

# The Impact of Mandatory IFRS Adoption on Foreign Mutual Fund Ownership: The Role of Comparability

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## Abstract

Proponents of International Financial Reporting Standards (IFRS) claim that mandating a uniform set of accounting standards improves financial statement comparability that in turn attracts greater cross-border investment. Our study tests this assertion by examining the change in foreign mutual fund investment in IFRS users following the mandatory adoption of IFRS in the European Union (EU) in 2005. We predict that mandatory IFRS adoption improves comparability only in countries with credible implementation, and that the improvement is stronger for companies experiencing larger increases in uniformity (where increased uniformity is defined as an increase in the number of industry peers using the same accounting standards). We support our prediction by finding that foreign mutual fund ownership increases following mandatory IFRS adoption only in countries with strong implementation credibility, and that the increase is greater in companies with larger increases in uniformity.

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# The Impact of Mandatory IFRS Adoption on Foreign Mutual Fund Ownership: The Role of Comparability

## 1. Introduction

Comparability is a qualitative characteristic of financial information that is expected to enhance its usefulness (FASB 1980, 2008; IASB 1989, 2008). Advocates of mandatory IFRS adoption claim that IFRS increases financial statement comparability, which in turn leads to greater cross-border investment (e.g., McCreevy 2005; Bielstein et al. 2007; SEC 2008; Tweedie 2008). The purpose of this study is to test this assertion by examining whether the EU's mandatory adoption of IFRS in 2005 results in improved comparability that leads to increased investment by foreign mutual funds.

We expect improved financial statement comparability to reduce the information acquisition costs of global investors and thereby increase their investment in foreign firms (Kang and Stulz 1997; Morgan Stanley Dean Witter 1998). But while mandatory IFRS adoption increases financial statement uniformity, the improvement to comparability is likely to vary across adopters for two reasons. First, we only expect uniformity to improve comparability when the uniform standards are credibly implemented. Because IFRS is principles-based, there is flexibility in its implementation (Nally and Kaplan 2007; Henry 2008). Thus, we expect mandatory IFRS adoption to improve comparability only in countries with strong implementation credibility. Second, we expect increased uniformity to improve comparability more for some adopters than for others. For a given firm, increased uniformity improves comparability by increasing the number of industry peers that use the same accounting standards. Because the number

of IFRS adopters varies across countries and industries, the increase in comparable industry peers also varies. Thus, we expect a relatively larger improvement in comparability when IFRS results in a relatively greater increase in uniformity, where increased uniformity is defined as an increase in the number of industry peers using the same accounting standards. For these two reasons we hypothesize that mandatory IFRS adoption is more likely to result in increased foreign investment when (1) countries have strong implementation credibility and (2) firms experience a relatively larger increase in uniformity.

As in Armstrong et al. (2008) and Li (2009), we examine mandatory IFRS adoption in the EU. This is a unique setting for investigating the impact of financial reporting uniformity and comparability because thousands of public companies in the EU ceased using their countries' local accounting standards in 2005 and simultaneously adopted a common set of reporting standards. We use foreign mutual fund ownership to capture cross-border investment because mutual funds represent a sophisticated set of investors that generally base their investment decisions on detailed analyses of financial statements and are likely to benefit from improved comparability.

We test our hypothesis using a treatment group of 5,588 firm-year observations of mandatory adopters (who use IFRS only after it is mandated in 2005) in 14 EU countries and a benchmark group of 36,284 firm-year observations of non-adopters in ten countries that do not allow IFRS during the period of our analysis. Our primary research design consists of a regression that tests whether the change in foreign mutual fund holdings subsequent to mandatory IFRS adoption differs across proxies for (1) the strength of a

country's implementation credibility, and (2) the change in a firm's accounting standards uniformity.

We define implementation credibility using the country-level earnings quality score from Leuz et al. (2003), which captures the effects of country-level institutions on earnings quality. This measure is used in prior studies examining the impact of mandatory IFRS adoption, such as Daske et al. (2008), to capture reporting incentives.<sup>1</sup> We define uniformity as the number of firms that use the same accounting standard in the firm's industry. We measure changes in uniformity as the number of firms that use IFRS in a given industry subsequent to mandatory IFRS adoption, divided by the number of firms in a given country in that industry that use local accounting standards prior to mandatory adoption.<sup>2</sup> This measure captures the number of peer firms that local GAAP users can be compared with *after* mandatory IFRS adoption, relative to the number of peer firms they can be compared with *before* mandatory IFRS adoption.<sup>3</sup>

Using a difference-in-differences design, our baseline analysis regresses foreign mutual fund ownership on a dummy variable indicating the post adoption period (2006-2007), a dummy variable indicating whether the firm is a mandatory adopter, and their interaction. The coefficient on the interaction term captures the change in foreign mutual fund ownership in mandatory adopters after the IFRS mandate, relative to the change for benchmark firms from countries that do not allow IFRS. As in prior literature (e.g., Covrig et al. 2007), we include several variables to control for potentially omitted

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<sup>1</sup> Daske et al. (2008) suggest that firms operating in countries with higher earnings quality exhibit stronger reporting incentives, and therefore are more responsive to the IFRS mandate.

<sup>2</sup> We use the term 'changes in uniformity' and 'increases in uniformity' interchangeably because mandatory IFRS adoption only leads to increased uniformity, not decreased uniformity.

<sup>3</sup> For example, assume there is one Austrian firm using Austrian GAAP and 20 U.K. firms using U.K. GAAP in the petroleum industry prior to mandatory IFRS adoption. Also, assume that there are 25 firms in the petroleum industry that use IFRS after mandatory adoption. The Austrian GAAP user will have a much larger increase in the uniformity measure (25/1) than the U.K. GAAP user (25/20).

correlated variables.<sup>4</sup> We test our hypothesis by running our baseline regression after partitioning our sample on the median values of our measures capturing implementation credibility and the change in uniformity. Consistent with our hypothesis, we find that foreign mutual funds increase their ownership in mandatory IFRS adopters that are in countries with strong implementation credibility, and that the increase in ownership is larger in firms experiencing greater increases in uniformity.

Since we argue that reduced information costs explain the increase in foreign mutual fund ownership associated with improved comparability, we perform two additional analyses to corroborate this argument. Our first analysis repeats our regression analysis after replacing foreign mutual fund ownership with domestic mutual fund ownership. We expect that the information cost argument is less likely to hold for domestic investors because these investors have better access to alternative information channels (such as managers and local analysts) and are more familiar with local accounting standards (Covrig et al. 2007). Consistent with this prediction, we find that improved comparability associated with mandatory IFRS adoption does not increase domestic mutual fund ownership.

Our second additional analysis separately examines the change in ownership among four types of foreign mutual funds as defined in prior studies (Chan et al. 2005, 2006; Covrig et al. 2007): (1) foreign global funds - foreign funds with at least 80% of their equity holdings in no specific country or region, (2) foreign regional funds - foreign mutual funds with at least 80% of their equity holdings in the investee firm's region, (3)

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<sup>4</sup> Our control variables consist of analyst following, firm size, a dummy variable indicating whether the firm is included in the MSCI World Index, a dummy variable indicating whether the firm is cross-listed in the U.S., a dummy variable indicating whether the firm is audited by a Big 5 auditor, return on equity, stock returns, return variation, leverage, dividend yield, book-to-market ratio, the earnings-to price ratio, and industry and country fixed effects.

foreign country funds - foreign mutual funds with at least 80% of their equity holdings in the investee firm's country, and (4) others foreign funds. Foreign global and regional funds have investments across a large number of countries, and hence, when compared with foreign country and other funds, are more likely to benefit from benchmarking with a larger set of firms. Consistent with our prediction that increased comparability is likely to be more important for foreign global and regional funds, we find that the effect of comparability on foreign mutual fund ownership is primarily driven by these funds.

We also find that our results are generally robust to a variety of sensitivity tests. These tests include the exclusion of control variables that are measured using accounting data (since the standards used to measure the variables change after 2005 for mandatory adopters), controlling for improvement in disclosure, the exclusion of firm-year observations from countries with influential observations (i.e., U.K., Japan, or the U.S.), and an alternative measure for implementation credibility based on an earnings quality index measured over our sample period.

Our findings make several contributions to the literature. First, we provide evidence that suggests implementation credibility is an important determinant of the effects of increased uniformity. Specifically, we find that large increases in uniformity only attract foreign mutual fund ownership in countries with strong implementation credibility. Consistent with the FASB/IASB Conceptual Framework, this suggests that uniformity does not necessarily lead to comparability, and that the effects of adopting a uniform set of accounting standards on cross-border investment critically depend on the economic institutions of the adopting country.

Second, we add to a growing body of literature on mandatory IFRS adoption by documenting the impact of enhanced comparability on cross-border investment.<sup>5</sup> Examining the impact of comparability is important because it is a key motivation behind the EU's decision to mandate IFRS adoption. While there are several concurrent papers examining the impact of mandatory IFRS adoption on cross-border investment, they generally do not explore the direct effects of comparability (e.g., Beneish et al. 2009; Bruggemann et al. 2009; Florou and Pope 2009; Yu 2009). Specifically, Beneish et al. (2009) examine whether mandatory IFRS adoption results in increased cross-border investment in equity and debt markets. They find that IFRS adoption does not affect cross-border equity investment, but positively impacts cross-border debt investment. In contrast, Bruggemann et al. (2009) and Yu (2009) focus the effect of mandatory IFRS adoption on foreign institutional investors and Florou and Pope (2009) focus on foreign individual investors. These studies document an increase in foreign institutional and individual ownership. While these concurrent papers do not study the effects of comparability, Yu (2009) attempts to address this issue by capturing improvement in comparability as the distance between the mutual funds' home GAAP and the adopting company's home GAAP. While Yu (2009) concludes that her findings are consistent with increased comparability reducing home bias, her GAAP distance measure is more likely to capture familiarity than comparability (Bradshaw et al. 2004).<sup>6</sup>

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<sup>5</sup> Another line of literature on IFRS adoption examines benefits from voluntary IFRS adoption (Covrig et al. 2007). We focus our discussion on studies examining mandatory IFRS adoption because voluntary IFRS adoption, when it is not yet widely used, can actually reduce firms' comparability with their peers. Thus, prior studies on voluntary IFRS adoption generally document the effect of increased disclosure, not comparability.

<sup>6</sup> The analysis of the change in mutual fund ownership in Yu (2009) also does not include variables that control for other reasons for which mutual fund ownership may change over the period of her investigation.

Third, we provide evidence on the consequences of comparability, a qualitative characteristic of financial reporting that is widely believed to increase the usefulness of accounting information. While standard setters and regulators have long acknowledged the benefits of enhanced financial statement comparability, few studies investigate its consequences. Exceptions are concurrent papers by De Franco et al. (2008), Barth et al. (2009), and Bradshaw et al. (2009). However, our study addresses different implications of comparability, and in a different setting. We also capture comparability using different empirical measures as compared with these papers. For example, De Franco et al. (2008) examine comparability among U.S. firms and measure comparability using financial statement outputs (such as covariance between a firm's earnings and the earnings of other firms in the same industry). Barth et al. (2009) also use output-based comparability measures (such as the value relevance of earnings) and examine the comparability of non-U.S. firms that use IFRS with U.S. firms that use U.S. GAAP. Bradshaw et al. (2009) measure comparability using commonality of accounting choices (such as depreciation method choice) and examines the impact of comparability on analysts forecast errors and dispersion. By comparison with these other papers, we contribute to the literature on comparability by providing evidence consistent with comparability playing an important role in IFRS adopters' attractiveness to foreign investors such as foreign mutual funds.

The remainder of the paper is organized as follows. Section 2 discusses our hypothesis development. Section 3 presents the research design and Section 4 reports the empirical results. Section 5 presents the additional analyses and Section 6 reports sensitivity tests. Section 7 concludes the study.



## **2. Hypothesis Development**

### **2.1 INCREASED COMPARABILITY AND FOREIGN INVESTMENT**

Comparability, one of the “enhancing qualitative characteristics” of accounting information, is a key motivation behind the initiative to converge global accounting standards and EU’s mandatory adoption of IFRS. Proponents of IFRS claim that mandatory adoption results in improved financial statement comparability that in turn leads to increased cross-border investment. For example, the European Commissioner for the Internal Market, Frits Bolkestein, states that adoption of IFRS will mean that *“investors and other stakeholders will be able to compare like with like. It will help European firms to compete on equal terms when raising capital on world markets”* (GAAP Convergence 2002).

The argument that improved comparability will lead to increased cross-border investment is consistent with the existing academic literature as well as the views of investment professionals. Prior studies suggest that a major factor explaining why investors are reluctant to make cross-border investments is the high costs of acquiring and processing information about foreign companies (Kang and Stulz 1997; Bradshaw et al. 2004; Chan et al. 2005; Covrig et al. 2007). Similarly, investment professionals often argue that a major obstacle to cross-border investment is the time-consuming reconciliation of differences in accounting standards across countries (Morgan Stanley Dean Witter 1998). Thus, improved financial statement comparability is expected to reduce information acquisition costs for foreign investors, thereby increasing their investment in foreign firms.

However, we expect the effects on comparability of adopting a uniform set of accounting standards, such as IFRS, to vary across firms for two reasons. First, increased uniformity only improves comparability when the uniform standards are credibly implemented; and second, IFRS adoption is likely to have a greater effect on uniformity for some firms than others. We discuss each of these in turn.

## **2.2 CREDIBLE IMPLEMENTATION OF UNIFORM STANDARDS**

Uniformity simply means requiring firms to apply the same set of standards, while comparability means treating like items alike and different items differently (FASB 2008; IASB 2008). Comparability is a characteristic of the relation between two or more items of information and should improve financial reporting quality by allowing financial statement users to identify similarities in, and differences between, two or more sets of economic phenomena. While comparability is the desired outcome of adopting a set of uniform accounting standards, uniformity alone does not necessarily result in comparability and an overemphasis on uniformity may actually reduce comparability. For example, if two firms have different operating characteristics, forcing them both to use the same set of accounting standards may make dissimilar economic phenomena appear similar, which impairs comparability. This is consistent with the FASB Concepts Statement 2, which states *“uniformity may even adversely affect comparability of information if it conceals real differences between enterprises.”* This is also consistent with a report from Moody’s Investor Service that states *“the financial statements currently prepared under IFRS are not necessarily any easier to compare. This is due to*

*a lack of standardization in certain areas, but we have also come across several instances of seemingly inconsistent interpretations by companies and their auditors.”<sup>7</sup>*

Based on prior cross-country accounting studies we posit that increased uniformity will improve comparability among firms in countries with strong implementation credibility, but will have little impact on comparability among firms in countries with weak implementation credibility. Prior literature suggests that weak country-level institutions can impair the implementation of high quality accounting standards (e.g., Ball et al. 2000, 2003; Hung 2000). Weak country-level institutions result in poor implementation of accounting standards, which in turn result in less credible financial reporting (Hung 2000). Because IFRS is principles-based, it allows the exercise of more management judgment and greater flexibility in its application (Nally and Kaplan 2007; Henry 2008). Thus, the increased uniformity that follows from IFRS mandatory adoption is unlikely to lead to financial statement comparability in countries with poor implementation credibility. Consequently, we predict that while the benefits from increased uniformity associated with mandatory IFRS adoption (such as increased cross-border investment) are likely to be evident in countries with strong implementation credibility, such benefits are likely to be undermined in countries with weak implementation credibility.

### **2.3 VARIATION IN INCREASED UNIFORMITY**

The benefits from increased comparability are based on the assumption that information about a given firm is more useful when it adopts the same accounting standards as the standards used by its industry peers. The notion is that increased uniformity leads to improved comparability, where increased uniformity is defined as an

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<sup>7</sup> See ‘Are we better off under IFRS?’ (Moody’s Investors Service, November 2008).

increase in the number of firms using the same accounting standards as the firm of interest. This is consistent with the SEC's emphasis on uniformity in its recent proposal to mandate IFRS in the U.S. In particular, the SEC's proposed roadmap to IFRS adoption states that U.S. companies qualify for early IFRS adoption when they are in industries where IFRS is the most frequently used foreign standards (SEC 2008). In other words, the proposal allows early adoption, but only when it results in a relatively large increase in uniformity between the adopter and its industry peers.

Mandatory IFRS adoption, however, will increase uniformity more for some firms than others. That is, the number of peer firms that local GAAP users can be compared with *after* mandatory IFRS adoption, may be relatively high or low when compared with the number of peer firms that they can be compared with *before* mandatory IFRS adoption. For example, compared to a U.K. firm using U.K. GAAP in the petroleum industry, an Austrian firm using Austrian GAAP in the same industry is expected to have a larger increase in uniformity subsequent to mandatory IFRS adoption because there are fewer firms using Australian GAAP than U.K. GAAP prior to mandatory IFRS adoption.

## **2.4 HYPOTHESIS**

Based on the above arguments, we expect the mandatory adoption of a uniform set of accounting standards, such as IFRS, to attract greater investment by foreign mutual funds if the standards increase financial reporting comparability. Further, IFRS adoption is more likely to increase comparability when IFRS is credibly implemented, and when it results in a relatively greater improvement in uniformity. This leads to the following hypothesis:

*Hypothesis: Mandatory IFRS adoption is more likely to result in increased foreign investment when countries have strong implementation credibility and companies experience a relatively larger increase in uniformity.*

### **3. Research Design**

We use foreign mutual fund holding to capture foreign investment because mutual funds represent a large and sophisticated subset of global investors (Chan et al. 2005; Covrig et al. 2007). To test our hypothesis, we begin our analysis by partitioning the sample based on a proxy for the strength of a country's implementation credibility and a proxy for the change in a firm's accounting standards uniformity. We then run a baseline regression that captures the change in foreign mutual fund holding subsequent to mandatory IFRS adoption in each partition and test whether the changes in foreign mutual fund holding differ across the partitions. We discuss the key variables used to partition our sample, the baseline regression model, and the predictions based on our hypothesis below.

#### **3.1 PROXIES FOR STRENGTH OF IMPLEMENTATION CREDIBILITY AND CHANGE IN UNIFORMITY**

We measure the credibility with which IFRS is likely to be implemented using the earnings quality score derived in Leuz et al. (2003). This score, which we refer to as "implementation credibility," is computed as the average rank across four measures of country-level earnings quality, with higher values indicating countries with relatively less implementation credibility. We classify firms into "strong implementation credibility" or "weak implementation credibility" using the country median value of the implementation credibility measure.

We define accounting standards uniformity for a firm as the number of industry peers using the same (i.e., uniform) accounting standards. We capture uniformity based on industry membership because of investment professionals' industry-oriented analysis when comparing global companies. The focus on industry-level comparison is also consistent with the SEC's industry-related guidelines for early IFRS adoption in the U.S. As in Daske et al. (2008) and Li (2009), our industry classifications are based on Campbell (1996), which results in a reasonably large number of observations per industry as compared with using 2-digit SIC codes. Consistent with the SEC's criteria for comparing U.S. firms with their worldwide peers, as outlined in its roadmap to IFRS adoption in the U.S., we use the universe of Compustat Global and North America databases to capture the firms and industries included in our uniformity measure.<sup>8</sup>

Our measure of the change in uniformity associated with mandatory IFRS adoption, referred to as “ $\Delta$ uniformity” equals the number of firms using IFRS in a given industry subsequent to the EU mandatory adoption, divided by the number of firms in a given country that use local accounting standards in that industry prior to the mandatory adoption. This measure captures the increase in the peer group that uses a given firm's accounting standards (or GAAP). Larger values of this measure indicate relatively larger increases in the industry peer group and therefore a greater increase in accounting standards uniformity. Since this variable is an industry-country-level measure, we classify firms into having a “large increase in uniformity” or a “small increase in

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<sup>8</sup> The only data constraint for a firm in the Compustat population to be included in our calculation of the comparability measures is that it needs to have non-missing industry and accounting standard code throughout our sample period.

uniformity” using the median value of the  $\Delta$ uniformity measure based on the industry-country-level observations.<sup>9</sup>

### 3.2 BASELINE REGRESSION

Our baseline regression models the overall impact of mandatory IFRS adoption on foreign mutual fund ownership in EU firms. Following prior literature, the dependent variable is the firm-level foreign mutual fund ownership, calculated as the total number of shares owned by foreign mutual funds divided by the total number of shares outstanding for the firm (e.g., Covrig et al. 2007). We employ a difference-in-differences design and compare the change of foreign mutual fund ownership in mandatory IFRS users before and after the IFRS mandate (i.e., 2003-2004 vs. 2006-2007), relative to the corresponding change in a benchmark group of non-IFRS adopters. We include the benchmark group in order to control for changes in foreign mutual fund ownership in firms that are unrelated to IFRS adoption. We eliminate 2005 to avoid the potentially confounding effects in the transition year.

Our independent variables of interest include two dummy variables capturing mandatory IFRS adopters in the EU countries and the post adoption period. Our first dummy variable, *Mandatory adopters*, equals one for EU firms who adopted IFRS only after it became mandatory in 2005, and zero otherwise. Specifically, a firm is classified as a mandatory adopter if Compustat Global codes its accounting standards (data item *astd*) as DS prior to 2005 and as DI after 2004, where DS indicates the firm uses local standards and DI indicates the firm uses IFRS. Our second dummy variable, *Post adoption*, equals one when the firm-year observation falls in the post-adoption period (i.e.,

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<sup>9</sup> Since the industry-country-level classifications used to calculate the  $\Delta$ uniformity measure are not applicable to the benchmark group, we randomly assign half of the benchmark firms to each partition.

after 2005), and zero otherwise. We interact the dummy for mandatory adopters with the post-adoption dummy. The coefficient on the interaction term is our variable of interest because it captures the change in foreign mutual fund ownership after 2005 for mandatory adopters, relative to the corresponding change for the benchmark group of non-IFRS adopters.

The baseline regression also includes several control variables used in prior research to explain mutual fund holdings (Bradshaw et al. 2004; Covrig et al. 2006, 2007; Leuz et al. 2008). The regression model includes the following: (1) the number of analysts following and firm size, *Nanalyst* and *Size*, to capture the firm's information environment; (2) a dummy variable indicating whether the firm is included in the MSCI World Index, *MSCI index*, to capture the firm's visibility to investors; (3) a dummy variable indicating whether the firm is cross-listed on the U.S. stock exchanges or OTC markets, *ADR*, to capture the firm's trading environment; (4) a dummy variable indicating whether the firm is audited by a Big 5 auditor, *Big 5 auditor*, to capture financial reporting credibility;<sup>10</sup> (5) variables controlling for firms' financial characteristics that may impact the investment preferences of mutual fund managers: *ROE* (return on equity), *Returns* (stock return over the fiscal year), *Return variation* (variation of monthly stock returns over the fiscal year), *LEV* (leverage), *Div. yield* (dividend yield), *Book-to-market* (ratio of book value of equity to market value), and *E-P ratio* (ratio of earnings to stock price); and (6) dummy

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<sup>10</sup> In Compustat Global, the code for the type of auditor firms is missing ("AUOP"="091") for over 70% of our sample firms in 2006 and 2007. We therefore collect information on audit firms in 2007 from Worldscope and supplement it to the code in Compustat Global whenever it is missing. In addition, Compustat Global mistakenly codes the audit firms as "other" for countries such as Japan and Korea where the 'Big 5 auditors' are the local affiliates of the Big 5 international firms (for example, Ernst & Young as 'Shin Nihon' in Japan). We correct the auditor codes in these countries based on the full auditor names in Worldscope.



variables controlling for industry and country fixed effects. The formal baseline regression model is as follows:

$$\begin{aligned}
 \text{Foreign mutual fund ownership} = & \beta_0 + \beta_1(\text{Mandatory adopters}) + \beta_2(\text{Post adoption}) \\
 & + \beta_3(\text{Mandatory adopters} * \text{Post adoption}) + \beta_4(\text{Nanalyst}) + \beta_5(\text{Size}) \\
 & + \beta_6(\text{MSCI index}) + \beta_7(\text{ADR}) + \beta_8(\text{Big 5 auditor}) + \beta_9(\text{ROE}) \\
 & + \beta_{10}(\text{Returns}) + \beta_{11}(\text{Return variation}) + \beta_{12}(\text{LEV}) + \beta_{13}(\text{Div. yield}) \\
 & + \beta_{14}(\text{Book-to-market}) + \beta_{15}(\text{E-P ratio}) + \beta_m(\text{DIndustry}) \\
 & + \beta_n(\text{DCountry}) + \varepsilon
 \end{aligned} \tag{1}$$

where:

*Foreign mutual fund ownership*: Percentage ownership of foreign mutual funds of the firm, computed as the total number of shares owned by foreign mutual funds divided by the total number of shares outstanding at year-end.<sup>11</sup>

*Mandatory adopters*: An indicator variable equal to 1 if a firm does not adopt IFRS until 2005, and 0 otherwise.

*Post adoption*: An indicator variable equal to 1 if a firm-year observation falls after 2005, and 0 otherwise.

*Nanalyst*: Number of analysts following the firm at year-end.

*Size*: the natural logarithm of the market value of equity in millions of U.S. dollars at year-end.

*MSCI index*: An indicator variable equal to one if a firm is included in MSCI World index as of December 2002.

*ADR*: An indicator variable equal to one if a firm has securities cross-listed on U.S. stock exchanges or OTC markets as of November 2006, according to JP Morgan ADR Analytics.

*Big 5 auditor*: An indicator variable equal to one if a firm is audited by a member of the Big 5 audit firms at year-end of 2004 (for firm-years in 2003 and 2004) and 2007 (for firm-years in 2006 and 2007).

*ROE*: Net income before extraordinary items divided by book value of equity at year-end.

*Returns*: Stock returns over the fiscal year.

*Return variation*: Standard deviation of monthly stock returns over the fiscal year.

*LEV*: Total liabilities divided by total assets at year-end.

*Div. yield*: Total dividends divided by market value of equity at year-end.

*Book-to-market*: Book value of equity divided by market value of equity at year-end.

*E-P ratio*: Net income divided by market value of equity at year-end.

*DIndustry*: Dummy variables indicating industry membership based on two-digit SIC codes.

*DCountry*: Dummy variables for countries.

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<sup>11</sup> Mutual fund ownership in 2007 is measured as of June 30, 2007, since our data coverage ends in September 30, 2007.

The coefficient on the interaction term ( $\beta_3$ ), captures the change in foreign mutual ownership in mandatory adopters, after controlling for the other variables in our regression. Since each firm appears multiple times in our regression, we adjust the standard errors by firm clusters.

### **3.3 HYPOTHESIS TEST**

To test our hypothesis, we compare the coefficient that captures the change in foreign mutual fund ownership (i.e., *Mandatory adopters\*Post adoption*) across the samples partitioned on the strength of implementation credibility and the increase in uniformity.<sup>12</sup> Our hypothesis predicts that for the subgroup of firms in countries with strong implementation credibility, the coefficient on *Mandatory adopters\*Post adoption* is positive for both the partitions with large and small increases in uniformity, and that the coefficient in the partition with a large increase in uniformity is higher than that in the partition with a small increase in uniformity.

## **4. Empirical Analysis**

### **4.1 SAMPLE AND DESCRIPTIVE STATISTICS**

Our sample consists of a treatment group of 5,588 firm-year observations in 14 EU countries and a benchmark group of 30,696 firm-year observations in ten non-IFRS adoption countries from 2003-2004 and 2006-2007. We exclude 2005 to ensure transition effects in the first year of mandatory IFRS adoption do not drive the results. To be

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<sup>12</sup> An alternative research design is to include a dummy variable indicating a large increase in uniformity and a dummy variable indicating strong implementation credibility in our regression model and further interact these two dummies with the interaction term *Mandatory adopters\*Post adoption*. As in Bradshaw et al. (2004) and Covrig et al. (2007), we use a partitioning approach because it is less restrictive and allow the coefficients on the control variables to vary across the partitions. In addition, this approach allows us to avoid the difficulty of interpreting regression results with four interaction terms.

included in the sample, each country must have necessary country-level data and each firm must have the necessary firm-level data for our regression analysis.

We obtain foreign mutual fund holdings data from the Thomson Financial Services (TFS) international mutual fund database. This database reports firm-level investments and gathers its mutual fund holding data from local authorities and mutual funds and includes both open and closed-end funds.<sup>13</sup> Our financial statement and stock performance variables, including accounting standards, are collected from Compustat Global and North America, and the number of analysts following is collected from I/B/E/S. To mitigate the influence of outliers, we winsorize all of the scaled independent variables included in our multivariate regression analysis (i.e., *ROE*, *Returns*, *Return variation*, *LEV*, *Div. yield*, *Book-to-market*, and *E-P ratio*) at the top and bottom 1% of their distributions.

Table 1 presents the sample distribution for our treatment sample of EU mandatory adopters and the benchmark non-IFRS adopters.<sup>14</sup> Columns two and three indicate that the number of unique firms and the number of total observations vary widely across the EU countries. For example, the U.K. has the largest number of firm-year observations (1,500) while Portugal has the lowest (84). In addition, the table shows that there is considerable variation in sample distribution across the benchmark firms. For example, The U.S. has the largest number of observations (13,556) while Pakistan has the lowest (60).

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<sup>13</sup> For a detailed description of the TFS worldwide mutual fund holding data, see Chan et al. (2005) and Covrig et al. (2006).

<sup>14</sup> Our analysis is limited to the 14 EU countries with sufficient data over the period of our analysis. While there are 27 EU countries in total, the countries excluded from our analysis have few public firms, representing only approximately 5% of all public firms in the EU (i.e., Bulgaria, Cyprus, The Czech Republic, Estonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Poland, Romania, Slovakia and Slovenia). Thus, omission of these countries from the analysis is not expected to have important implications for our conclusions.

Table 2 reports country-level descriptive statistics on foreign mutual fund ownership and the control variables, as well as correlation among these variables. Panel A shows that for the treatment sample, the country-level mean foreign mutual fund ownership percentage ranges from a low of 1.2% in Austria to a high of 13.5% in Ireland, with a mean of 4.6% and a standard deviation of 6.2% across all firm-year observations in the EU. Similarly, there is a high degree of variation in the control variables across the EU countries. For example, the number of analysts following across all firm-year observations is on average 4.9 with a standard deviation of 6.9. Panel B shows that for the benchmark sample of non-IFRS adopters, the mean (median) of foreign mutual fund holdings is 1.5% (0.2%), with a standard deviation of 3.3%.

Panel C of Table 2 reports the Pearson correlation coefficients for the variables. Consistent with prior studies such as Covrig et al. (2006, 2007), we find that foreign mutual fund percentage ownership is positively correlated with richer information environments (as captured by *Nanalyst* and *Size*) and higher visibility (as captured by *MSCI index*), all at  $p \leq 1\%$  (two-tailed). We also find that foreign mutual fund ownership is positively correlated with U.S. cross-listing (*ADR*), Big 5 auditors (*Big 5 auditor*), higher return on equity (*ROE*), lower return volatility (*Return variation*), lower leverage (*LEV*), higher dividend yield (*Div. yield*), lower book-to-market ratios (*Book-to-market*), and higher earnings-to-price ratios (*E-P ratio*), all significant at  $p \leq 1\%$  (two-tailed).

Table 3 presents a univariate analysis comparing foreign mutual fund ownership before and after the IFRS mandate in 2005 for mandatory adopters and non-IFRS adopters. The table reports that the percentage ownership in the post-adoption period (2006-2007) is significantly greater than that in the pre-adoption period (2003-2004) for

both groups: 5.3% versus 3.9% for mandatory adopters and 1.6% versus 1.5% for non-IFRS adopters. While there seems to be an overall increase in foreign mutual fund holding during our sample period, we find that mandatory adopters experience a significantly greater increase in percentage ownership after 2005 even after accounting for the corresponding change for non-IFRS adopters (1.4% and 0.1% for mandatory adopters and non-IFRS adopters respectively, with the difference significant at  $p \leq 1\%$ ).

## 4.2 EMPIRICAL RESULTS

Table 4 reports descriptive statistics on the variables used to partition our sample (i.e., implementation credibility and  $\Delta$ uniformity). Panel A of Table 4 reports descriptive statistics on the implementation credibility measure for the countries in our sample, where higher scores indicate less implementation credibility. The panel indicates that there is a wide variation in implementation credibility scores across the countries in our sample. Austria and Greece have the lowest implementation credibility (28.3), while Ireland has the highest (5.1). Panel B reports the components used to calculate the  $\Delta$ uniformity measure, as well as some summary descriptive statistics. The panel indicates that the largest increase in uniformity occurs in the Austrian-GAAP users in the services industry, with a  $\Delta$ uniformity ratio of 386 (386/1). The smallest increase in uniformity occurs in the U.K. GAAP users in the petroleum industry, with a  $\Delta$ uniformity measure of 4.32 (82/19).

Table 5 reports the results of our hypothesis test. Consistent with our hypothesis, the table shows that for the subgroup of firms in countries with strong implementation credibility, the coefficient on the interaction term *Mandatory adopters\*Post adoption* is significantly positive at  $p \leq 1\%$  (two-tailed) in both the partitions with large and small

increases in uniformity (Models 1 and 2). Further, the coefficient in the partition with large increases in uniformity is greater than that in the partition with small increases in uniformity, with the difference significant at  $p \leq 1\%$  (two-tailed). In contrast, for the subgroup of firms in countries with weak implementation credibility, the coefficient on the interaction term *Mandatory adopters\*Post adoption* is insignificant in both partitions at the conventional levels (Models 3 and 4). In addition, for completeness, we report the difference in differences between Models 1 and 2, and Models 3 and 4. Table 5 indicates that the difference between Models 1 and 2 are significantly larger than the difference between Models 3 and 4.

Finally, Table 5 finds that foreign mutual fund percentage ownership is higher among firms with more analyst following (*Nanalyst*), that are larger (*Size*), and that have lower earnings-price ratios (*E-P ratio*), all significant at  $p \leq 10\%$  (two-tailed) or better in all models. These associations are consistent with prior studies such as Bradshaw et al. (2004), Covrig et al. (2006, 2007), and Ferreira and Matos (2008).

In summary, the results in Table 5 suggest that implementation credibility plays an important role in how increased uniformity influences foreign mutual fund ownership in mandatory IFRS adopters. Specifically, foreign mutual funds increase their ownership in mandatory adopters that experience increases in uniformity only when they are in countries with strong implementation credibility. Further, in these countries, the increase in ownership is larger when firm experiencing greater increases in uniformity.

## 5. Additional analyses

### 5.1 ANALYSIS OF DOMESTIC MUTUAL FUNDS

Our hypothesis development argues that improved comparability leads to increased foreign mutual fund ownership because an improvement in financial statement comparability reduces the information acquisition costs of foreign investors. Compared to foreign investors, the information costs argument is less likely to hold for domestic investors because domestic investors have better access to alternative information channels (such as managers and local analysts) and tend to be more familiar with local accounting standards (Covrig et al. 2007). Thus, to provide corroborating evidence on this argument, we repeat our analysis in Table 5 with domestic mutual fund holdings as the dependent variable.

Table 6 reports the results of this analysis. In sharp contrast to the result in Table 5, Table 6 shows that for the subgroup of firms in countries with strong implementation credibility, the coefficient on the interaction term *Mandatory adopters\*Post adoption* is significantly negative at  $p \leq 1\%$  (two-tailed) in both partitions and the coefficient in the partition with large increases in uniformity is significantly lower than that in the partition with small increases in uniformity. Thus, the results in Table 6 suggest that improved comparability associated with mandatory IFRS adoption does not increase domestic mutual fund ownership. Rather, we find evidence consistent with domestic investors being net sellers subsequent to the mandatory IFRS adoption in settings where improved comparability attracts foreign investors, consistent with mandatory IFRS adoption decreasing the information advantage of domestic investors.

## **5.2 ANALYSIS OF DIFFERENT TYPES OF FOREIGN MUTUAL FUNDS**

In this section we attempt to corroborate our findings by separately examining specific types of foreign mutual funds. As in prior studies (Chan et al. 2005, 2006; Covrig et al. 2007), we disaggregate foreign mutual funds into four types based on the scope of their investment: (1) foreign global funds - foreign funds at least 80% of whose equity holdings are not concentrated in any specific country or region, (2) foreign regional funds - foreign mutual funds with at least 80% of their equity holdings in the investee firm's region, (3) foreign country funds - foreign mutual funds with at least 80% of their equity holdings in the investee firm's country, and (4) other foreign funds. The benefits of comparability (i.e., the enhanced ability to make cross-country comparisons of the EU adopters) are likely to be greater for the foreign global and regional funds, when compared to the foreign country funds. This is because foreign global and regional funds have investments across a large number of countries, and hence are more likely to benefit from the improved ability to benchmark with a larger set of firms. Therefore, we expect that the effect of comparability to be primarily driven by foreign global and regional funds.

Our test consists of repeating our analysis in Table 5 after partitioning the foreign mutual funds based on whether they are foreign global, regional, country, or other funds. Table 7 reports the results from this analysis. Panel A shows the results for foreign global and regional funds and Panel B shows the results for foreign country and other funds. For ease of presentation, the table only shows the results for the subgroup of firms in countries with strong implementation credibility because we are interested in knowing whether the significant effect of increased uniformity on cross-border investment in these



countries (i.e., Models 1 and 2 of Table 5) is driven by different types of funds. Consistent with our prediction, the results suggest that the impact of comparability on foreign mutual fund ownership is primarily driven by foreign global and regional funds. Specifically, the coefficient on the interaction term for Model 1 (i.e., the strong credibility and large increase in uniformity subsample) is 0.014, 0.012, 0.005, and -0.002 for the regression model with the dependent variable being foreign global funds, foreign regional funds, foreign country funds, and others, respectively. Thus, more than 90% (0.026/0.028) of the change in foreign mutual fund ownership in Model 1 of Table 5 is due to foreign global and regional funds.<sup>15</sup>

## **6. Sensitivity tests**

### **6.1. EXCLUDING ACCOUNTING-BASED CONTROL VARIABLES**

Hung and Subramanyam (2007) find that the value and variability of accounting numbers are significantly different between IFRS and German GAAP. To the extent that IFRS adoption affects the measurement of accounting-based variables, the changes in foreign mutual fund investment after the IFRS mandate may be mechanically related to the differences between accounting numbers based on local GAAP and those based on IFRS. To ensure that this confounding effect does not drive our results, we remove from our regression analysis the control variables constructed based on accounting measures (i.e., *ROE*, *LEV*, *Div. yield*, *Book-to-market*, and *E-P ratio*). We then repeat our analysis

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<sup>15</sup> The sum of the coefficients on the interaction term across different types of mutual funds in Table 7 does not always add up to the coefficient on the interaction term in Table 5 because of rounding.

in Table 5 and find that the results are qualitatively identical.<sup>16</sup> Thus, our primary conclusion is robust to excluding accounting-based control variables.

## **6.2 CONTROLLING FOR IMPROVEMENT IN DISCLOSURE**

In addition to improved comparability, another commonly espoused outcome of mandatory IFRS adoption is increased disclosure. While some researchers find evidence consistent with mandatory IFRS adoption resulting in increased disclosure (e.g., Li 2009), the results tend to be mixed. Regardless, it is reasonable to ask whether our findings are explained by changes in disclosure, rather than by comparability. To investigate this alternative explanation, we repeat our analysis in Table 5 after replacing our country dummy variables with a country-level variable capturing the extent of increased disclosures under IFRS relative local standards as used in Li (2009). This analysis finds that the results are qualitatively identical. Thus, our primary analysis is robust to controlling for improvement in disclosure.

## **6.3 EXCLUDING COUNTRIES WITH INFLUENTIAL OBSERVATIONS**

The country-level sample distribution in Table 1 suggests that the U.K. has the largest number of firms in our treatment sample, and that Japan and the U.S. has the largest number of firms in our benchmark sample. While we include country dummies to control for country fixed effects, we explore whether our results are driven by firms in these countries. We repeat our analysis in Table 5 after excluding all observations from the U.K., Japan, and the U.S. one at a time and finds qualitatively identical results for our

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<sup>16</sup> Based on  $p \leq 10\%$  (two-tailed) as a cutoff for significance, we define “qualitatively identical” to our analysis in Table 5 to mean that (1) for the subgroup of firms in countries with strong implementation credibility, the coefficient on *Mandatory adopters\*Post adoption* is positive in both partitions and the coefficient in the partition with a large increase in uniformity is higher than that in the partition with a small increase in uniformity; (2) for the subgroup of firms in countries with weak implementation credibility, the coefficient on the interaction *Mandatory adopters\*Post* is insignificant in both partitions..

hypothesis test. Thus, our primary conclusion is not sensitive to excluding countries with influential observations.

#### **6.4 RE-MEASURING IMPLEMENTATION CREDIBILITY**

We use the earnings quality score in Leuz et al. (2003) to capture implementation credibility. While this measure is used in prior research on mandatory IFRS adoption (Daske et al. 2008) and the country-level institutions that influence reporting incentives are likely to be stable over time, it is possible that the index from Leuz et al., which was compiled using data from 1990 to 1999, may change over time. To address this concern, we update the earnings quality score using the same methodology as in Leuz et al. by using data from Compustat over our sample period.<sup>17</sup> We find that the updated measure is highly correlated with the measure we currently use, with a correlation coefficient of 0.80. This is consistent with country-level institutions being relatively stable over time. In addition, the analysis after using the updated earnings quality measure finds results that are qualitatively identical with those reported in Table 5. Thus, our primary conclusions are not sensitive to this alternative implementation credibility measure.

### **7. Conclusion**

This study examines the effect of adopting a uniform set of accounting standards (i.e., mandatory IFRS adoption) on comparability and cross-border investment. While we expect improved comparability to result in increased cross-border investment, we predict that increased uniformity associated with mandatory IFRS adoption will lead to improved

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<sup>17</sup> We do not re-measure the scores over the post-IFRS adoption period (i.e., 2006-2007), because relatively long time-series data is necessary to obtain the valid scores. Similarly, Bruggemann et al. (2009) update the earnings quality scores using data from 2001-2007, and their updated measure is highly correlated with that in Leuz et al. (correlation coefficient=0.85). We do not use the updated measure in Bruggemann et al. because four of our sample countries are not covered in their sample.

comparability only when the accounting standards are credibly implemented. Consistent with our prediction, our analysis finds that foreign mutual funds ownership increases after the IFRS mandate only when countries have strong implementation credibility, and that the increase is greater in companies with a relative larger increase in uniformity.

Additional analysis shows that improved comparability associated with mandatory IFRS adoption does not increase domestic mutual fund ownership. Rather, we find evidence consistent with domestic investors being net sellers subsequent to the mandatory IFRS adoption in settings where improved comparability attracts foreign investors. Further, consistent with financial statement comparability being important for global and regional investors, we find that our results regarding the impact of comparability on foreign mutual fund ownership is primarily driven by foreign global and regional funds. Overall, our findings suggest that the effects of increased uniformity associated with mandatory IFRS adoption on comparability depend on the institutional environment that shapes firms' reporting incentives, and the improved information comparability helps attract cross-border investment.

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**Table 1**  
**Sample distribution**

<b>Country</b>	<b>Unique firms</b>	<b>Firm-years (from 2003-2004 and 2006-2007)</b>
<i>Mandatory adopters in EU countries</i>		
Austria	9	36
Belgium	31	124
Denmark	39	156
Finland	74	296
France	251	1,004
Germany	89	356
Greece	48	192
Ireland	22	88
Italy	159	636
Netherlands	69	276
Portugal	21	84
Spain	51	204
Sweden	159	636
U.K.	375	1,500
<b>Subtotal</b>	<b>1,397</b>	<b>5,588</b>
<i>Benchmark firms in countries that forbid IFRS adoption</i>		
Canada	241	964
India	18	72
Indonesia	109	436
Japan	2,676	10,704
Korea	163	652
Malaysia	383	1,532
Pakistan	15	60
Taiwan	436	1,744
Thailand	244	976
U.S.	3,389	13,556
<b>Subtotal</b>	<b>7,674</b>	<b>30,696</b>
<b>Total</b>	<b>9,071</b>	<b>36,284</b>

**Table 2**  
**Descriptive Statistics and Pearson Correlation**

**Panel A: Mean values of firm-specific variables by country, firms in EU countries (N=5,588 firm-years)**

<b>Country</b>	<b>Percentage foreign mutual fund ownership</b>	<b>Nanalyst</b>	<b>Size</b>	<b>MSCI Index</b>	<b>ADR</b>	<b>Big 5 auditor</b>	<b>ROE</b>	<b>Returns</b>	<b>Return variation</b>	<b>LEV</b>	<b>Div. Yield</b>	<b>Book- to- market</b>	<b>E-P ratio</b>
Austria	1.2%	1.722	4.900	0.111	0.111	0.667	0.005	0.119	0.080	0.642	0.020	1.293	0.043
Belgium	4.7%	4.790	6.284	0.226	0.097	0.613	0.148	0.243	0.074	0.571	0.020	0.711	0.060
Denmark	4.5%	4.167	6.234	0.250	0.051	0.833	0.231	0.263	0.098	0.617	0.018	0.613	0.053
Finland	7.1%	5.622	5.518	0.081	0.014	0.845	0.126	0.202	0.086	0.546	0.032	0.600	0.011
France	3.8%	4.663	5.612	0.088	0.067	0.416	0.090	0.169	0.092	0.634	0.011	0.647	0.005
Germany	2.5%	1.455	4.549	0.000	0.000	0.449	0.070	0.161	0.112	0.631	0.015	0.820	-0.012
Greece	3.6%	5.188	6.349	0.271	0.063	0.469	0.162	0.193	0.104	0.652	0.015	0.697	0.041
Ireland	13.5%	5.023	6.593	0.273	0.125	0.818	0.180	0.212	0.092	0.577	0.015	0.466	0.056
Italy	4.1%	5.399	6.437	0.132	0.085	0.881	0.049	0.153	0.075	0.675	0.012	0.698	0.011
Netherlands	11.6%	8.428	6.773	0.174	0.196	0.899	0.173	0.198	0.085	0.597	0.026	0.583	0.049
Portugal	2.5%	4.155	6.246	0.286	0.071	0.714	0.109	0.239	0.070	0.778	0.014	0.708	0.022
Spain	5.3%	12.078	7.829	0.353	0.137	0.931	0.173	0.262	0.066	0.698	0.014	0.464	0.049
Sweden	4.6%	3.484	5.373	0.082	0.025	0.827	0.077	0.156	0.103	0.520	0.023	0.592	0.003
U.K.	3.7%	4.617	6.431	0.109	0.141	0.837	0.146	0.154	0.090	0.562	0.024	0.593	0.028
<i>Mean</i>	<i>4.6%</i>	<i>4.889</i>	<i>6.042</i>	<i>0.126</i>	<i>0.087</i>	<i>0.727</i>	<i>0.116</i>	<i>0.174</i>	<i>0.090</i>	<i>0.602</i>	<i>0.019</i>	<i>0.635</i>	<i>0.020</i>
<i>Median</i>	<i>1.7%</i>	<i>2.000</i>	<i>5.898</i>	<i>0.000</i>	<i>0.000</i>	<i>1.000</i>	<i>0.136</i>	<i>0.160</i>	<i>0.077</i>	<i>0.615</i>	<i>0.013</i>	<i>0.525</i>	<i>0.055</i>
<i>Std. dev.</i>	<i>6.2%</i>	<i>6.942</i>	<i>2.106</i>	<i>0.332</i>	<i>0.282</i>	<i>0.446</i>	<i>0.353</i>	<i>0.429</i>	<i>0.051</i>	<i>0.231</i>	<i>0.022</i>	<i>0.482</i>	<i>0.177</i>

Table 2, continued

**Panel B: Mean values of firm-specific variables by country, benchmark firms in countries that forbid IFRS adoption (N=30,696 firm-years)**

<b>Country</b>	<b>Percentage foreign mutual fund ownership</b>	<b>Nanalyst</b>	<b>Size</b>	<b>MSCI Index</b>	<b>ADR</b>	<b>Big 5 auditor</b>	<b>ROE</b>	<b>Returns</b>	<b>Return variation</b>	<b>LEV</b>	<b>Div. yield</b>	<b>Book- to- market</b>	<b>E-P ratio</b>
Canada	3.8%	5.386	6.744	0.000	0.000	0.948	0.078	0.141	0.106	0.498	0.017	0.556	0.010
India	4.2%	5.722	6.503	0.000	0.111	0.278	0.373	0.309	0.107	0.519	0.016	0.275	0.070
Indonesia	2.1%	2.115	4.200	0.000	0.018	0.656	0.128	0.156	0.136	0.581	0.008	1.062	0.027
Japan	1.4%	1.660	5.207	0.089	0.035	0.586	0.056	0.042	0.091	0.553	0.016	1.104	0.026
Korea	6.5%	1.012	6.531	0.000	0.043	0.794	0.119	0.140	0.119	0.556	0.018	1.121	0.067
Malaysia	0.8%	1.243	3.873	0.000	0.010	0.708	0.054	0.064	0.104	0.455	0.017	1.292	0.010
Pakistan	0.8%	0.383	5.743	0.000	0.000	0.567	0.334	0.232	0.101	0.757	0.021	0.429	0.069
Taiwan	2.0%	0.967	5.081	0.000	0.011	0.838	0.070	-0.006	0.119	0.480	0.000	0.941	0.014
Thailand	1.1%	2.772	4.243	0.000	0.033	0.637	0.113	0.115	0.100	0.462	0.008	1.008	0.045
U.S.	1.2%	4.412	5.618	0.000	0.000	0.606	0.055	0.269	0.138	0.671	0.010	0.442	-0.045
<i>Mean</i>	<i>1.5%</i>	<i>2.967</i>	<i>5.350</i>	<i>0.031</i>	<i>0.016</i>	<i>0.633</i>	<i>0.062</i>	<i>0.150</i>	<i>0.116</i>	<i>0.592</i>	<i>0.012</i>	<i>0.788</i>	<i>-0.005</i>
<i>Median</i>	<i>0.2%</i>	<i>0.000</i>	<i>5.218</i>	<i>0.000</i>	<i>0.000</i>	<i>1.000</i>	<i>0.081</i>	<i>0.053</i>	<i>0.091</i>	<i>0.548</i>	<i>0.006</i>	<i>0.642</i>	<i>0.047</i>
<i>Std. dev.</i>	<i>3.3%</i>	<i>5.139</i>	<i>2.105</i>	<i>0.173</i>	<i>0.125</i>	<i>0.482</i>	<i>0.470</i>	<i>0.599</i>	<i>0.089</i>	<i>0.424</i>	<i>0.017</i>	<i>0.679</i>	<i>0.212</i>

Table 2, continued

Panel C: Pearson correlation matrix with two-sided p-values in italics (N=36,284 firm-years)

	<i>foreign mutual fund ownership</i> (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Nanalyst (2)	0.410 <i>&lt;.0001</i>											
Size (3)	0.407 <i>&lt;.0001</i>	0.678 <i>&lt;.0001</i>										
MSCI Index (4)	0.314 <i>&lt;.0001</i>	0.354 <i>&lt;.0001</i>	0.321 <i>&lt;.0001</i>									
ADR (5)	0.237 <i>&lt;.0001</i>	0.270 <i>&lt;.0001</i>	0.232 <i>&lt;.0001</i>	0.402 <i>&lt;.0001</i>								
Big 5 auditor (6)	0.202 <i>&lt;.0001</i>	0.286 <i>&lt;.0001</i>	0.439 <i>&lt;.0001</i>	0.104 <i>&lt;.0001</i>	0.086 <i>&lt;.0001</i>							
ROE (7)	0.056 <i>&lt;.0001</i>	0.090 <i>&lt;.0001</i>	0.134 <i>&lt;.0001</i>	0.031 <i>&lt;.0001</i>	0.017 <i>0.001</i>	0.023 <i>&lt;.0001</i>						
Returns (8)	0.015 <i>0.003</i>	0.020 <i>0.000</i>	0.102 <i>&lt;.0001</i>	-0.011 <i>0.041</i>	-0.010 <i>0.055</i>	0.017 <i>0.001</i>	0.097 <i>&lt;.0001</i>					
Return variation (9)	-0.117 <i>&lt;.0001</i>	-0.183 <i>&lt;.0001</i>	-0.389 <i>&lt;.0001</i>	-0.097 <i>&lt;.0001</i>	-0.057 <i>&lt;.0001</i>	-0.193 <i>&lt;.0001</i>	-0.093 <i>&lt;.0001</i>	0.197 <i>&lt;.0001</i>				
LEV (10)	-0.052 <i>&lt;.0001</i>	-0.024 <i>&lt;.0001</i>	-0.128 <i>&lt;.0001</i>	0.021 <i>&lt;.0001</i>	0.023 <i>&lt;.0001</i>	-0.142 <i>&lt;.0001</i>	0.129 <i>&lt;.0001</i>	-0.017 <i>0.001</i>	0.271 <i>&lt;.0001</i>			
Div. yield (11)	0.064 <i>&lt;.0001</i>	0.030 <i>&lt;.0001</i>	0.154 <i>&lt;.0001</i>	0.052 <i>&lt;.0001</i>	0.040 <i>&lt;.0001</i>	0.052 <i>&lt;.0001</i>	0.105 <i>&lt;.0001</i>	-0.078 <i>&lt;.0001</i>	-0.306 <i>&lt;.0001</i>	-0.038 <i>&lt;.0001</i>		
Book-to-market (12)	-0.109 <i>&lt;.0001</i>	-0.239 <i>&lt;.0001</i>	-0.252 <i>&lt;.0001</i>	-0.049 <i>&lt;.0001</i>	-0.038 <i>&lt;.0001</i>	-0.042 <i>&lt;.0001</i>	-0.075 <i>&lt;.0001</i>	-0.214 <i>&lt;.0001</i>	-0.239 <i>&lt;.0001</i>	-0.294 <i>&lt;.0001</i>	0.170 <i>&lt;.0001</i>	
E-P ratio (13)	0.091 <i>&lt;.0001</i>	0.111 <i>&lt;.0001</i>	0.320 <i>&lt;.0001</i>	0.050 <i>&lt;.0001</i>	0.025 <i>&lt;.0001</i>	0.120 <i>&lt;.0001</i>	0.265 <i>&lt;.0001</i>	0.187 <i>&lt;.0001</i>	-0.391 <i>&lt;.0001</i>	-0.309 <i>&lt;.0001</i>	0.210 <i>&lt;.0001</i>	0.131 <i>&lt;.0001</i>

## Table 2, continued

### Variable definitions:

*Percentage foreign mutual fund ownership:* The total number of shares owned by foreign mutual funds divided by shares outstanding at yearend. Foreign mutual funds are those funds whose domicile is different from the country of their investees.

*Nanalyst:* The number of analysts following the company at yearend.

*Size:* The natural logarithm of the market value of equity in millions of U.S. dollars at yearend.

*MSCI index:* An indicator variable equal to one if a company is included in MSCI World Index as of December 2002.

*ADR:* An indicator variable equal to one if a company is cross-listed in the U.S. stock exchanges or OTC market as of November 2006, according to JP Morgan ADR Analytics.

*Big5 auditor:* An indicator variable equal to one if a company is audited by a Big 5 audit firm at yearend of 2004 and 2007.

*ROE:* Net income before extraordinary items divided by book value of equity at yearend.

*Returns:* Stock returns over the fiscal year.

*Return variation:* Standard deviation of monthly stock returns over the fiscal year.

*LEV:* Total liabilities divided by total assets.

*Div. yield:* Total dividends divided by market value of equity at yearend.

*Book-to-market:* Book value of equity divided by market value of equity at yearend.

*E-P ratio:* Net income divided by market value of equity at yearend.

**Table 3**  
**Univariate analysis of foreign mutual fund ownership, pre and post mandatory IFRS adoption (N=36,284 firm-years)**

		Pre (2003-2004)	Post (2006-2007)	Diff.
<b>A</b>	<b>Ownership of MANDATORY adopters</b>	3.9% <i>N=2,794</i>	5.3% <i>N=2,794</i>	1.4%***
<b>B</b>	<b>Ownership of Non-IFRS adopters</b>	1.5% <i>N=15,348</i>	1.6% <i>N=15,348</i>	0.1%***
Diff.	A-B	2.4 %***	3.7%***	1.3%***

\*\*\*\*, \*\*, \*Indicates significance at the 0.01, 0.05, and 0.10 level or better, respectively

**Variable definitions:**

*Mandatory adopters:* Companies that prepared their financial statements based on local accounting standards before 2005, and switched to IFRS after 2005.

*Non-IFRS adopters:* Companies in non-IFRS adoption countries that prepared their financial statements based on local standards throughout our sample period.

All other variables are defined as in Table 2.

**Table 4**  
**Descriptive statistics on implementation credibility and increased uniformity**

**Panel A: Descriptive statistics on country-level implementation credibility measure**

<b>Country</b>	<b>Implementation credibility</b>	<b>Country</b>	<b>Implementation credibility</b>
<i>EU</i>		<i>Benchmark</i>	
Austria	28.3	Canada	5.3
Belgium	19.5	India	19.1
Denmark	16.0	Indonesia	18.3
Finland	12.0	Japan	20.5
France	13.5	Korea	26.8
Germany	21.5	Malaysia	14.8
Greece	28.3	Pakistan	17.8
Ireland	5.1	Taiwan	22.5
Italy	24.8	Thailand	18.3
Netherlands	16.5	U.S.	2.0
Portugal	25.1		
Spain	18.6	<i>Mean</i>	<i>17.0</i>
Sweden	6.8	<i>Median</i>	<i>18.3</i>
U.K .	7.0	<i>Std dev</i>	<i>7.5</i>

Table 4, continued

**Panel B: Descriptive statistics on industry-country-level changes in uniformity ( $\Delta$ uniformity) measure (N=182 industry-countries)**

	Industry as in Campbell (1996)	Number of IFRS users in 2007	Number of local-GAAP users in 2003													
			Austria	Belgium	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Netherlands	Portugal	Spain	Sweden	U.K.
1	Finance & real estate	909	4	19	15	12	72	52	11	7	55	19	4	25	34	180
			<i>227.25</i>	<i>47.84</i>	<i>60.60</i>	<i>75.75</i>	<i>12.63</i>	<i>17.48</i>	<i>82.64</i>	<i>129.86</i>	<i>16.53</i>	<i>47.84</i>	<i>227.25</i>	<i>36.36</i>	<i>26.74</i>	<i>5.05</i>
2	Food & tobacco	244	2	9	4	4	33	10	5	5	6	10	3	7	5	28
			<i>122.00</i>	<i>27.11</i>	<i>61.00</i>	<i>61.00</i>	<i>7.39</i>	<i>24.40</i>	<i>48.80</i>	<i>48.80</i>	<i>40.67</i>	<i>24.40</i>	<i>81.33</i>	<i>34.86</i>	<i>48.80</i>	<i>8.71</i>
3	Utilities	230	2	5	3	2	20	11	5	0	18	3	5	16	6	29
			<i>115.00</i>	<i>46.00</i>	<i>76.67</i>	<i>115.00</i>	<i>11.50</i>	<i>20.91</i>	<i>46.00</i>	.	<i>12.78</i>	<i>76.67</i>	<i>46.00</i>	<i>14.38</i>	<i>38.33</i>	<i>7.93</i>
4	Basic industry	464	2	9	7	11	44	25	13	3	16	6	6	18	27	67
			<i>232.00</i>	<i>51.56</i>	<i>66.29</i>	<i>42.18</i>	<i>10.55</i>	<i>18.56</i>	<i>35.69</i>	<i>154.67</i>	<i>29.00</i>	<i>77.33</i>	<i>77.33</i>	<i>25.78</i>	<i>17.19</i>	<i>6.93</i>
5	Transportation	174	0	0	6	4	9	6	5	3	11	5	1	2	7	19
			.	.	<i>29.00</i>	<i>43.50</i>	<i>19.33</i>	<i>29.00</i>	<i>34.80</i>	<i>58.00</i>	<i>15.82</i>	<i>34.80</i>	<i>174.00</i>	<i>87.00</i>	<i>24.86</i>	<i>9.16</i>
6	Consumer durables	605	1	5	7	16	59	32	9	1	29	20	2	7	40	77
			<i>605.00</i>	<i>121.00</i>	<i>86.43</i>	<i>37.81</i>	<i>10.25</i>	<i>18.91</i>	<i>67.22</i>	<i>605.00</i>	<i>20.86</i>	<i>30.25</i>	<i>302.50</i>	<i>86.43</i>	<i>15.13</i>	<i>7.86</i>
7	Construction	238	1	3	4	3	26	6	8	4	18	7	7	14	6	32
			<i>238.00</i>	<i>79.33</i>	<i>59.50</i>	<i>79.33</i>	<i>9.15</i>	<i>39.67</i>	<i>29.75</i>	<i>59.50</i>	<i>13.22</i>	<i>34.00</i>	<i>34.00</i>	<i>17.00</i>	<i>39.67</i>	<i>7.44</i>
8	Services	676	3	6	4	21	110	51	6	4	17	20	2	10	58	142
			<i>225.33</i>	<i>112.67</i>	<i>169.00</i>	<i>32.19</i>	<i>6.15</i>	<i>13.25</i>	<i>112.67</i>	<i>169.00</i>	<i>39.76</i>	<i>33.80</i>	<i>338.00</i>	<i>67.60</i>	<i>11.66</i>	<i>4.76</i>
9	Textiles & trade	247	2	5	1	5	32	16	3	2	25	9	1	7	13	36
			<i>123.50</i>	<i>49.40</i>	<i>247.00</i>	<i>49.40</i>	<i>7.72</i>	<i>15.44</i>	<i>82.33</i>	<i>123.50</i>	<i>9.88</i>	<i>27.44</i>	<i>247.00</i>	<i>35.29</i>	<i>19.00</i>	<i>6.86</i>
10	Leisure	219	0	1	3	3	22	7	4	3	15	7	7	5	7	42
			.	<i>219.00</i>	<i>73.00</i>	<i>73.00</i>	<i>9.95</i>	<i>31.29</i>	<i>54.75</i>	<i>73.00</i>	<i>14.60</i>	<i>31.29</i>	<i>31.29</i>	<i>43.80</i>	<i>31.29</i>	<i>5.21</i>
11	Petroleum	82	1	0	1	2	5	1	2	1	3	0	1	2	4	19
			<i>82.00</i>	.	<i>82.00</i>	<i>41.00</i>	<i>16.40</i>	<i>82.00</i>	<i>41.00</i>	<i>82.00</i>	<i>27.33</i>	.	<i>82.00</i>	<i>41.00</i>	<i>20.50</i>	<i>4.32</i>
12	Capital goods	386	1	5	6	16	32	35	6	2	23	8	0	4	41	51
			<i>386.00</i>	<i>77.20</i>	<i>64.33</i>	<i>24.13</i>	<i>12.06</i>	<i>11.03</i>	<i>64.33</i>	<i>193.00</i>	<i>16.78</i>	<i>48.25</i>	.	<i>96.50</i>	<i>9.41</i>	<i>7.57</i>
13	Others	26	0	0	1	0	2	0	0	0	4	0	1	0	2	2
			.	.	<i>26.00</i>	.	<i>13.00</i>	.	.	.	<i>6.50</i>	.	<i>26.00</i>	.	<i>13.00</i>	<i>13.00</i>

*Descriptive statistics on industry-country-level  $\Delta$ uniformity measure: Mean: 67.18; Median: 39.67; Std dev: 89.34*



#### Table 4, continued

**Variable definitions:**

*Implementation credibility:* The aggregate earnings management score from Leuz et al. (2003). Higher values represent countries with less implementation credibility (more earnings management).

*$\Delta$ uniformity:* An industry-country-level measure of changes in uniformity, calculated as the number of firms in an industry that a firm can be compared to after the mandatory IFRS adoption divided by the number of firms in an industry that a firm can be compared to before the mandatory adoption.

Table 5

Foreign mutual fund ownership regressed on mandatory adoption dummy interacted with post adoption dummy, partitioned on strong and weak implementation credibility, and on large and small increases in uniformity, with two-tailed p-values in parenthesis<sup>a,b</sup>

	Model 1	Model 2	Model 3	Model 4
	Strong credibility		Weak credibility	
	Large increase in uniformity	Small increase in uniformity	Large increase in uniformity	Small increase in uniformity
Mandatory adopters	0.051*** (0.002)	-0.008 (0.255)	-0.002 (0.957)	-0.042*** (0.000)
Post adoption	-0.005*** (0.000)	-0.004*** (0.000)	0.004*** (0.000)	0.006*** (0.000)
<b>Mandatory adopters*Post adoption</b>	<b>0.028*** (0.000)</b>	<b>0.010*** (0.000)</b>	<b>-0.000 (0.993)</b>	<b>-0.002 (0.497)</b>
<i>Test of diff</i>		<i>0.018*** (0.001)</i>		<i>0.002 (0.735)</i>
<i>Test of diff-in-diffs</i>			<i>0.016** (0.019)</i>	
Controls				
Nanalyst	0.001*** (0.000)	0.002*** (0.000)	0.003*** (0.000)	0.002*** (0.000)
Size	0.003*** (0.000)	0.003*** (0.000)	0.006*** (0.000)	0.008*** (0.000)
MSCI index	0.078*** (0.000)	0.037*** (0.000)	0.003 (0.388)	0.003 (0.464)
ADR	-0.003 (0.827)	0.009* (0.093)	0.005 (0.387)	0.001 (0.752)
Big5 auditor	0.000 (0.965)	0.001 (0.624)	0.000 (0.872)	-0.001 (0.228)
ROE	0.000 (0.921)	-0.001* (0.055)	0.010*** (0.002)	0.007*** (0.003)
Returns	0.000 (0.643)	0.001* (0.054)	-0.001* (0.088)	-0.002** (0.046)
Return variation	0.003 (0.379)	0.014*** (0.001)	-0.033*** (0.000)	-0.031*** (0.000)
LEV	-0.001 (0.178)	0.001 (0.550)	-0.016*** (0.000)	-0.010*** (0.002)
Div. yield	-0.112*** (0.001)	-0.000 (0.998)	0.040 (0.414)	0.130** (0.013)
Book-to-market	0.000 (0.977)	0.000 (0.681)	-0.000 (0.661)	-0.000 (0.626)
E-P ratio	-0.003*** (0.006)	-0.006*** (0.000)	-0.010*** (0.002)	-0.008*** (0.004)
Industry indicators	Included	Included	Included	Included
Country indicators	Included	Included	Included	Included
Adj-R <sup>2</sup>	0.409	0.370	0.463	0.432
N	9,372	12,108	7,040	7,764

### Table 5, continued

<sup>a</sup> p-values are based on robust standard errors clustered by firm. \*\*\*, \*\*, \* indicates significance at the 0.01, 0.05, and 0.10 level or better, respectively.

<sup>b</sup> A firm is classified into the less credible implementation partition if the implementation credibility index is greater than the sample country median. A firm is classified into the large increase in uniformity partition if its  $\Delta uniformity$  measure is greater than the median industry-country-level observation.

#### **Variable definitions:**

*Implementation credibility:* The aggregate earnings management score from Leuz et al. (2003). Higher values represent countries with less implementation credibility (more earnings management).

*$\Delta uniformity$ :* An industry-country-level measure of changes in uniformity, calculated as the number of firms in an industry that a firm can be compared to after the mandatory IFRS adoption divided by the number of firms in an industry that a firm can be compared to before the mandatory adoption.

*Mandatory adopters:* A dummy variable indicating companies that prepared their financial statements based on local accounting standards before 2005, and switched to IFRS after 2005.

*Post adoption:* A dummy variable equal to one if a firm-year falls on or after 2005.

*Industry indicators:* Dummy variables indicating industry membership as classified in Campbell (1996).

*Country indicators:* Dummy variables indicating a firm's country.

All other variables are defined as in Table 2.

**Table 6**

**Domestic mutual fund ownership regressed on mandatory adoption dummy interacted with post adoption dummy, partitioned on more and less implementation credibility, and on large and small increases in uniformity, with two-tailed p-values in parenthesis<sup>a,b</sup>**

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
	<b>Strong credibility</b>		<b>Weak credibility</b>	
	<b>Large increase in uniformity</b>	<b>Small increase in uniformity</b>	<b>Large increase in uniformity</b>	<b>Small increase in uniformity</b>
Mandatory adopters	-0.054*** (0.009)	-0.059*** (0.003)	0.012** (0.030)	0.054** (0.016)
Post adoption	0.024*** (0.000)	0.024*** (0.000)	0.001* (0.097)	0.002*** (0.000)
<b>Mandatory adopters*Post adoption</b>	<b>-0.050*** (0.000)</b>	<b>-0.034*** (0.000)</b>	<b>-0.004 (0.115)</b>	<b>-0.002 (0.212)</b>
<i>Test of diff</i>		<b>-0.016*** (0.001)</b>		<b>-0.002 (0.468)</b>
<i>Test of diff-in-diffs</i>			<b>-0.014** (0.013)</b>	
Controls				
Nanalyst	0.004*** (0.000)	0.004*** (0.000)	0.000** (0.018)	0.000*** (0.000)
Size	0.022*** (0.000)	0.016*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
MSCI index	-0.099*** (0.000)	-0.075*** (0.000)	-0.003* (0.062)	-0.003** (0.022)
ADR	-0.030** (0.037)	-0.048*** (0.000)	-0.003 (0.148)	-0.005*** (0.001)
Big5 auditor	0.055*** (0.000)	0.042*** (0.000)	0.002*** (0.005)	0.001* (0.073)
ROE	0.002 (0.382)	0.002 (0.347)	0.010*** (0.000)	0.009*** (0.000)
Returns	-0.011*** (0.000)	-0.011*** (0.000)	-0.001** (0.021)	-0.001 (0.208)
Return variation	-0.118*** (0.000)	-0.145*** (0.000)	0.010** (0.040)	0.012** (0.024)
LEV	0.007** (0.030)	-0.004 (0.173)	-0.010*** (0.000)	-0.006*** (0.001)
Div. yield	-0.482*** (0.000)	-0.406*** (0.000)	0.057*** (0.007)	0.018 (0.520)
Book-to-market	0.014*** (0.000)	0.012*** (0.000)	-0.004*** (0.000)	-0.003*** (0.000)
E-P ratio	0.014*** (0.006)	0.009* (0.064)	-0.001 (0.791)	-0.001 (0.554)
Industry indicators	Included	Included	Included	Included
Country indicators	Included	Included	Included	Included
Adj-R <sup>2</sup>	0.591	0.537	0.261	0.225
N	9,372	12,108	7,040	7,764

### Table 6, continued

<sup>a</sup> p-values are based on robust standard errors clustered by firm. \*\*\*, \*\*, \* indicates significance at the 0.01, 0.05, and 0.10 level or better, respectively.

<sup>b</sup> A firm is classified into the less credible implementation partition if the implementation credibility index is greater than the sample country median. A firm is classified into the large increase in uniformity partition if its  $\Delta uniformity$  measure is greater than the median industry-country-level observation.

**Variable definitions:**

See Tables 2 and 5.

Table 7

Different types of foreign fund ownership regressed on mandatory adoption dummy interacted with post adoption dummy, partitioned on large and small increases in uniformity among countries with strong implementation credibility, with two-tailed p-values in parenthesis<sup>a,b</sup>

**Panel A: Regression with dependent variable being foreign global and regional funds**

	Dependent variable = Foreign global mutual funds		Dependent variable = Foreign regional mutual funds	
	Model 1	Model 2	Model 1	Model 2
	Large increase in uniformity	Small increase in uniformity	Large increase in uniformity	Small increase in uniformity
Mandatory adopters	0.025*** (0.004)	-0.005 (0.193)	0.024*** (0.005)	-0.001 (0.737)
Post adoption	0.001*** (0.000)	0.002*** (0.000)	0.000 (0.288)	0.000 (0.169)
<b>Mandatory adopters*Post adoption</b>	<b>0.014*** (0.000)</b>	<b>0.005*** (0.000)</b>	<b>0.012*** (0.000)</b>	<b>0.003*** (0.000)</b>
<i>Test of diff</i>		<i>0.009 (0.014)</i>		<i>0.009 (0.005)</i>
Controls	Included	Included	Included	Included
Industry indicators	Included	Included	Included	Included
Country indicators	Included	Included	Included	Included
Adj-R <sup>2</sup>	0.398	0.341	0.425	0.334
N	9,372	12,108	9,372	12,108

**Panel B: Regression with dependent variable being foreign country funds and others**

	Dependent variable = Foreign country mutual funds		Dependent variable = Foreign other mutual funds	
	Model 1	Model 2	Model 1	Model 2
	Large increase in uniformity	Small increase in uniformity	Large increase in uniformity	Small increase in uniformity
Mandatory adopters	-0.004*** (0.018)	-0.004*** (0.002)	0.006*** (0.002)	0.002 (0.147)
Post adoption	-0.006*** (0.000)	-0.006*** (0.000)	-0.000 (0.612)	-0.000 (0.274)
<b>Mandatory adopters*Post adoption</b>	<b>0.005*** (0.000)</b>	<b>0.003*** (0.000)</b>	<b>-0.002** (0.031)</b>	<b>-0.001*** (0.000)</b>
<i>Test of diff</i>		<i>0.002 (0.032)</i>		<i>-0.001 (0.502)</i>
Controls	Included	Included	Included	Included
Industry indicators	Included	Included	Included	Included
Country indicators	Included	Included	Included	Included
Adj-R <sup>2</sup>	0.425	0.334	0.090	0.072
N	9,372	12,108	9,372	12,108

### Table 7, continued

<sup>a</sup> p-values are based on robust standard errors clustered by firm. \*\*\*, \*\*, \* indicates significance at the 0.01, 0.05, and 0.10 level or better, respectively.

<sup>b</sup> A firm is classified into the less credible implementation partition if the implementation credibility index is greater than the sample country median. A firm is classified into the large increase in uniformity partition if its  $\Delta uniformity$  measure is greater than the median industry-country-level observation.

#### **Variable definitions:**

See Tables 2 and 5.