	-0.046	0.021	-0.003	-1.688	0.092
ACCRUAL(EW)	141	-0.037	-0.037	0.018	444	-0.042	-0.041	0.021	-0.005	-2.546	0.011
CASHFLOW(VW)	141	0.109	0.108	0.030	444	0.099	0.099	0.032	-0.010	-3.236	0.001
CASHFLOW(EW)	141	0.044	0.050	0.034	444	0.054	0.060	0.035	0.010	3.007	0.003
GDPG	141	0.073	0.080	0.088	444	0.066	0.067	0.097	-0.007	-0.784	0.433
RETURN(VW)	141	0.126	0.189	0.331	444	0.141	0.131	0.304	0.015	0.503	0.615
RETURN(EW)	141	0.129	0.179	0.382	444	0.164	0.131	0.351	0.035	1.012	0.312
INFLATION	141	0.059	0.023	0.170	444	0.040	0.025	0.070	-0.019	-1.954	0.051
T-Bill	141	0.035	0.027	0.037	444	0.065	0.045	0.062	0.030	5.417	0.000
TERM	141	0.010	0.010	0.023	444	0.030	0.015	0.072	0.020	3.323	0.001
UNEMPLOYMENT	141	0.002	-0.041	0.173	444	0.019	-0.004	0.172	0.017	1.031	0.303

Table 3 shows descriptive statistics of the IFRS-adopter sample, separately from those of the non-adopter sample. The sample period covers 1991 to 2011. Variable definitions are in Appendix A.

Consistent with this result, Figure 1 shows that before and after IFRS adoption, the two groups exhibit similar trends in changes in GDP. These findings imply that the IFRS-adopter sample (treatment group) and the non-adopter sample (control group) exhibit similar economy-wide growth rates over the sample period, supporting the parallel

trends assumption required for a difference-in-differences analysis (see Tables 11 and 15 for formal tests).

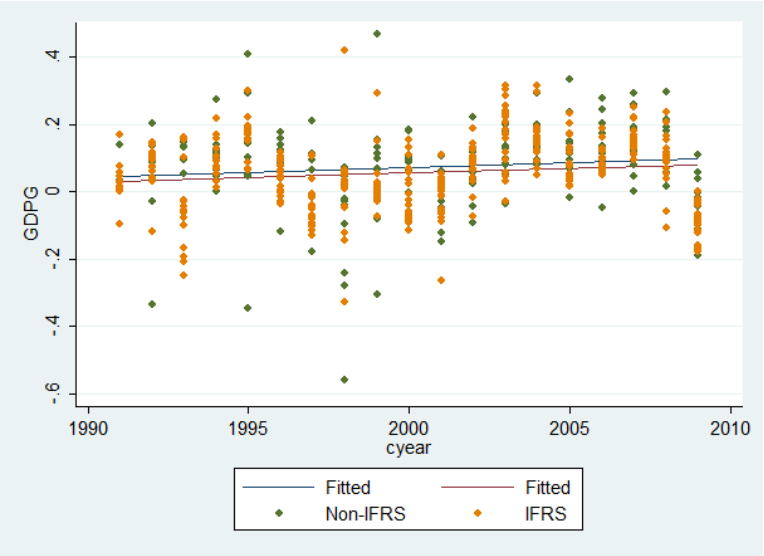

Figure 1: GDP Change for IFRS-Adopting Countries and Non-IFRS Adopting Countries

With regard to accounting variables, although the magnitudes of the differences in means for aggregate earnings, aggregate accruals, and aggregate cash flows are small (from -0.013 to 0.01), the two groups exhibit statistically different averages of the accounting variables (e.g., the means of ACCRUAL(EW) for the IFRS-adopter sample and the non-adopter sample are -0.037 and -0.045, respectively, difference significant at the 1 percent level). These differences in the accounting variables between the two groups are expected since IFRS adoption changes measurement and recognition requirements (e.g., see Ding et al. 2007).

Pearson (above the diagonal) and Spearman (below the diagonal) correlations for the primary variables used in this study are reported in Table 4. All six aggregate

accounting variables are correlated (from 0.52 to 0.56 between EARNING(EW) and EARNING(VW), from 0.60 to 0.61 between ACCRUAL(EW) and ACCRUAL(VW), and 0.52 between CASHFLOW(EW) and CASHFLOW(VW), significant at the 1 percent level or better). Similar to results in firm-level research (e.g., Sloan 1996) and aggregate-level research (e.g., Hirshleifer et al. 2009), aggregate earnings are more strongly correlated with aggregate cash flows (from 0.42 to 0.86, significant at the 1 percent level or better) than with aggregate accruals (from 0.11 to 0.40, significant at the 10 percent level or better). These results are consistent with prior evidence that the cash flow component of aggregate earnings is more persistent than the accrual component of earnings. However, since this univariate correlation analysis does not distinguish the IFRS-adopting countries from the non-adopting countries, and aggregate earnings are also highly correlated with other GDP change predictors such as returns, inflation rates, T-Bill, yield spread (TERM), and change in unemployment rate and corporate investment, this table suggests a need to control for these variables in later tests to examine the marginal abilities of aggregate accruals and aggregate cash flows to predict one-year-ahead GDP change after IFRS adoption.

Table 4: Correlation Matrix

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
[1] EARNING(VW)	1.00	0.52***	0.09*	0.23***	0.85***	0.45***	0.22***	0.25***	0.23***	0.07	0.08	0.22***	-0.17***	0.26***
[2] EARNING(EW)	0.56***	1.00	0.10*	0.40***	0.42***	0.86***	0.21***	0.24***	0.23***	0.06	0.07	0.13**	-0.23***	0.26***
[3] ACCRUAL(VW)	0.12**	0.11**	1.00	0.61***	-0.43***	-0.20***	0.09**	-0.16***	-0.15***	0.15***	0.16***	0.01	-0.10*	0.20***
[4] ACCRUAL(EW)	0.26***	0.39***	0.60***	1.00	-0.11**	-0.08*	0.19***	-0.06**	-0.09**	0.18***	0.14***	0.07	-0.28***	0.43***
[5] CASHFLOW(VW)	0.80***	0.42***	-0.43***	-0.11**	1.00	0.52***	0.15***	0.32***	0.29***	-0.02	-0.02	0.20***	-0.10*	0.11**
[6] CASHFLOW(EW)	0.42***	0.81***	-0.22***	-0.13**	0.52***	1.00	0.11**	0.29***	0.30***	-0.02	0.03	0.15***	-0.11**	0.08
[7] GDPG	0.26***	0.21***	0.13**	0.20***	0.15***	0.10*	1.00	0.03	0.03	0.07	-0.01	0.08	-0.39***	0.52***
[8] RETURN(VW)	0.27***	0.28***	-0.15***	-0.05**	0.34***	0.30***	0.04	1.00	0.86***	0.05	0.02	0.09*	0.08	-0.06
[9] RETURN(EW)	0.25***	0.28***	-0.16***	-0.09**	0.33***	0.35***	0.03	0.88***	1.00	0.07	0.01	0.13**	0.10*	-0.07
[10] INFLATION	0.22***	0.17***	0.16***	0.22***	0.08	0.04	0.22***	-0.10*	-0.10*	1.00	0.67***	0.03	0.01	0.02
[11] T-Bill	0.17***	0.18***	0.10*	0.13***	0.06	0.10*	0.09*	-0.08	-0.09*	0.67***	1.00	0.22***	0.02	-0.09*
[12] TERM	0.10*	0.18***	-0.06	0.00	0.14***	0.22***	-0.01	0.20***	0.25***	0.04	-0.08	1.00	0.01	0.03
[13] UNEMPLOYMENTG	-0.20***	-0.26***	-0.11**	-0.30***	-0.08	-0.09*	-0.30***	0.07	0.09*	-0.05	-0.09*	0.14***	1.00	-0.57***
[14] INVESTMENTG	0.30***	0.36***	0.21***	0.45***	0.10*	0.07	0.43***	-0.01	-0.02	0.11**	0.06	0.03	-0.53***	1.00

Table 4 presents Pearson (above the diagonal) and Spearman (below the diagonal) correlation coefficients for aggregate accounting variables (EARNING(VW), EARNING(EW), ACCRUAL(VW), ACCRUAL(EW), CASHFLOW(VW), and CASHFLOW(EW)) and macroeconomic indicators (nominal GDP change (GDPG), value-weighted stock market returns (RETURN(VW)), equal-weighted stock market returns (RETURN(EW)), inflation rate (INFLATION), treasury-bill (T-Bill) rate, spread between T-Bill and 10-year government bond (TERM), unemployment rate change (UNEMPLOYMENT), and corporate investment rate change (INVESTMENTG)). The sample period spans 1991 to 2011. Variable definitions are in Appendix A. The statistical significance of the correlation coefficient is based on a two-tailed test and is indicated as follows: *** p<0.01, ** p<0.05, * p<0.10.

3.3 Research Design

I test whether the predictive ability of aggregate accruals for one-year-ahead GDP change improves after IFRS adoption, based on my analysis (in Section 2.1) of common versus idiosyncratic imperfections in accruals measurement, and based on the view that IFRS prescribe better standards for accruals measurement of real output than local accounting standards do.[23] Specifically, I examine the relation between GDP change at year t+1 and both aggregate accruals and aggregate cash flows at year t before and after IFRS adoption, controlling for macroeconomic variables at year t. I estimate the following model using a difference-in-differences approach, including country- and year-fixed effects:[24]

$$GDPG_{ct+1} = \gamma_c + \lambda_t + \beta_1 IFRS_{ct} \times ACCRUAL_{ct} + \beta_2 IFRS_{ct} \times CASHFLOW_{ct} + \beta_3 ACCRUAL_{ct} + \beta_4 CASHFLOW_{ct} + \beta_5 IFRS_{ct} + \delta X_{ct} + \varepsilon_{ct+1} \quad (4)$$

The variables of interest (described in Appendix A) are defined as follows (as of year t): γ_c and λ_t are country- and year-fixed effects, respectively. $GDPG_{ct+1}$ is country c's

[23] IFRS specify more accruals-based rules than local accounting standards around the world (Hung, 2001; Ding et al., 2007). To the extent accruals-based accounting standards are conceptually superior to cash-based standards, the ability of accruals to capture true economic profitability under IFRS would be greater than that under local accounting standards.

[24] A difference-in-differences (DD) design with country- and year-fixed effects is a generalization of a standard DD with the treatment indicator for average treated countries' effect and the post period indicator for average treated years' effect (Angrist and Pischke, 2008). If there are sufficient time-series data, a DD design with country- and year-fixed effects is preferred to a standard DD approach, as it relaxes the assumption that any trend in a dependent variable would be the same for the treatment group and the control group in the absence of the treatment (Card, 1992). Also, a fixed effect DD design allows me to exploit the staggered adoption of IFRS among mandatory adopters, which mitigates concerns that observed results are confounded by other contemporaneous events (Brochet et al., 2013).

nominal GDP change from year t to year t+1 (i.e., $\frac{GDP_{ct+1} - GDP_{ct}}{GDP_{ct}}$) where GDP is measured at current market prices (purchaser's prices) and is the sum of gross value added by all resident producers in an economy plus product taxes and minus subsidies not included in the value of the products. $ACCRUAL_{ct}$ is country c's equal-weighted average of aggregate accruals at year t (ACCRUAL(EW)). $CASHFLOW_{ct}$ is country c's equal-weighted average of aggregate cash flow at year t (CASHFLOW(EW)). IFRS is an indicator variable set to one if IFRS are adopted in country c by year t. Based on prior research, the vector X_{ct} includes control variables known to affect one-period-ahead GDP change: $GDPG_{ct}$, $RETURN(EW)_{ct}$, $INFLATION_{ct}$, $T\text{-}BILL_{ct}$, $TERM_{ct}$, and $UNEMPLOYMENT_{ct}$. $GDPG_{ct}$ is country c's nominal GDP change from year t-1 to year t. $RETURN(EW)_{ct}$ is the equal-weighted average of country c's stock market return in year t.[25] $INFLATION_{ct}$ is the annual rate of price change in country c's economy in year t. $T\text{-}BILL_{ct}$ is the average of the 3-month treasury bill rate for country c in year t. $TERM_{ct}$ is the average spread between T-BILL and the 10-year government bond rate for country c in year t; it measures the slope of a country's yield curve. $UNEMPLOYMENT_{ct}$ is the annual rate of change in the share of the labor force that is without work and seeking employment for country c in year t.

[25] Inferences are similar using value-weighted stock market return as a control variable.

If IFRS adoption increases (decreases) the ability of aggregate accruals to predict GDP change at t+1, I expect $\beta_1 > 0$ ($\beta_1 < 0$). Consistent with the framework in Section 2.1, a finding that $\beta_1 > 0$ implies that a change in accounting standards in the form of IFRS adoption reduces imperfections in the listed firms' accruals measurement of real output from business activities in the country. This implication in turn suggests a macro-role for accounting standards.

I estimate equation (4) using ordinary least squares. Since observations are aggregated at the country level, I examine the statistical significance of coefficients using standard errors adjusted for heteroskedasticity and within-country clustering, which takes into account serial correlation of observations within a country (Angrist and Pischke, 2008).[26]

To provide insight into the mechanism that leads to a change in aggregate accruals' predictive ability for one-year-ahead GDP change after IFRS adoption, I examine aggregate accruals' predictive ability for aggregate cash flows and aggregate earnings (components of GDP) and change in aggregate corporate investment and changes in unemployment rate (factors related to GDP change).[27] If IFRS adoption improves the ability of aggregate accruals to predict one-year-ahead GDP change, I expect to observe

[26] The inferences are not sensitive to Newey-West heteroscedasticity and autocorrelation consistent standard errors with the bandwidth of the Bartlett kernel to be the integer part of $4\times\left(\frac{T}{100}\right)^{\frac{2}{9}}$, where T is the number of observations in the regressions.

[27] According to Okun's law, the unemployment rate in an economy is negatively associated with GDP.

a greater ability to predict one-year-ahead GDP components and related factors. Specifically, I estimate the following models in a difference-in-differences approach with country- and year-fixed effects:

$$EARNING_{ct+1} = \gamma_c + \lambda_t + \beta_1 IFRS_{ct} \times ACCRUAL_{ct} + \beta_2 IFRS_{ct} \times CASHFLOW_{ct} + \beta_3 ACCRUAL_{ct} + \beta_4 CASHFLOW_{ct} + \beta_5 IFRS_{ct} + \delta X_{ct} + \varepsilon_{ct+1} \quad (5a)$$

$$CASHFLOW_{ct+1} = \gamma_c + \lambda_t + \beta_1 IFRS_{ct} \times ACCRUAL_{ct} + \beta_2 IFRS_{ct} \times CASHFLOW_{ct} + \beta_3 ACCRUAL_{ct} + \beta_4 CASHFLOW_{ct} + \beta_5 IFRS_{ct} + \delta X_{ct} + \varepsilon_{ct+1} \quad (5b)$$

$$INVESTMENTG_{ct+1} = \gamma_c + \lambda_t + \beta_1 IFRS_{ct} \times ACCRUAL_{ct} + \beta_2 IFRS_{ct} \times CASHFLOW_{ct} + \beta_3 ACCRUAL_{ct} + \beta_4 CASHFLOW_{ct} + \beta_5 IFRS_{ct} + \delta X_{ct} + \varepsilon_{ct+1} \quad (5c)$$

$$UNEMPLOYMENTG_{ct+1} = \gamma_c + \lambda_t + \beta_1 IFRS_{ct} \times ACCRUAL_{ct} + \beta_2 IFRS_{ct} \times CASHFLOW_{ct} + \beta_3 ACCRUAL_{ct} + \beta_4 CASHFLOW_{ct} + \beta_5 IFRS_{ct} + \delta X_{ct} + \varepsilon_{ct+1} \quad (5d)$$

Variables are as defined above, except as follows: INVESTMENTG is the annual growth rate of aggregate corporate investment for country c and UNEMPLOYMENTG is the annual growth rate of change in the share of the labor force that is without work and seeking employment for country c. Both variables are collected from the World Bank.

A result that $\beta_1 > 0$ for each model implies that the greater predictive ability of aggregate accruals for one-period-ahead GDP change after IFRS adoption (compared to non-adopting countries) occurs because IFRS adoption enables aggregate accruals to better predict a component of GDP (corporate profits) and factors related to GDP change (change in corporate investment and unemployment rate). In particular, the improved

predictive ability of aggregate accruals for a component of GDP and factors related to GDP change would be observed when there is less attenuation bias on the estimated coefficient β_1 under IFRS than under local accounting standards. This would imply lower variance of the common measurement error in aggregate accruals (i.e., $\sigma^2_{\eta_{c,t}}$ in Section 2.1), suggesting that IFRS adoption systematically reduced imperfections in accruals measurement in relation to one-period-ahead economic activities.

Finally, to the extent the observed effects of IFRS adoption relate to accruals (rather than cash flows), I expect that the predictive ability of aggregate accruals for future aggregate cash flows would be altered after IFRS adoption, while the predictive ability of aggregate cash flows for future aggregate cash flows would not. Accounting standard setters indicate that an objective of financial reporting is to provide information to users of financial statements for predicting a firm's future cash flows. Accruals at the firm-level capture information about future cash flows related to past transactions as well as information about management's expected future operating and investing activities (Barth et al., 2001, 2016). A finding that aggregate accruals show improved predictive ability for one-period-ahead aggregate cash flows implies that after IFRS adoption, the reduction in accruals imperfections common across listed firms in an economy occurs because aggregate accruals capture more information about future aggregate operating and investing activity as well as future aggregate cash flows related to past transactions. Since aggregate cash flows (from operating activities) are a component of corporate

profits, which form part of GDP (e.g., at least 10 percent worldwide; McKinsey and Company 2015), the test can shed light on how IFRS adoption improves the predictive ability of accruals for one-year-ahead GDP change.

Specifically, I examine whether aggregate accruals' explanatory ability for the variance of one-year-ahead aggregate cash flows differs in the post-adoption period for countries adopting IFRS compared to non-adopting countries.[28] I also examine aggregate cash flows' explanatory ability for the variance of one-year-ahead aggregate cash flows to test whether a statistical property of cash flows, one measure of fundamentals, changes with IFRS adoption. Under the alternative hypothesis, I expect to find increased aggregate accruals' explanatory ability for the variance of one-year-ahead aggregate cash flows after IFRS adoption, and no change in aggregate cash flows' explanatory ability for the variance of one-year-ahead aggregate cash flows after IFRS adoption. I estimate the following model using a difference-in-differences approach with country- and year-fixed effects:

$$ACCRUAL\ (CASH)\ PROPERTY_{ct} = \gamma_c + \lambda_t + \beta IFRS_{ct} + \varepsilon_{ct} \quad (6)$$

Variables are as defined above, except as follows: ACCRUAL PROPERTY is measured as country c's PREDICTIVE_ABILITY in year t, and CASH PROPERTY is measured as country c's AR(1)_R^2 in year t. PREDICTIVE_ABILITY is country-level

[28] By explanatory ability, I mean statistical explanatory power or r-squared in a regression framework.

explanatory ability from a regression of equal-weighted aggregate cash flows in year t+1 on equal-weighted aggregate accruals in year t and measures the extent to which aggregate accruals explain the variance of one-year-ahead aggregate cash flows. AR(1)_R^2 is country-level explanatory ability from a regression of equal-weighted aggregate cash flows in year t+1 on equal-weighted aggregate cash flows in year t, and measures the extent to which aggregate cash flows explain the variance of one-year-ahead aggregate cash flows. The two measures are estimated using country-specific time-series regressions in 5-year rolling windows before and after IFRS adoption, separately, to prevent confounding effects from either period. A larger value of PREDICTIVE_ABILITY corresponds to greater aggregate accruals' predictive ability for one-year-ahead aggregate cash flows. A larger value of AR(1)_R^2 corresponds to greater aggregate cash flows' predictive ability for one-year-ahead aggregate cash flows.

If IFRS adoption reduces imperfections in the measurement of aggregate accruals, I expect $\widehat{\beta} > 0$ for PREDICTIVE_ABILITY. This would suggest that IFRS adoption increases the adopting countries' aggregate accruals' predictive ability for one-year-ahead aggregate cash flows. In contrast, to the extent IFRS do not prescribe the measurement and recognition of cash flows and adopting countries' economic fundamentals do not change due to IFRS adoption, I expect $\widehat{\beta}$ to be statistically not different from zero for AR(1)_R^2. This finding would be consistent with the view that an over-time statistical property of aggregate cash flows, a measure of business

fundamentals, does not vary before and after IFRS adoption. Also, this finding would support that the improved predictive ability of aggregate accruals for one-period-ahead GDP change is less likely due to changes in economic fundamentals associated with IFRS adoption.

4. Results

Table 5 reports the results of estimating model in equation (4), which tests the predictive ability of aggregate earnings, accruals, and cash flows for one-year-ahead GDP change before and after IFRS adoption. Columns 1 and 2 show that in the baseline models using aggregate earnings, and aggregate accruals and cash flows, respectively, the aggregate accounting variables are statistically associated with one-year-ahead GDP change at the 5 percent level or better.

The result in column 3 shows that aggregate earnings' predictive ability for one-year-ahead GDP change is greater for IFRS-adopting countries in the post-adoption period. The coefficient on IFRS×EARNING is 0.524, significant at the 5 percent level. However, an issue with this aggregate earnings result is that the improved predictive ability of earnings for one-year-ahead GDP change could be due to IFRS adoption or to a shift in economic fundamentals. To rule out the alternative explanation that the improved predictive ability of aggregate earnings is due to better economic fundamentals in the post-IFRS adoption period, I focus on the model that decomposes aggregate earnings into aggregate accruals and aggregate cash flows. In particular, based on the view that IFRS adoption affects the measurement of aggregate accruals, not the measurement of aggregate cash flows, I expect, under the alternative hypothesis, a change in the predictive ability of aggregate accruals and no change in the predictive ability of aggregate cash flows, if a change in the common error is due to IFRS adoption.

Column 4 in Table 5 shows that aggregate accruals' predictive ability for GDP change is greater for IFRS-adopting countries in the post-adoption period (compared to non-adopting countries), whereas aggregate cash flows do not incrementally predict one-year-ahead GDP change among IFRS-adopting countries. The estimated coefficient on IFRS×ACCRUAL is significantly positive at the 1 percent level with a t-statistic of 2.97 (equal-weighted accruals) and at the 5 percent level with a t-statistic of 2.34 (value-weighted accruals, untabulated).[29] The magnitudes of the estimated coefficients imply that a one-standard-deviation increase in aggregate accruals is associated with a 1.8 to 2.3 percentage point increase in year t+1 nominal GDP change for IFRS-adopting countries compared to non-IFRS adopting countries in the post-adoption period. These results suggest that with IFRS adoption, the accrual component of aggregate earnings reflects information about future economic activities, incremental to the information captured in the cash flow component of earnings and other macroeconomic variables.

[29] The estimated coefficient on ACCRUAL is significant at the 10 percent level for equal-weighted accruals. It indicates that aggregate accruals are positively associated with one-period-ahead GDP change for both non-adopting countries in the entire sample period and adopting countries in the pre-IFRS adoption period.

Table 5: The Effect of IFRS Adoption on the Ability of Accruals to Predict One-Year-Ahead GDP Change

Dependent Variable	$GDPG_{t+1}$			
	(1)	(2)	(3)	(4)
EARNING(EW)	0.556***		0.655***	
	(0.187)		(0.171)	
ACCRUAL(EW)		0.416**		0.419*
		(0.200)		(0.212)
CASHFLOW(EW)		0.656***		0.695***
		(0.193)		(0.189)
IFRS*EARNING(EW)			0.524**	
			(0.229)	
IFRS*ACCRUAL(EW)				1.311***
				(0.442)
IFRS*CASHFLOW(EW)				-0.241
				(0.246)
GDPG	0.104*	0.104*	0.101*	0.092
	(0.054)	(0.058)	(0.058)	(0.063)
RETURN(EW)	0.006	0.008	0.004	0.007
	(0.018)	(0.016)	(0.017)	(0.015)
INFLATION	0.229	0.224	0.268	0.259
	(0.245)	(0.240)	(0.247)	(0.242)
T-Bill	0.387**	0.409**	0.435**	0.460**
	(0.164)	(0.168)	(0.170)	(0.170)
TERM	-0.205	-0.197	-0.165	-0.106
	(0.356)	(0.355)	(0.365)	(0.345)
UNEMPLOYMENT	-0.006	-0.010	-0.006	-0.007
	(0.027)	(0.028)	(0.028)	(0.028)
IFRS			-0.050	0.009
			(0.057)	(0.023)
Country-Fixed Effect	YES	YES	YES	YES
Year-Fixed Effect	YES	YES	YES	YES
S.E. Clustered	Country	Country	Country	Country
Observations	585	585	585	585
R-squared	0.514	0.519	0.521	0.526

Table 5 reports panel regressions of country c's GDP change in year t+1 on aggregate accruals and cash flows, an indicator variable for IFRS adoption, its interaction with aggregate accruals and cash flows, and macroeconomic control variables during 1991-2011. GDP is measured at current market prices (purchaser's prices) and comprises the sum of gross value added by all resident producers in an economy plus product taxes and minus subsidies not included in the value of the products. IFRS is a binary indicator variable that varies by country c and year t to capture the staggered adoptions of IFRS. ACCRUAL(EW) and CASHFLOW(EW) are country c's equal-weighted averages of aggregate accruals and cash flows, respectively. The calculation of the accounting variables appears in Section 3.2 or Appendix A. All other variables are defined in Appendix A. Standard errors, adjusted for heteroskedasticity and within-country clustering, are in parentheses. The statistical significance of coefficients is indicated as follows: *** p<0.01, ** p<0.05, * p<0.10.

The main result on aggregate accruals' predictive ability after IFRS adoption is similar to Figure 2, which provides visual evidence that the univariate association between aggregate accruals and GDP change is more pronounced for the IFRS-adopting countries in the post IFRS implementation period, as compared to the non-IFRS adopting countries. A result that IFRS adoption does not change the predictive ability of aggregate cash flows is consistent with the view that IFRS do not change the measurement of cash flows and that the improved predictive ability of aggregate accruals is less likely due to a shift in economic fundamentals and more likely due to a change in accounting standards through IFRS adoption. The coefficient on ACCRUAL(EW) is positive and significant at the 10 percent level, implying that aggregate accruals are associated with one-period-ahead GDP change for adopting countries before IFRS adoption and for non-adopting countries for the entire sample period.

Table 6 shows the results of estimating models in equations (5a) through (5d), which test whether the improved predictive ability of aggregate accruals for one-year-ahead GDP change comes from its increased ability to predict a component of GDP (corporate profits) and factors related to GDP change (change in corporate investment and unemployment rate).

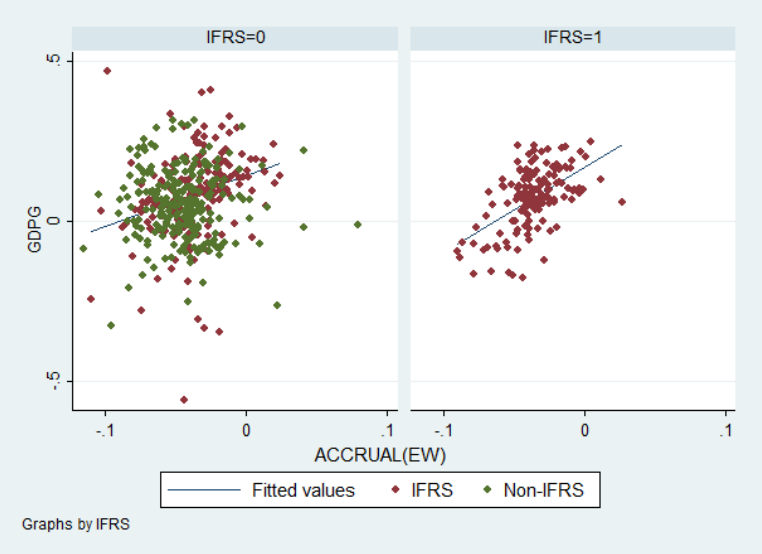

Figure 2: Scatterplot of GDPG and ACCRUAL by IFRS adoption[30]

With regard to aggregate accruals' predictive ability for aggregate earnings, column 1 in Table 6 shows that the estimated coefficient on IFRS×ACCRUAL is significantly positive at the 5 percent level for equal-weighted accruals. With regard to aggregate accruals' predictive ability for one-year-ahead aggregate cash flows, column 2 shows that the estimated coefficient on IFRS×ACCRUAL is significantly positive at the 1 percent level for equal-weighted accruals.[31] The magnitude of the estimated coefficients suggests that a one-standard-deviation increase in aggregate accruals is associated with a 0.47 (0.70) percentage point increase in one-year-ahead aggregate earnings (one-year-

[30] Inferences are similar when value-weighted accruals are used or when the IFRS sample is restricted to the countries that adopted IFRS in 2005, the largest adoption year in terms of the number of adopting countries.

[31] The estimated coefficient on ACCRUAL is significant at the 5 percent level or better for equal-weighted accruals. This result indicates that aggregate accruals are positively associated with one-period-ahead aggregate earnings and cash flows, and one-period-ahead change in corporate investment and unemployment rate for both non-adopting countries in the entire sample period and adopting countries in the pre-IFRS adoption period.

ahead aggregate cash flows) for IFRS-adopting countries compared to non-IFRS adopting countries in the post-adoption period.

The results in columns 3 and 4 for corporate investment change (INVESTMENTG) and unemployment rate change (UNEMPLOYMENTG) indicate that the estimated coefficient on IFRS×ACCRUAL is significantly positive at the 5 to 10 percent level for equal-weighted accruals. The magnitude of the estimated coefficients implies that a one-standard-deviation increase in aggregate accruals is associated with a 1.7 (3.6) percentage point increase (decrease) in one-year-ahead corporate investment change (unemployment rate change) for IFRS-adopting countries compared to non-IFRS adopting countries in the post-adoption period. Consistent with the results in Table 3, I find no evidence that IFRS adoption affects the predictive ability of aggregate cash flows for one-year-ahead aggregate earnings, aggregate cash flows, and change in corporate investment and unemployment rate. [32]

[32] Inferences are similar when using value-weighted accruals and cash flows.

Table 6: Aggregate Accruals' Predictive Ability for Corporate Profits and Factors Related to One-Year-Ahead GDP Change

Dependent Variable	***EARNING*** $_{t+1}$	***CASHFLOW*** $_{t+1}$	***INVESTMENTG*** $_{t+1}$	***UNEMPLOYMENTG*** $_{t+1}$
IFRS×ACCRUAL(EW)	0.259**	0.389***	0.968*	-2.026**
	(0.129)	(0.130)	(0.510)	(0.974)
IFRS×CASHFLOW(EW)	-0.043	0.052	-0.177	-0.081
	(0.092)	(0.077)	(0.328)	(0.463)
ACCRUAL(EW)	0.674***	0.224***	0.535**	-1.432**
	(0.068)	(0.086)	(0.242)	(0.553)
CASHFLOW(EW)	0.691***	0.458***	0.639***	-1.323***
	(0.055)	(0.056)	(0.192)	(0.336)
Control Variables	YES	YES	YES	YES
Country-Fixed Effect	YES	YES	YES	YES
Year-Fixed Effect	YES	YES	YES	YES
S.E. Clustered	Country	Country	Country	Country
Observations	553	553	579	579
R-squared	0.836	0.673	0.395	0.298

Table 6 reports the results from panel regressions of aggregate earnings in year t+1, aggregate cash flows in year t+1, corporate investment change from t to t+1, and unemployment rate change from t to t+1, respectively, on aggregate accruals, aggregate cash flows, an indicator variable for IFRS adoption, its interaction with aggregate accruals and cash flows, as well as macroeconomic variables during 1991-2011. Standard errors, adjusted for heteroskedasticity and within-country clustering, are in parentheses. The statistical significance of coefficients is indicated as follows: *** p<0.01, ** p<0.05, * p<0.10.

The results in Table 6 indicate that after IFRS adoption, aggregate accruals of IFRS-adopting countries better predict one-year-ahead aggregate cash flows, aggregate earnings, change in corporate investment, and change in unemployment rate. Since earnings and cash flows form part of GDP as corporate profits, and change in investment and change in unemployment are factors related to GDP change, the results indicate that the increased predictive ability of aggregate accruals for one-period-ahead GDP change arises from aggregate accruals' increased predictive ability for components of GDP and factors related to GDP change, implying lower variance of the common measurement error in aggregate accruals (i.e., $\sigma^2_{\eta_{c,t}}$ in Section 2.1) after IFRS adoption. This suggests that

IFRS adoption reduces systematic imperfections in accruals measurement in relation to one-period-ahead economic activities.

Column 1 of Table 7 shows the result from rolling regressions of aggregate accruals' explanatory ability for the variance of one-year-ahead aggregate cash flows (measured by PREDICTIVE_ABILITY) on the IFRS indicator variable, with country- and year-fixed effects. The coefficient on IFRS is positive and significant at the 1 percent level with a t-statistic of 3.09, indicating an increase in aggregate accruals' explanatory ability for the variance of one-year-ahead aggregate cash flows after IFRS adoption. Column 2 of Table 7 shows the result from rolling regressions of aggregate cash flows' explanatory ability for the variance of one-year-ahead aggregate cash flows (measured by AR(1)_R^2) on the IFRS indicator variable, with country- and year-fixed effects. Consistent with the main results in Table 5, the coefficient on the IFRS variable is not statistically different from zero at conventional levels, suggesting no change in a statistical property of aggregate cash flows with IFRS adoption.

Table 7: Statistical Properties of Aggregate Accruals and Aggregate Cash Flows

Dependent Variable	***PREDICTIVE_ABILITY (ACCRUAL)***	***AR(1)_R² (CASH)***
IFRS	0.189***	0.006
	(0.061)	(0.060)
Country-Fixed Effect	YES	YES
Year-Fixed Effect	YES	YES
S.E. Clustered	Country	Country
Observations	395	395
R-squared	0.369	0.308

Table 7 shows statistical properties of aggregate accruals (PREDICTIVE_ABILITY) and aggregate cash flows (AR(1)_R^2) before and after IFRS adoption. PREDICTIVE_ABILITY is country-level explanatory ability from a regression of equal-weighted aggregate cash flows in year t+1 on equal-weighted aggregate accruals in year t and measures the extent to which aggregate accruals explain the variance of one-year-ahead aggregate cash flows. AR(1)_R^2 is country-level explanatory ability from a regression of equal-weighted aggregate cash flows in year t+1 on equal-weighted aggregate cash flows in year t and measures the extent to which aggregate cash flows explain the variance of one-year-ahead aggregate cash flows. The two measures are estimated using country-specific time-series regressions in 5-year rolling windows before and after the IFRS adoption period, separately, to prevent confounding effects from either period. A larger value of PREDICTIVE_ABILITY corresponds to greater aggregate accruals' predictive ability for one-year-ahead aggregate cash flows. A larger value of AR(1)_R^2 corresponds to greater aggregate cash flows' predictive ability for one-year-ahead aggregate cash flows. Standard errors, adjusted for heteroskedasticity and within-country clustering, are in parentheses. The statistical significance of coefficients is indicated as follows: *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Overall, I find that IFRS-adopting countries' aggregate accruals exhibit improved predictive ability not only for one-year-ahead GDP change, but also for two of its components (aggregate earnings and aggregate cash flows), and for two factors related to GDP change (change in corporate investment and change in unemployment rate). I also find that aggregate accruals' explanatory ability for the variance of one-year-ahead aggregate cash flows is improved after IFRS adoption. These findings are consistent with the idea that IFRS adoption reduces imperfections in aggregate accruals—as a measure of real activity—that are common across all reporting firms in an economy.

In contrast, I do not find any change in the predictive ability of aggregate cash flows after IFRS adoption for one-year-ahead GDP change, two of its components (aggregate earnings and aggregate cash flows), and two factors related to GDP change (change in corporate investment and change in unemployment rate). I also find no change in aggregate cash flows' explanatory ability for the variance of one-year-ahead aggregate cash flows before and after IFRS adoption. I interpret these findings as suggesting that a change in accounting standards can affect the predictive ability of aggregate earnings and that the improved predictive ability comes from the accrual component (rather than the cash flow component) of earnings, which incorporates forward-looking information about future economic activities.

5. Additional Tests

5.1 Cross-Sectional Analysis Based on Differences between Local GAAP and IFRS

I expect more pronounced effects when IFRS adoption results in bigger changes in accounting standards, that is, when the distance between domestic accounting standards (local GAAP) and IFRS is greater. If a country's local GAAP is similar to IFRS, the effects of IFRS adoption would be small because imperfections in the measurement of aggregate accruals would not be affected much. However, if a country's local GAAP is substantially different from IFRS, adopting IFRS would result in greater changes in the measurement of aggregate accruals, with a larger impact on the predictive ability of accruals for one-year-ahead GDP change.

To examine this conjecture, I define the high (low) GAAP difference group as the group whose number of differences between local GAAP and IFRS is above (below) the cross-sectional median value of the total number of differences between local GAAP and IFRS. I consider 52 accounting items in International Accounting Standards (IAS). My measure is based on *gaapdiff*2 in Bae et al. (2008) who use *A Survey of National Accounting Rules Benchmarked Against International Accounting Standards* (Nobes, 2001). In this survey, partners in big accounting firms from more than 60 countries identified whether the local GAAP in their country is different from IAS on 80 accounting issues related to recognition, measurement, and disclosure. For each country, the survey reports the following four

types of differences between local GAAP and IAS as of December 31, 2001: (1) the absence in local GAAP guidance for recognition and measurement rules that are present in IAS; (2) the absence in local GAAP guidance for disclosure rules that are present in IAS; (3) inconsistencies between local GAAP and IAS that could lead to differences in reporting outcomes for many enterprises; and (4) other issues that could lead to differences in reporting outcomes between local GAAP and IAS for certain enterprises. Bae et al. note that the construction of *gaapdiff2* is more mechanical and less judgmental (compared to other GAAP difference measures): the differences between local GAAP and IFRS are entirely based on the survey responses, rather than on the past literature or the researcher's own judgment.

Table 8 shows the results of a cross-sectional analysis based on low versus high GAAP difference groups. Because *gaapdiff2* indicates the number of differences between local GAAP and IAS for both IFRS-adopting countries and non-adopting countries, I separately estimate model in equation (4) for low and high GAAP difference groups. Column 1 shows that for the low GAAP difference group, the estimated coefficients on IFRS×ACCRUAL and IFRS×CASHFLOW are not statistically different from zero.[33] For this group, switching to IFRS involves relatively fewer changes, so the measurement of

[33] The explanatory power (R-squared) for the LOW GAAP DIFFERENCE group is 0.613, slightly lower than that for the HIGH GAAP DIFFERENCE group. This explanatory power is due to the inclusion of country- and year-fixed effects, not the test variables. Without fixed effects, the explanatory power is 0.168.

aggregate accruals would be less affected. In contrast, column 2 shows that for the high GAAP difference group, there is a more pronounced increase in the predictive ability of aggregate accruals for one-year-ahead GDP change. The estimated coefficient on IFRS×ACCRUAL is significantly positive at the 5 percent level (with a t-statistic of 2.43) for equal-weighted accruals.[34] The findings in Table 8 suggest that IFRS adoption plays a role in reducing the imperfections in accruals measurement for countries whose IFRS adoption results in greater changes in accounting standards.

[34] Inferences are similar when using value-weighted accruals and cash flows.

Table 8: Cross-Sectional Analysis based on the Number of Differences between Local GAAP and IFRS for 52 Accounting Items

	LOW GAAP DIFFERENCE	HIGH GAAP DIFFERENCE
Dependent Variable	***GDPG$_{t+1}$***	
IFRS×ACCRUAL(EW)	0.959	1.265**
	(0.889)	(0.520)
IFRS×CASHFLOW(EW)	-0.256	-0.055
	(0.274)	(0.497)
ACCRUAL(EW)	-0.391	0.647*
	(0.497)	(0.323)
CASHFLOW(EW)	0.624**	0.735**
	(0.243)	(0.337)
GDPG	0.172**	0.089
	(0.069)	(0.064)
RETURN(EW)	0.018	-0.003
	(0.023)	(0.011)
INFLATION	1.200***	0.235**
	(0.181)	(0.096)
T-Bill	-0.302	0.104
	(0.252)	(0.150)
TERM	0.283	-0.306
	(0.324)	(0.205)
UNEMPLOYMENTG	-0.025	0.023
	(0.028)	(0.036)
IFRS	0.003	0.016
	(0.035)	(0.022)
Comparing Coefficients on IFRS×ACCRUAL(EW)	Chi-squared = 4.38 *p*-value = 0.036	
Country-Fixed Effect	YES	YES
Year-Fixed Effect	YES	YES
S.E. Clustered	Country	Country
Observations	275	310
R-squared	0.613	0.653

Table 8 shows the results of a cross-sectional analysis based on low versus high GAAP difference groups. Because *gaapdiff2* indicates the number of differences between local GAAP and IAS for both IFRS-adopting countries and non-adopting countries, I estimate model in equation (4) (i.e., a regression of country c's GDP change in year t+1 on aggregate accruals, aggregate cash flows, an indicator variable for IFRS adoption, its interaction with aggregate accruals and cash flows, as well as macroeconomic variables) for low and high GAAP difference groups, separately. I define the high (low) GAAP difference group as the group whose number of differences between local GAAP and IFRS is above (below) the cross-sectional median value of the total number of differences between local GAAP and IFRS. My measure is based on *gaapdiff2* in Bae et al. (2008), constructed based on 52 accounting items in International Accounting Standards (IAS). The sample period covers 1991 to 2011. Variable definitions are in Appendix A. Standard errors, adjusted for heteroskedasticity and within-country clustering, are in parentheses. The statistical significance of coefficients is indicated as follows: *** p<0.01, ** p<0.05, * p<0.10.

5.2 Cross-Sectional Analysis Based on Enforcement Differences

Prior research suggests that effective enforcement increases the quality of management's implementation of accounting standards (Leuz, 2010; Christensen et al., 2013); in the context of my analysis, weak enforcement would reduce the likelihood that IFRS provisions are correctly implemented, thereby attenuating the effects of IFRS adoption. Specifically, managers in a weak-enforcement jurisdiction are expected to apply IFRS less rigorously, suggesting little or even no reduction in the imperfections in accruals as a measure of real output. In contrast, managers in a strong-enforcement jurisdiction are expected to implement standards prescribed by IFRS scrupulously. Based on the view that IFRS provide better guidance on the measurement and recognition of accruals compared to local accounting standards (Hung, 2001; Ding et al., 2007), I expect increased predictive ability of aggregate accruals for one-year-ahead GDP change among IFRS-adopting countries with strong enforcement.

To test this idea, I examine whether the effect of IFRS adoption is more pronounced for countries with higher enforcement. I define the high (low) enforcement group as the group whose index score of (1) disclosure requirements (DISC), (2) public securities enforcement (PUBLIC), (3) liability standards (LIAB), and (4) the first principal component factor of DISC, PUBLIC, and LIAB (FACTOR) is above (below) the cross-sectional median values of DISC, PUBLIC, LIAB, and FACTOR. The measures are from La Porta et al. (2006) except for FACTOR. DISC is the arithmetic mean of a country's

securities disclosure requirements in the following areas: securities offerings, insiders' compensation, equity ownership structure, insider ownership, contracts outside the normal course of business, and transactions with related parties. PUBLIC is the arithmetic mean of a supervisor characteristics index, rule-making power index, investigative powers index, orders index, and criminal index (see La Porta et al., 2006, p.7-9). LIAB is the arithmetic mean of liability standards applicable to the issuer (a corporation that raises capital through an initial public offering of common shares) and its directors, distributors, and auditors. La Porta et al.'s data are based on surveys of attorneys from 49 countries in 1993 and 2000, and each index is formed by assigning 1 or 1.5 if a country has a specific rule, and zero if a country does not have that rule.

I separately estimate model in equation (4) for the low and high enforcement groups. Table 9 reports the results of the cross-sectional analysis. For the low enforcement group, I find weak evidence that IFRS adoption improves the predictive ability of aggregate accruals for one-year-ahead GDP change. For the low disclosure enforcement group (DISC in LOW ENFORCEMENT), column 1 of Table 9 shows that the estimated coefficient on IFRS×ACCRUAL is not statistically different from zero at conventional levels. For the low public enforcement and liability standards group (PUBLIC and LIAB in LOW ENFORCEMENT), columns 2 and 3 of Table 9 show that there is weak but statistically significant association between aggregate accruals and one-year-ahead GDP change after IFRS adoption (with t-statistics of 1.89 and 1.93, respectively). For the low

FACTOR group in LOW ENFORCEMENT, column 4 reveals that the estimated coefficient on IFRS×ACCRUAL is not statistically different from zero at conventional levels. For aggregate cash flows, none of columns 1 through 4 shows statistically reliable evidence of improved predictive ability for GDP change after IFRS adoption.[35]

With regard to the high enforcement group, I find stronger evidence, in terms of coefficient sizes and the levels of statistical significance, of the improved predictive ability of aggregate accruals for one-year-ahead GDP change after IFRS adoption. Columns 5 to 8 in Table 9 show that all estimated coefficients on IFRS×ACCRUAL are positive and significant at the 10 percent level or better, while all estimated coefficients on IFRS×CASHFLOW are not statistically different from zero at conventional levels. To test whether the coefficients on IFRS×ACCRUAL differ across the low enforcement and high enforcement groups, I conduct chi-square difference tests. The results show that for DISC and FACTOR, the coefficients on IFRS×ACCRUAL are statistically different across the two groups at the 5 percent significance level or better, while for PUBLIC and LIAB, the coefficients on IFRS×ACCRUAL are not statistically different across the two groups at conventional levels.

[35] Column 3 for LIAB shows the coefficient on IFRS×CASHFLOW is -0.473 and significant at the 10 percent level, with a t-statistic of 1.77. This is one peculiar result in this study that shows a significantly negative coefficient on IFRS×CASHFLOW. The caveat is that the result is based on the liability standards measure (LIAB) that is highly skewed. Partitioning LIAB into median leaves 480 observations for the low enforcement group and 105 observations for the high enforcement group.

It appears that the inconsistent results could be due to noise in the enforcement measures. The correlation matrix for the enforcement measures in Table 10 reveals that the pairwise correlations among DISC, PUBLIC, and LIAB range from 0.33 to 0.84, whereas the correlation coefficients between FACTOR and the enforcement measures (i.e., DISC, PUBLIC, and LIAB) range from 0.60 to 0.97. Placing the most weight on FACTOR, which captures the greatest variation among DISC, PUBLIC, and LIAB, I can conclude that the two groups' coefficients on IFRS×ACCRUALS statistically differ at the 1 percent level, implying that the effect of IFRS adoption is more pronounced for the high enforcement group.

Overall, the results in Table 9 show some evidence of increased correlation between aggregate accruals and one-year-ahead GDP change for both low enforcement and high enforcement countries. The weight of the evidence also suggests that the predictive ability of aggregate accruals for one-period-ahead GDP change is more pronounced for the high enforcement group compared with the low enforcement group, particularly when inferences are based on the first principal component enforcement factor (FACTOR).[36]

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[36] With regard to the coefficient on IFRS×ACCRUAL and its t-statistic, the coefficient on FACTOR for the high enforcement group is 1.721 with a t-statistic of 2.24, whereas the coefficient on FACTOR for the low enforcement group is 0.564 with a t-statistic of 1.01. Inferences are similar or stronger when using value-weighted accruals and cash flows. That is, the results are more pronounced for the high enforcement group. In untabulated analyses, the results using value-weighted accounting variables reveal that LIAB and FACTOR in the high enforcement group are associated with improved predictive ability of aggregate accruals for one-year-ahead GDP change, whereas no partitioning of the low enforcement group shows improved predictive ability of aggregate accruals for one-year-ahead GDP change.

Table 9: Cross-Sectional Analysis based on Enforcement Differences

	LOW ENFORCEMENT				HIGH ENFORCEMENT			
	DISC	PUBLIC	LIAB	FACTOR	DISC	PUBLIC	LIAB	FACTOR
Dependent Variable				***GDPG$_{t+1}$***				
IFRS×ACCRUAL(EW)	0.834	1.428*	0.994*	0.564	1.209**	1.211*	1.081*	1.721**
	(0.801)	(0.754)	(0.513)	(0.556)	(0.551)	(0.687)	(0.540)	(0.768)
IFRS×CASHFLOW(EW)	-0.458	-0.441	-0.473*	-0.347	-0.040	0.090	0.471	-0.087
	(0.595)	(0.333)	(0.266)	(0.349)	(0.286)	(0.334)	(0.581)	(0.342)
ACCRUAL(EW)	0.922*	-0.549	0.621**	0.467	-0.396	0.169	0.419***	0.057
	(0.529)	(0.538)	(0.270)	(0.297)	(0.415)	(0.336)	(0.111)	(0.272)
CASHFLOW(EW)	1.067*	0.893**	0.914***	0.602**	0.454**	0.578***	0.391***	0.417***
	(0.546)	(0.341)	(0.267)	(0.288)	(0.180)	(0.156)	(0.058)	(0.140)
Comparing Coefficients				Chi-squared =	4.69	0.74	0.51	4.15
on IFRS×ACCRUAL(EW)				*p*-value =	0.030	0.390	0.473	0.042
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Country-Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES
Year-Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES
S.E. Clustered	Country	Country	Country	Country	Country	Country	Country	Country
Observations	202	293	480	292	383	283	105	293
R-squared	0.680	0.686	0.542	0.619	0.575	0.602	0.631	0.623

Table 9 reports the results of the cross-sectional analysis based on model in equation (4) (i.e., a regression of country c's GDP change in year t+1 on aggregate accruals, aggregate cash flows, an indicator variable for IFRS adoption, its interaction with aggregate accruals and cash flows, as well as macroeconomic control variables), separately for the low and high enforcement groups. I define the high (low) enforcement group as the group whose index score of (1) disclosure requirements (DISC), (2) public securities enforcement (PUBLIC), (3) liability standards (LIAB), and (4) the first principal component factor of DISC, PUBLIC, and LIAB (FACTOR) is above (below) the cross-sectional median values of DISC, PUBLIC, LIAB, and FACTOR. The measures are from La Porta et al. (2006) except for FACTOR. Variables are defined in Appendix A. Standard errors, adjusted for heteroskedasticity and within-country clustering, are in parentheses. The statistical significance of coefficients is indicated as follows: *** p<0.01, ** p<0.05, * p<0.10.

Table 10: Correlation Matrix for Enforcement Variables

	FACTOR	DISC	ENF	LIA
FACTOR	1.00	0.91***	0.93***	0.67***
DISC	0.87***	1.00	0.84***	0.40***
ENF	0.97***	0.81***	1.00	0.43***
LIA	0.60***	0.33***	0.45***	1.00

Table 10 presents Pearson (above the diagonal) and Spearman (below the diagonal) correlation coefficients for the country-level enforcement variables used in the enforcement-based cross-sectional analysis reported in Table 9. DISC is the level of a country's disclosure requirements, PUBLIC is the level of a country's public securities enforcement, LIAB is the level of a country's liability standards, and FACTOR is the first principal component factor of DISC, PUBLIC, and LIAB. The enforcement measures DISC, PUBLIC, and LIAB are from La Porta et al. (2006). The statistical significance of the correlation coefficient is based on a two-tailed test and is indicated as follows: *** p<0.01, ** p<0.05, * p<0.10.

5.3 Dynamic Timing Effects of IFRS Adoption on the Predictive Ability of Aggregate Accruals for One-Year-Ahead GDP Change

One assumption of the difference-in-differences method is that prior to IFRS adoption, adopting and non-adopting countries would have similar GDP changes, and the predictive ability of aggregate accruals for one-year-ahead GDP change is similar between the IFRS-adopting countries and the non-adopting countries before IFRS adoption (a parallel trends assumption). Panel C of Table 1 shows that the difference in average GDP change between the two groups is not statistically significant at conventional levels, consistent with the visual evidence in Figure 1. To test whether the predictive ability of aggregate accruals for one-year-ahead GDP change is similar between the adopting countries and the non-adopting countries before IFRS adoption, I estimate the following model, with different IFRS adoption timing indicators:

$$\begin{aligned} GDPG_{ct+1} = {} & \gamma_c + \lambda_t + \beta_1 IFRS[-2]_{ct} \times ACCRUAL_{ct} + \beta_2 IFRS[-2]_{ct} \times CASHFLOW_{ct} \\ & + \beta_3 IFRS[-1]_{ct} \times ACCRUAL_{ct} + \beta_4 IFRS[-1]_{ct} \times CASHFLOW_{ct} \\ & + \beta_5 IFRS[0,+1]_{ct} \times ACCRUAL_{ct} + \beta_6 IFRS[0,+1]_{ct} \times CASHFLOW_{ct} \\ & + \beta_7 IFRS[2+]_{ct} \times ACCRUAL_{ct} + \beta_8 IFRS[2+]_{ct} \times CASHFLOW_{ct} \\ & + \beta_9 ACCRUAL_{ct} + \beta_{10} CASHFLOW_{ct} + \beta_{11} IFRS_{ct} + \delta X_{ct} + \varepsilon_{ct+1} \end{aligned} \quad (8)$$

Variables are as defined above, except as follows: IFRS[-2] and IFRS[-1] are indicator variables set to one if IFRS will be adopted within two years and within one year by country c, respectively (i.e., two years and one year before the IFRS adoption at

year t, respectively), and zero otherwise. IFRS[0,+1] is an indicator variable set to one if IFRS were adopted for country c in year t or t+1, and zero otherwise. IFRS[2+] is an indicator variable set to one if IFRS were adopted for country c in year t+2 or thereafter, and zero otherwise. If the parallel trends assumption holds, I expect the estimated coefficients β_1 and β_3 will not be reliably different from zero. To the extent the effect of IFRS adoption on the predictive ability of aggregate accruals for GDP change is not specific to the particular year after IFRS adoption, I expect the estimated coefficients β_5 and β_7 will be significant and positive.

Table 11 reports the results of estimating model (8). The estimated coefficients on IFRS[-2]×ACCRUAL and IFRS[-1]×ACCRUAL are not statistically different from zero at conventional levels, providing support for similar trends in the pre-IFRS period between IFRS-adopting countries and the non-adopting countries. The results also show that the estimated coefficients on IFRS[0,+1]×ACCRUAL and IFRS[2+]×ACCRUAL are positive and significant at the 10 percent level or better, suggesting that the effects of IFRS adoption on the predictive ability of aggregate accruals for one-year-ahead GDP change persist for at least two years in the post-IFRS period. Overall, Table 11 supports the validity of the parallel trends assumption.

Table 11: Dynamic Timing Effects of IFRS Adoption on Aggregate Accruals' Predictive Ability for One-Year-Ahead GDP Change

Dependent Variable	$GDPG_{t+1}$
IFRS[-2]×ACCRUAL(EW)	-0.236
	(0.439)
IFRS[-2]×CASHFLOW(EW)	-0.197
	(0.308)
IFRS[-1]×ACCRUAL(EW)	-0.016
	(0.575)
IFRS[-1]×CASHFLOW(EW)	-0.002
	(0.482)
IFRS[0,+1]×ACCRUAL(EW)	1.283**
	(0.522)
IFRS[0,+1]×CASHFLOW(EW)	-0.223
	(0.355)
IFRS[2+]×ACCRUAL(EW)	1.239***
	(0.435)
IFRS[2+]×CASHFLOW(EW)	-0.323
	(0.276)
ACCRUAL(EW)	0.414*
	(0.213)
CASHFLOW(EW)	0.691***
	(0.189)
GDPG	0.187
	(0.271)
RETURN(EW)	0.006
	(0.016)
INFLATION	0.268
	(0.248)
T-Bill	0.483**
	(0.181)
TERM	-0.117
	(0.346)
UNEMPLOYMENTG	-0.004
	(0.030)
IFRS	0.187
	(0.271)
Country-Fixed Effect	YES
Year-Fixed Effect	YES
S.E. Clustered	Country
Observations	585
R-squared	0.549

Table 11 reports the results of estimating model (8) (i.e., a regression of country c's GDP change in year t+1 on aggregate accruals, aggregate cash flows, four IFRS indicator variables, their interactions with aggregate accruals and cash flows, as well as macroeconomic variables). The four IFRS indicator variables include IFRS[-2] and IFRS[-1], set to one if IFRS will be adopted within two years and within one year by country c, respectively (i.e., two years and one year before the IFRS adoption at year t, respectively), and zero otherwise; IFRS[0,+1], set to one if IFRS were adopted for country c in year t or t+1, and zero otherwise; and IFRS[2+], set to one if IFRS were adopted for country c in year t+2 or thereafter, and zero otherwise. All other variables are defined in Appendix A. Standard errors, adjusted for heteroskedasticity and within-country clustering, are in parentheses. The statistical significance of coefficients is indicated as follows: *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

5.4 Robustness Tests

5.4.1 Change in Enforcement, IFRS Adoption, and the Predictive Ability of Aggregate Accruals

Based on Christensen at al. (2013) who claim that managers' reporting incentives determine the quality of financial reporting outcomes (not accounting standards *per se*), I examine whether changes in financial reporting enforcement around the time of IFRS adoption affect the predictive ability of aggregate accruals and cash flows for one-year-ahead GDP change. According to Christensen et al. (2013), IFRS adoption does not have meaningful effects on their capital-market outcome indicators, liquidity and bid-ask spreads. They claim that the effects ascribed to IFRS adoption in previous IFRS studies are in fact due to contemporaneous changes in enforcement. To rule out Christensen et al.'s explanation, I use the same enforcement indicator variable they use, and test whether changes in enforcement affect the predictive ability of aggregate accruals for one-year-ahead GDP change. Next, to disentangle the effect of IFRS adoption from enforcement changes, I examine whether changes in enforcement are responsible for the improved predictive ability of aggregate accruals, rather than the IFRS adoption, by including indicator variables for changes in enforcement and IFRS adoption, and their interactions. Specifically, I estimate the following two models using a difference-in-differences approach, including country- and year-fixed effects:

$$GDPG_{ct+1} = \gamma_c + \lambda_t + \beta_1 \Delta ENF_{ct} \times ACCRUAL_{ct} + \beta_2 \Delta ENF_{ct} \times CASHFLOW_{ct} + \beta_3 ACCRUAL_{ct} + \beta_4 CASHFLOW_{ct} + \beta_5 \Delta ENF_{ct} + \delta X_{ct} + \varepsilon_{ct+1} \quad (9a)$$

$$GDPG_{ct+1} = \gamma_c + \lambda_t + \beta_1 \Delta ENF_{ct} \times IFRS_{ct} \times ACCRUAL_{ct} + \beta_2 \Delta ENF_{ct} \times IFRS_{ct} \times CASHFLOW_{ct}$$
$$+ \beta_3 \Delta ENF_{ct} \times ACCRUAL_{ct} + \beta_4 \Delta ENF_{ct} \times CASHFLOW_{ct}$$
$$+ \beta_5 IFRS_{ct} \times ACCRUAL_{ct} + \beta_6 IFRS_{ct} \times CASHFLOW_{ct}$$
$$+ \beta_7 ACCRUAL_{ct} + \beta_8 CASHFLOW_{ct} + \beta_9 \Delta ENF_{ct} \times IFRS_{ct} + \beta_{10} \Delta ENF_{ct} + \beta_{11} IFRS_{ct}$$
$$+ \delta X_{ct} + \varepsilon_{ct+1} \quad (9b)$$

Variables are as defined above and in Appendix A, except as follows: ΔENF_{ct} is an indicator variable set to one if a country c's substantive increase in enforcement takes effect by year t.[37] An example of a substantive increase in enforcement includes "the creation of new supervisory agencies and the initiation of a proactive review process of financial statement information by the local supervisory authority" (Christensen et al., 2013, p. 170).

If Christensen et al.'s explanation does not apply at the aggregate level (i.e., if changes in enforcement do not affect the predictive ability of aggregate accruals and cash flows), I expect β_1 and β_2 in model (9a) to be not reliably different from zero. In model (9b), I expect β_1, β_2, β_3, β_4, and β_6 to be not reliably different from zero, while β_5 to be positive, which would be consistent with my main findings in Table 5.

Results in Table 12 show that there is no change in the predictive ability of aggregate accruals and aggregate cash flows with changes in enforcement. Column 1

[37] Christensen et al.'s (2013) Table 1 provides countries' dates of adopting substantive changes in financial reporting enforcement.

shows that the coefficients on ΔENF×ACCRUAL and ΔENF×CASHFLOW are not statistically significant at conventional levels. Consistent with no effects from changes in enforcement, column 2 shows that the coefficients on ΔENF×IFRS×ACCRUAL, ΔENF×IFRS×CASHFLOW, ΔENF×ACCRUAL, and ΔENF×CASHFLOW are not statistically significant at conventional levels. In contrast, the coefficient on IFRS×ACCRUAL is 1.303, significant at the 1 percent level, and the coefficient on IFRS×CASHFLOW is not significant at conventional levels. Thus, the results in Table 12 are consistent with my main finding that IFRS adoption improves the predictive ability of aggregate accruals for one-year-ahead GDP change. These findings suggest that the switch from local GAAP to IFRS reporting, rather than changes in enforcement, played a primary role in reducing the common measurement error inherent in the financial reporting system in measuring firms' true economic performance.

Table 12: Change in Enforcement, IFRS Adoption, and the Predictive Ability of Aggregate Accruals for One-Year-Ahead GDP change

Dependent Variable	$GDPG_{t+1}$	
	(1)	(2)
ΔENF×IFRS×ACCRUAL(EW)		-0.697
		(3.407)
ΔENF×IFRS×CASHFLOW(EW)		0.215
		(1.174)
IFRS×ACCRUAL(EW)		1.303***
		(0.449)
IFRS×CASHFLOW(EW)		-0.143
		(0.276)
ΔENF×ACCRUAL(EW)	1.162	0.813
	(0.741)	(3.353)
ΔENF×CASHFLOW(EW)	-0.369	-0.474
	(0.256)	(1.126)
ACCRUAL(EW)	0.421**	0.426**
	(0.205)	(0.203)
CASHFLOW(EW)	0.664***	0.702***
	(0.194)	(0.172)
GDPG	0.101*	0.092
	(0.059)	(0.058)
RETURN(EW)	0.008	0.007
	(0.016)	(0.013)
INFLATION	0.223	0.261
	(0.238)	(0.175)
T-Bill	0.427**	0.469***
	(0.171)	(0.129)
TERM	-0.194	-0.103
	(0.351)	(0.326)
UNEMPLOYMENT	-0.010	-0.007
	(0.028)	(0.027)
ΔENF	0.039	0.027
	(0.030)	(0.155)
IFRS		0.003
		(0.024)
ΔENF*IFRS		-0.015
		(0.157)
Country Fixed Effect	YES	YES
Year Fixed Effect	YES	YES
S.E. Clustered	Country	Country
Observations	585	585
R-squared	0.524	0.540

Table 12 reports the results of estimating models (9a) and (9b) (i.e., a regression of country c's GDP change in year t+1 on aggregate accruals, aggregate cash flows, a ΔENF indicator variable, an IFRS indicator variable, their interactions with aggregate accruals and cash flows, as well as macroeconomic variables). ΔENF_{ct} is an indicator variable set to one if country c's substantive increase in enforcement takes effect by year t. An example includes "the initiation of a proactive review process of financial statement information by the local supervisory authority" (Christensen et al., 2013, p. 170). All other variables are defined in Appendix A. Standard errors, adjusted for heteroskedasticity and within-country clustering, are in parentheses. The statistical significance of coefficients is indicated as follows: *** p<0.01, ** p<0.05, * p<0.10.

5.4.2 Robustness Test using Tercile-based Differences between Local GAAP and IFRS for 52 Accounting Items

In Table 8, I expect the main effect of aggregate accruals (ACCRUAL) to be positive, based on the view that for countries that had fewer differences between IFRS and local GAAP, accruals' ability to capture real economic activity under local GAAP should be similar to that under IFRS. That is, for the LOW GAAP DIFFERENCE group, aggregate accruals should exhibit some predictive ability for one-year-ahead GDP change in the pre-IFRS adoption period, similar to that in the post-IFRS adoption period. However, inconsistent with this expectation, the coefficient on ACCRUAL in the LOW GAAP DIFFERENCE group is not significantly positive at conventional levels. To shed light on this puzzling result, I conduct the same test as in Table 8 after partitioning the GAAP DIFFERENCE measure into terciles by defining the high (low) GAAP difference group as the group whose number of differences between local GAAP and IFRS falls in the highest (lowest) tercile of the total differences between local GAAP and IFRS. This research design is based on the view that finer partitioning in a cross-sectional analysis will reduce the noise in the cross-sectional proxy (i.e., the GAAP DIFFERENCE measure in my study) and increase the power of a statistical test. The reason is that when partitions are finer, the members of a group are more homogeneous (Lang and Lundholm, 1996).

Column 1 in Table 13 reveals that for the LOW GAAP DIFFERENCE group, the coefficient on the main effect ACCRUAL is 1.082, significant at the 10 percent level, and the coefficient on IFRS×ACCRUAL is not significant at conventional levels, consistent

with the results in Table 8. For the HIGH GAAP DIFFERENCE group, the results are similar to those in Table 8. That is, the coefficients on IFRS×ACCRUAL and ACCRUAL are positive and significant at the 10 percent level or better. Overall, the results in Table 13 suggest that the effect of IFRS adoption on the predictive ability of aggregate accruals is more pronounced for the HIGH GAAP DIFFERENCE group and that for the LOW GAAP DIFFERENCE group, the quality of aggregate accruals in terms of reflecting future real economic activity is high under local GAAP because local GAAP is similar to IFRS.

Table 13: Robustness Test using Tercile-based Differences between Local GAAP and IFRS for 52 Accounting Items

	LOW GAAP DIFFERENCE	HIGH GAAP DIFFERENCE
Dependent Variable	***GDPG*$_{t+1}$**	
IFRS×ACCRUAL(EW)	1.001	2.060**
	(0.707)	(0.812)
IFRS×CASHFLOW(EW)	-0.521	0.685
	(0.431)	(0.575)
ACCRUAL(EW)	1.082*	0.737*
	(0.583)	(0.395)
CASHFLOW(EW)	0.701*	0.801**
	(0.381)	(0.381)
Control Variables	YES	YES
Country-Fixed Effect	YES	YES
Year-Fixed Effect	YES	YES
S.E. Clustered	Country	Country
Observations	164	179
R-squared	0.669	0.703

Table 13 shows the results of a cross-sectional analysis based on low versus high GAAP difference groups. Because *gaapdiff2* indicates the number of differences between local GAAP and IAS for both IFRS-adopting countries and non-adopting countries, I estimate the model in equation (4) (i.e., a regression of country c's GDP change in year t+1 on aggregate accruals, aggregate cash flows, an indicator variable for IFRS adoption, its interaction with aggregate accruals and cash flows, as well as macroeconomic variables) for low and high GAAP difference groups, separately. I define the high (low) GAAP difference group as the group whose number of differences between local GAAP and IFRS falls in Tercile 3 (Tercile 1) of the cross-sectional value of the total number of differences between local GAAP and IFRS. My measure is based on *gaapdiff2* in Bae et al. (2008), constructed based on 52 accounting items in International Accounting Standards (IAS). The sample period covers 1991 to 2011. Variable definitions are in Appendix A. Standard

errors, adjusted for heteroskedasticity and within-country clustering, are in parentheses. The statistical significance of coefficients is indicated as follows: *** p<0.01, ** p<0.05, * p<0.10.

5.4.3 Pseudo Test on the Non-Adopting Countries' Predictive Ability of Aggregate Accruals and Cash Flows for One-Year-Ahead GDP Change

To support my main finding that the effect of IFRS adoption on the predictive ability of aggregate accruals exists only for the adopting countries in the post-adoption period, not for the non-adopting countries, I estimate model (10) using non-adopting countries. This estimation provides evidence on whether the predictive ability of aggregate accruals or cash flows is altered for the non-IFRS adopters in a pseudo post-adoption period. Specifically, I estimate the following model:

$$GDPG_{ct+1} = \alpha + \beta_1 POST_t \times ACCRUAL_{ct} + \beta_2 POST_t \times CASHFLOW_{ct} + \beta_3 ACCRUAL_{ct} + \beta_4 CASHFLOW_{ct} + \beta_5 POST_t + \delta X_{ct} + \varepsilon_{ct+1} \quad (10)$$

Variables are as defined above and in Appendix A, except as follows: $POST_t$ is an indicator variable set to one if year t is 2005 or later, and zero otherwise. POST is a pseudo-test variable whose estimated coefficient captures an incremental change in non-adopting countries' predictive ability of aggregate accruals and cash flows starting in 2005, the largest IFRS adoption year in terms of the number of adopting countries. Under my alternative hypothesis that for the non-adopting countries the predictive ability of aggregate accruals and cash flows does not change with IFRS adoption, I expect β_1 and β_2 to be not reliably different from zero.

Results in Table 14 reveal no change in the predictive ability of aggregate accruals and cash flows for one-year-ahead GDP change. The coefficients on POST×ACCRUAL and POST×CASHFLOW are not significant at conventional levels, indicating that the predictive ability of aggregate accruals and cash flows do not change at the 2005 IFRS adoption year for the non-adopting countries.

Table 14: Pseudo Test on Non-Adopting Countries' Predictive Ability of Aggregate Accruals and Cash Flows for One-Year-Ahead GDP change

Dependent Variable	***GDPG$_{t+1}$***	
	(1)	(2)
POST×ACCRUAL(EW)	-0.841	-1.226
	(0.947)	(0.899)
POST×CASHFLOW(EW)	0.190	0.250
	(0.193)	(0.169)
ACCRUAL(EW)	-0.519	-0.535
	(0.584)	(0.737)
CASHFLOW(EW)	0.353	0.519
	(0.228)	(0.351)
GDPG	0.106	0.066
	(0.073)	(0.071)
RETURN(EW)	0.062	0.057
	(0.034)	(0.039)
INFLATION	1.627***	1.574***
	(0.308)	(0.386)
T-Bill	-1.135***	-1.040*
	(0.332)	(0.528)
TERM	0.046	0.227
	(0.116)	(0.297)
UNEMPLOYMENT	0.011	0.004
	(0.026)	(0.032)
POST	-0.013	N.A.
	(0.042)	due to FE
Constant	0.011	N.A.
	(0.035)	due to FE
Country-Fixed Effect	NO	NO
Year-Fixed Effect	NO	YES
S.E. Clustered	Country	Country
Observations	151	151
R-squared	0.371	0.402

Table 14 reports the results of estimating model (10) using the non-adopting countries (i.e., a regression of non-adopting country c's GDP change in year t+1 on aggregate accruals, aggregate cash flows, the POST indicator variable, its interactions with aggregate accruals and cash flows, as well as macroeconomic variables). $POST_t$ is an indicator variable set to one if year t is 2005 or later, and zero otherwise. All other variables are defined in Appendix A. Standard errors, adjusted for heteroskedasticity and within-country

clustering, are in parentheses. The statistical significance of coefficients is indicated as follows: *** p<0.01, ** p<0.05, * p<0.10.

5.4.4 Additional Test for Dynamic Timing Effects of IFRS Adoption on Aggregate Accruals' Predictive Ability for One-Year-Ahead GDP Change

I test whether the effect of IFRS adoption on the predictive ability of aggregate accruals in the first adoption year differs from the effect in years t+1 and t+2 relative to the adoption year t. IFRS 1 permits but does not require a first-time adopter to choose exceptions to measurement principles of other IAS/IFRS and the general requirement of retrospective application. For example, "IFRS 1 permits previous goodwill practice to continue for old goodwill" (Nobes, 2006, p. 242). Specifically, a U.K. firm may choose to report pre-1998 goodwill at zero and to amortize subsequent goodwill over 20 years. The resulting incoherent goodwill figure from a U.K. balance sheet is recorded on the first-time IFRS balance sheet. Consequently, under IFRS, U.K. firms are likely to have less goodwill than otherwise similar firms in other countries, including France.

Given the number and nature of exceptions available to first-time IFRS adopters, whether IFRS adoption would affect the predictive ability of aggregate accruals in the first adoption year differently from the effect in subsequent years is an empirical question. To test this hypothesis, I modify model (8) to include different timing indicator variables. Specifically, I change IFRS[0,+1] in model (8) to IFRS[0] and set it to one if IFRS were adopted for country c in year t, and zero otherwise. This change allows me to capture the first IFRS-adoption-year effect on the predictive ability of aggregate accruals. To capture

the second IFRS-adoption-year effect, I change IFRS[2+] in model (8) to IFRS[+1] and set it to one if IFRS were adopted for country c in year t+1, and zero otherwise. I add a new indicator variable, IFRS[+2] and set it to one if IFRS were adopted for country c in year t+2, and zero otherwise. The coefficient on IFRS[+2] captures the third IFRS-adoption-year effect on the predictive ability of aggregate accruals. I estimate model (11), with different IFRS adoption timing indicators, country- and year-fixed effects:

$$\begin{aligned} GDPG_{ct+1} = {} & \gamma_c + \lambda_t + \beta_1 IFRS[-2]_{ct} \times ACCRUAL_{ct} + \beta_2 IFRS[-2]_{ct} \times CASHFLOW_{ct} \\ & + \beta_3 IFRS[-1]_{ct} \times ACCRUAL_{ct} + \beta_4 IFRS[-1]_{ct} \times CASHFLOW_{ct} \\ & + \beta_5 IFRS[0]_{ct} \times ACCRUAL_{ct} + \beta_6 IFRS[0]_{ct} \times CASHFLOW_{ct} \\ & + \beta_7 IFRS[+1]_{ct} \times ACCRUAL_{ct} + \beta_8 IFRS[+1]_{ct} \times CASHFLOW_{ct} \\ & + \beta_9 IFRS[+2]_{ct} \times ACCRUAL_{ct} + \beta_{10} IFRS[+2]_{ct} \times CASHFLOW_{ct} \\ & + \beta_{11} ACCRUAL_{ct} + \beta_{12} CASHFLOW_{ct} + \beta_{13} IFRS_{ct} + \delta X_{ct} + \varepsilon_{ct+1} \end{aligned} \quad (11)$$

If the effect of the first-IFRS-adoption year is similar to the effects of the subsequent-IFRS-adoption years in terms of the predictive ability of aggregate accruals for one-year-ahead GDP change, I expect β_5 to be statistically not different from β_7 and β_9.

Results of this estimation are in Table 15. Using Wald tests that compare the coefficients on IFRS[0]×ACCRUAL(EW) and IFRS[+1]×ACCRUAL(EW) and that compare the coefficients on IFRS[0]×ACCRUAL(EW) and IFRS[+2]×ACCRUAL(EW), I find that β_5 is not statistically different from β_7 and β_9, respectively, at conventional levels. These findings suggest that the effect of the first-time IFRS adoption year is not unusual in terms

of its effect on aggregate accruals' predictive ability, when compared with the effects of the second and third IFRS adoption years.

Table 15: Additional Test for Dynamic Timing Effects of IFRS Adoption on Aggregate Accruals' Predictive Ability for One-Year-Ahead GDP Change

Dependent Variable	$GDPG_{t+1}$
IFRS[-2]×ACCRUAL(EW)	-0.253
	(0.426)
IFRS[-2]×CASHFLOW(EW)	-0.284
	(0.314)
IFRS[-1]×ACCRUAL(EW)	0.088
	(0.554)
IFRS[-1]×CASHFLOW(EW)	-0.137
	(0.476)
IFRS[0]×ACCRUAL(EW)	1.318**
	(0.516)
IFRS[0]×CASHFLOW(EW)	-0.259
	(0.385)
IFRS[+1]×ACCRUAL(EW)	1.170**
	(0.541)
IFRS[+1]×CASHFLOW(EW)	0.195
	(0.336)
IFRS[+2]×ACCRUAL(EW)	1.360***
	(0.417)
IFRS[+2]×CASHFLOW(EW)	-0.585
	(0.472)
ACCRUAL(EW)	0.456**
	(0.223)
CASHFLOW(EW)	0.751***
	(0.194)
GDPG	0.100
	(0.066)
RETURN(EW)	0.007
	(0.016)
INFLATION	0.289
	(0.248)
T-Bill	0.486***
	(0.174)
TERM	-0.072
	(0.337)
UNEMPLOYMENTG	-0.000
	(0.027)
IFRS	-0.004
	(0.020)
Comparing Coefficients on IFRS[0]×ACCRUAL(EW) vs. IFRS[+1]×ACCRUAL(EW)	
Wald Test F-statistic (H_0: $\beta_5 = \beta_7$) = 0.08	
p-value = 0.783	
Comparing Coefficients on IFRS[0]×ACCRUAL(EW) vs. IFRS[+2]×ACCRUAL(EW)	
Wald Test F- statistic (H_0: $\beta_5 = \beta_9$) = 0.00	
p-value = 0.949	
Country-Fixed Effect	YES
Year-Fixed Effect	YES
S.E. Clustered	Country
Observations	585
R-squared	0.557

Table 15 reports the results of estimating model (11) (i.e., a regression of country c's GDP change in year t+1 on aggregate accruals, aggregate cash flows, five IFRS indicator variables, their interactions with aggregate accruals and cash flows, as well as macroeconomic variables). The five IFRS indicator variables include IFRS[-2] and IFRS[-1], set to one if IFRS will be adopted within two years and within one year by country c, respectively (i.e., two years and one year before IFRS adoption at year t, respectively), and zero otherwise; IFRS[0], set to one if IFRS were adopted for country c in year t, and zero otherwise; IFRS[+1], set to one if IFRS were adopted for country c in year t+1, and zero otherwise; and IFRS[+2], set to one if IFRS were adopted for country c in year t+2, and zero otherwise. All other variables are defined in Appendix A. Standard errors, adjusted for heteroskedasticity and within-country clustering, are in parentheses. The statistical significance of coefficients is indicated as follows: *** p<0.01, ** p<0.05, * p<0.10.

5.5 Other Robustness Tests

In untabulated analyses, I show that inferences are similar to those reported: (1) when I estimate firm-level accruals using the statement of cash flows (i.e., net income before extraordinary items minus operating cash flows from a statement of cash flows),[38] (2) when standard errors are estimated using bootstrap standard errors with repetitions of 100, 500, 1,000, 2,000, 5,000, and 10,000 with random seeds, (3) when China, Japan, or the U.S. is removed from the sample, (4) when the sample is limited to the OECD countries, (5) when lagged GDP changes from year t-1 to t-4 are added as additional control variable(s), (6) when the financial crisis period (e.g., 2007, 2008, 2009, separately, 2007-2008 or 2008-2009) is removed, and (7) when the GAAP difference measure (*gaapdiff2*) is restricted to the number of differences related to measurement and recognition (that is, differences owing to local GAAP specifying different rules or no rules

[38] Consistent with prior IFRS studies (e.g., Lang et al. 2012), I use the balance sheet approach for my main analyses to preserve sample size because some adopting countries' local GAAP (e.g., Greece) did not require listed firms to file a statement of cash flows.

for the measurement and recognition of firms' fundamentals relating to leases, defined benefit pensions, business combinations, asset impairments, and intangible assets).

6. Conclusion

This study examines whether IFRS adoption, a wholesale change in accounting standards, affects the ability of aggregate accruals to predict one-year-ahead GDP change. Using aggregate difference-in-differences analysis across 34 countries, I find that the extent to which aggregate accruals predict GDP change is greater for countries that adopted IFRS than for countries that did not. The mechanism for this increase in predictive ability appears to be that IFRS adoption increases aggregate accruals' predictive ability for aggregate cash flows and earnings (components of GDP as corporate profits) and for change in corporate investment and change in unemployment rate (macroeconomic factors related to GDP change). Additional analysis indicates that a country's IFRS adoption changes aggregate accruals' explanatory ability for the variance of one-year-ahead aggregate cash flows, whereas there is no change in aggregate cash flows' explanatory ability for the variance of one-year-ahead aggregate cash flows before and after IFRS adoption. The results are more pronounced for countries with greater differences between local GAAP and IFRS and for countries with stronger enforcement.

Overall, the results support the view that aggregate-level accounting information (particularly accruals) is useful in capturing economy-wide real activities. In contrast to previous research in which the effects of new accounting standards are assessed at the firm level and not at the aggregate level, these findings suggest that a change in accounting standards can improve forward-looking information about firms'

fundamentals reflected in aggregate accruals by reducing measurement and recognition imperfections that are common to most or all firms in an economy.

Appendix A

VARIABLE	DEFINITION	SOURCE
AGGREGATE	$\sum_{i=1}^{N_c} \alpha_i \, y_{c,i,t}$ where $y_{c,i,t} = \left\{ \left(\frac{NIBEX_{c,i,t}}{ATA_{c,i,t}}\right), \left(\frac{ACC_{c,i,t}}{ATA_{c,i,t}}\right), \left(\frac{CF_{c,i,t}}{ATA_{c,i,t}}\right) \right\}$; α_i = equal-weight or value-weight $\left(\text{by market capitalization}_{c,i,t-1}\right)$; $ATA_{c,i,t} = \frac{1}{2}(Asset_{c,i,t} + Asset_{c,i,t-1})$; $NIBEX_{c,i,t}$=Net income before extraordinary items; $ACCRUAL_{c,i,t} = \Delta CA - \Delta CL - \Delta CASH + \Delta STDEBT - DEPN$; $CF_{c,i,t} = NIBEX_{c,i,t} - ACCRUAL_{c,i,t}$; ΔCA = firm i's change in current assets between year t-1 and t; ΔCL = firm i's change in current liabilities between year t-1 and t; ΔCASH = firm i's change in cash between year t-1 and t; ΔSTDEBT = firm i's change in debt in current liabilities between year t-1 and t; and DEPN = firm i's depreciation and amortization expense in year t. Equal-weighted averages of scaled earnings $\left(\frac{NIBEX_{c,i,t}}{ATA_{c,i,t}}\right)$, scaled accruals $\left(\frac{ACC_{c,i,t}}{ATA_{c,i,t}}\right)$, and scaled cash flows $\left(\frac{CF_{c,i,t}}{ATA_{c,i,t}}\right)$ are denoted as EARNING(EW), ACCRUAL(EW), and CASHFLOW(EW), respectively. In the sensitive analyses, I also use value-weighted averages of the same variables based on the beginning of year t market capitalization and denote them as EARNING(VW), ACCRUAL(VW), and CASHFLOW(VW), respectively.	WorldScope /Datastream
IFRS	An indicator variable set to one if IFRS are adopted by time t and in country c.	IAS PLUS
$GDPG_{t+1\,(t)}$	Country's nominal GDP percent change from year t (t-1) to year t+1 (t) (i.e., $\frac{GDP_{ct+1(t)} - GDP_{ct(t-1)}}{GDP_{ct(t-1)}}$) where GDP is measured at current market prices (purchaser's prices) and is the sum of gross value added by all resident producers in the economy plus product taxes and minus subsidies not included in the value of the products.	World Bank
PREDICTIVE_ ABILITY	Country-level explanatory ability from a regression of equal-weighted aggregate cash flows in year t+1 on equal-weighted aggregate accruals in year t, and measures the extent to which aggregate accruals explain the variance of one-year-ahead aggregate cash flows. It is estimated using country-specific time-series regressions in 5-year rolling windows before and after the IFRS adoption period, separately, to prevent confounding effects from either period. A larger value of PREDICTIVE_ABILITY corresponds to greater aggregate accruals' predictive ability for one-year-ahead aggregate cash flows.	WorldScope

VARIABLE	DEFINITION	SOURCE
AR(1)_R²	Country-level explanatory ability from a regression of equal-weighted aggregate cash flows in year t+1 on equal-weighted aggregate cash flows in year t and measures the extent to which aggregate cash flows explain the variance of one-year-ahead aggregate cash flows. It is estimated using country-specific time-series regressions in 5-year rolling windows before and after the IFRS adoption period, separately, to prevent confounding effects from either period. A larger value of AR(1)_R² corresponds to greater aggregate cash flows' predictive ability for one-year-ahead aggregate cash flows.	WorldScope
RETURN(EW)	Equal-weighted average of country c's stock market returns in year t.	Datastream
INFLATION	Annual rate of price change in country c's economy in year t.	World Bank
T-BILL	Average of the 3-month treasury bill rate for country c in year t.	World Bank/ OECD/IMF
TERM	Average spread between T-BILL and 10-year government bond rate for country c in year t.	World Bank/ OECD/IMF
UNEMPLOYMENTG	Annual rate of change in the share of the labor force that is without work and seeking employment for country c in year t.	World Bank
INVESTMENTG	Annual growth rate of aggregate corporate investment for country c in year t.	World Bank
ΔENF	An indicator variable set to one if a country c's substantive increase in financial reporting enforcement takes effect by year t.	Christensen et al. (2013)
POST	An indicator variable set to one if year t is 2005 or later, and zero otherwise.	IAS PLUS
IFRS[-2]	An indicator variable set to one if IFRS will be adopted within two years (i.e., two years before the IFRS adoption at year t), and zero otherwise.	IAS PLUS
IFRS[-1]	An indicator variable set to one if IFRS will be adopted within one year by country c (i.e., one year before the IFRS adoption at year t), and zero otherwise.	IAS PLUS
IFRS[0,+1]	An indicator variable set to one if IFRS were adopted for country c in year t or t+1, and zero otherwise.	IAS PLUS
IFRS[2+]	An indicator variable set to one if IFRS were adopted for country c in year t+2 or thereafter, and zero otherwise.	IAS PLUS
IFRS[0]	An indicator variable set to one if IFRS were adopted for country c in year t, and zero otherwise.	IAS PLUS
IFRS[+1]	An indicator variable set to one if IFRS were adopted for country c in year t+1, and zero otherwise.	IAS PLUS
IFRS[+2]	An indicator variable set to one if IFRS were adopted for country c in year t+2, and zero otherwise.	IAS PLUS

Appendix B

Part 1: This section shows the calculation of $COV\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}, v\right)$:

$$GDPG_{c,t+1} = \beta\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c} - \eta_{c,t}\right) + \frac{\sum_{i=1}^{N_c} \epsilon_{c,i,t+1}}{N_c} = \beta\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right) + v$$

where $v = -\beta\eta_{c,t} + \frac{\sum_{i=1}^{N_c} \epsilon_{c,i,t+1}}{N_c}$. From the equation above and given that $y_{c,i,t} = X_{c,i,t} + \eta_{c,t} + \delta_{i,t}$, the covariance between the covariate ($\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}$) and the aggregate measurement error (v) can be shown as follows:

$$\begin{aligned}
COV\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}, v\right) &= \frac{1}{N_c}\sum_{i=1}^{N_c} COV(y_{c,i,t}, v) \\
&= \frac{1}{N_c}\sum_{i=1}^{N_c}\left[COV\left(y_{c,i,t}, \frac{\sum_{i=1}^{N_c} \epsilon_{c,i,t+1}}{N_c}\right) - \beta(COV(y_{c,i,t}, \eta_{c,t})\right] \\
&= \frac{1}{N_c}\sum_{i=1}^{N_c}\left[\frac{1}{N_c}\sum_{i=1}^{N_c} COV(y_{c,i,t}, \epsilon_{c,i,t+1}) - \beta(COV(y_{c,i,t}, \eta_{c,t})\right] \\
&= -\frac{\beta}{N_c}\sum_{i=1}^{N_c}[COV(y_{c,i,t}, \eta_{c,t})] \\
&= -\frac{\beta}{N_c}\sum_{i=1}^{N_c}[COV(X_{c,i,t} + \eta_{c,t} + \delta_{i,t}, \eta_{c,t})] \\
&= -\frac{\beta}{N_c}\sum_{i=1}^{N_c} VAR(\eta_{c,t}) \\
&= -\beta\sigma^2_{\eta_{c,t}} \neq 0
\end{aligned}$$

Part 2: This part shows the convergence of the estimator β in probability (i.e., $p\lim\hat{\beta}_{OLS}$):

$$p\lim\hat{\beta}_{OLS} = \frac{COV\left(GDPG_{c,t+1}, \frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)}{VAR\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)}$$

$$= \frac{COV\left(\beta\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c} + \frac{\sum_{i=1}^{N_c} \epsilon_{c,i,t+1}}{N_c} - \beta\eta_{c,t}, \frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)}{VAR\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)}$$

$$= \frac{\beta VAR\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right) - \beta COV\left(\eta_{c,t}, \frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)}{VAR\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)}$$

$$= \beta\left(1 - \frac{COV\left(\eta_{c,t}, \frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)}{VAR\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)}\right)$$

$$= \beta\left(1 - \frac{\sigma_{\eta_{c,t}}^2}{VAR\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)}\right)$$

Part 3: This part shows the detailed calculation for equation (3):

$$\sigma_{\bar{X}_c}^2 \equiv VAR\left(\frac{\sum_{i=1}^{N_c} y_{c,i,t}}{N_c}\right)$$

$$= VAR\left(\frac{\sum_{i=1}^{N_c} X_{c,i,t}}{N_c} + \eta_{c,t}\right)$$

$$= \frac{1}{N_c^2} VAR\left(\sum_{i=1}^{N_c} X_{c,i,t}\right) + VAR\left(\eta_{c,t}\right)$$

$$= \underset{\text{Indp.}}{\text{Ass.}} \frac{1}{N_c^2} VAR\left(\sum_{i=1}^{N_c} X_{c,i,t}\right) + VAR(\eta_{c,t})$$

$$= \underset{\text{AR(1)}}{\text{From}} \frac{1}{N_c^2}\sum_{i=1}^{N_c}\frac{\sigma_{\epsilon_{c,i}}^2}{1-\beta^2} + \sigma_{\eta_{c,t}}^2$$

$$= \frac{1}{N_c^2(1-\beta^2)}\sum_{i=1}^{N_c}\sigma_{\epsilon_{c,i}}^2 + \sigma_{\eta_{c,t}}^2$$

Part 4: This section shows how the variance of the imperfections in measurement that are common across all firms that comply with the same accounting standards affects the attenuation bias in the estimated coefficient $\hat{\beta}$.

Let's redefine $f(x) \equiv 1 - \frac{\sigma^2_{\eta_{c,t}}}{2\sigma^2_{\eta_{c,t}} + \frac{1}{N_c^2(1-\beta^2)}\sum_{i=1}^{N_c}\sigma^2_{\epsilon_{c,i}}}$, $x \equiv \sigma^2_{\eta_{c,t}}$, and $z \equiv \frac{1}{N_c^2(1-\beta^2)}\sum_{i=1}^{N_c}\sigma^2_{\epsilon_{c,i}}$, and take a first-order derivative of the attenuation factor of the signal-to-total variance ratio with respect to x:

$$f(x) = 1 - \frac{x}{2x + z}$$

$$\Rightarrow \frac{df(x)}{dx} = -\frac{2x + z - 2x}{(2x + z)^2} = -\frac{z}{(2x + z)^2} < 0$$

The result indicates that the higher x (i.e., the variance of the common measurement error) is, the more severe is the attenuation bias ($\hat{\beta} < \beta$).

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