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The accounting dimension in financial integration: International pricing under different accounting standards

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ABSTRACT

We suggest that accounting homogeneity is a necessary step in the process of financial market integration. Specifically, we analyze the effect of integration in the "accounting sense" in the correct analysis of international investments and fund allocation by estimating several pricing and valuation models in a cross-country context. We design our analysis in such a way that we can control for differences in accounting standards of the firms contained in the sample. Our results show that the accounting dimension is relevant for cross-country pricing and valuation: the use of homogeneous accounting leads to higher goodness-of-fit of international versions of the models, at levels similar to those of domestic versions and superior to those of non-homogeneous versions. Our results imply that accounting integration is an additional, and important, dimension of financial integration and that progress towards further accounting homogeneity would lead to more accurate pricing of international assets and to an improvement of the efficiency of international fund allocation.

Keywords: Accounting integration; pricing and valuation models; International financial integration; ADR's.

JEL Classification: M41, G12.

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1. Introduction

Financial market integration has received wide attention from finance researchers -see, e.g., Levine, 1997, for a review of the issues- given its numerous beneficial effects (Bekaert and Harvey, 2003).[1] First, cross-country capital flows increase significantly with integration. This leads to a rationalization of fund allocation in the receiving country, since international investors will look for the promising sectors while shunning those that are inefficient or declining. Second, a reduction in country-risk or, alternatively, an increase in a country's rating usually follows from higher integration. This implies a reduction in the cost of capital with a subsequent increase in investment (Stulz, 1999).[2] Ultimately, effects are felt at the macroeconomic level via, for example, lower consumer prices or faster economic growth and a higher level of development.[3] Third, integration provides with an increase in diversification benefits for local and global investors who are, therefore, subject to lower levels of risk, especially if the integrating country offers differential sources of risk. Finally, moves towards further financial integration usually require profound institutional reforms, so that the process of integration ends up bringing about a more solid institutional framework (Ferguson, 1999).

Thus, it is no surprise that accelerating the process of integration of financial markets is at present a central policy objective even of already developed areas, such as the EU (Grahl, 2006). Many of these policies are aimed at reducing different sources of transactions costs, which are usually behind barriers to financial integration. Bekaert (1995) distinguishes several obstacles to integration. First, existing legal barriers that arise from the different legal status of foreign and domestic investors with regard to, for example, foreign ownership restrictions and taxes on foreign investment, tend to hinder integration. Second, indirect barriers arising from differences in available information, accounting standards, and investor protection also affect the speed at which markets can integrate.

We are specifically interested in the latter, that is, in indirect barriers to financial integration stemming from differences in available information and, in particular, in accounting standards. An effective financial sector enables savings to flow to investments with the highest marginal return. The economy grows thanks to factors such as capital accumulation and technological innovation. Good information is vital to attain these, as it guarantees better investment decisions, and hence maximizes investment returns. Indeed, optimal investment decisions are ensured by reducing information asymmetry, which occurs when investors and insiders have different levels of information. Accounting information is key for the understanding of the financial status of the firm, for distinguishing good versus bad companies and for the elimination of information asymmetries.

If reliable accounting information is necessary for a smooth functioning of the financial markets, financial integration should benefit significantly from harmonization of accounting standards. The growing interdependence of international financial and banking markets requires accurate and transparent published financial statements that are consistent and comparable. The adoption of internationally recognized standards, or codes of good practice, helps improve economic policy and strengthen the international financial system. In fact, over the last several years, we have come to recognize that financial crises may result from improper accounting

[1] Financial markets are considered integrated when assets of identical risk command the same expected return irrespective of their domicile.

[2] The cost of equity capital was estimated to fall across Europe by about 40 basis points because of financial integration, with a further reduction of 10 basis points arising from reduced clearance and settlement costs.

[3] A recent study by the European Commission quantified that the overall level of EU-wide real GDP may increase by more than 1% over a decade or so as a result of further integration; the impact on employment would also be substantial (London Economics, 2002).

practices (this point made especially evident by debacles in corporate America and Europe), thus again stressing the importance of strong and comparable accounting standards.

By its own nature, international accounting standards constitute a typical instrument of harmonization and integration and, therefore, moves toward further accounting homogenization are being seen as a key policy action for stability and development of the financial system. In the last years, the amount of work devoted to the improvement of transparency and to the formulation of internationally accepted standards for accounting and auditing has accelerated (Lainez et al., 2004; Staking and Schulz, 1999). In this line, for example, the Basel Committee or the Lamfalussy Report (2001) have stressed the benefits of accounting harmonization for financial market integration, while at the same time expressing concerns regarding the extent to which international standards can be totally harmonized: a country's accounting regulation reflects its cultural, economic, and political institutions, and thus complete homogenization of standards may be quite difficult to attain.[4]

Despite the above mentioned trend towards accounting homogenization, there are still substantial differences in accounting standards across countries. For example, domestic accounting regulations across the globe differ very significantly in the speed of earnings and losses recognition, the intensity of earnings smoothing, the accounting and tax treatment of asset revaluation, etc. Thus, barriers to efficient investment allocation still persist because of informational transaction costs (or informational asymmetries) due to differences in accounting standards.

In this paper we want to look at the effects of the (lack of) cross-country comparability of accounting measures -such as earnings, book values and financial ratios- on financial integration. Specifically, we analyze the impact of accounting homogeneity on international pricing analyses. In these cross-country analyses, practitioners or researchers use accounting data of firms that quote in capital markets subject to different accounting standards. The heterogeneous cross-country behavior of accounting measures implies that the validity of pricing models, the estimation of the cost of capital in international contexts or the evaluation of earnings quality for companies subject to different accounting standards could be difficult to assess or distorted if the accounting dimension is not specifically controlled for (Barth et al., 2008). From a practical standpoint, the efficiency of international valuation and allocation of resources could be negatively affected if the distortions induced by differing accounting practices are not explicitly corrected for in the analysis.

This problem of cross-country comparability of accounting measures may in fact be behind the poor empirical performance of international pricing models that are estimated using firms' accounting information. For example, several extended versions of the CAPM model -the three-factor model of Fama and French (F-F, 1993) or the four-factor model that incorporates an accrual factor-, have been shown to work quite well at the domestic level but they have failed to provide a good explanation of the cross-country structure of returns. This failure could be caused by the invalidity of the models -thus the development of international extensions of the models-, but also by the distorting effects induced by the differing accounting standards used by the firms in the analyzed samples. If the latter were the case, then homogenization of accounting standards would lead to better international pricing and fund allocation -these models are used, among other things, for estimation of the cost of capital and for investment selection-, thus becoming a key component of the process of financial integration.

[4] Another example of the trend toward accounting homogenization is the 1998 Financial Services Act of the EC. Among forty-three legislative measures that were proposed for the creation of a single EU market for financial services, nineteen concerned the raising of capital on an EU-wide basis, via the establishment of a common legal framework for integrated assets markets and the movement towards a single set of accounting standards and procedures that would allow for comparison of the financial statements of companies in different EU countries (see Walter, 2002).

In this paper we provide evidence that suggests that this issue merits further attention. We use two pricing models -the F-F model and an accrual-augmented model- and an accounting valuation model and show how the performance of these models in cross-country settings may be poor, at least partly, due to heterogeneity of accounting data. We analyze whether the use of homogeneous accounting data improves the performance of international versions of the models, and provide evidence that suggests that a lack of accounting uniformity may be behind the poor fit of previous applications. Specifically, we carry out an innovative empirical analysis where we look for settings where we can explicitly control for the accounting dimension. We apply the models to several samples of firms, but especially to a set of firms that publish their accounting information following two different standards: non-US companies that have issued ADRs in the US are required to publish accounting numbers following the US GAAP at the same time that they publish their own domestic-based numbers. We show that the use of the homogeneous accounting numbers (those stemming from the reporting in the US following the GAAP) improves significantly the fit of the empirical model when compared to versions that use the domestic-standards-based accounting numbers. We also apply the models to a set of US firms and to a number of single-country samples of firms, which are accounting homogeneous by definition. We show how the models that pool together international samples of firms perform much better in accounting homogeneous samples. The results of our exercises, we believe, convincingly show the convenience of moving towards homogeneous or comparable accounting procedures, and give support to homogenization efforts such as those by the Basel Committee or the "Liabilities & Equity" project –undertaken by the FASB and IASB– or to the recommendation of unilateral adoption at an international level of a single set of accounting standards.

The rest of the paper proceeds as follows. In Section 2 we review some recent literature on the relationship between financial integration and accounting, which provides the justification and context for the empirical analysis. In Section 3 we describe the data and the empirical exercises, where we estimate different versions of the F-F three-factor model, of a four-factor model that includes an accrual factor and of an accounting valuation model. We place special emphasis on controlling for accounting differences. In Section 4 we comment briefly on the implications of our analysis for financial integration. In Section 5 we conclude.

2. Integration of accounting standards across countries and financial integration

The behavior of accounting measures differs quite significantly across countries in different accounting systems. The literature has found that countries that follow the same accounting system, for example, common-law or code-law countries, also share a similar accounting and legal environment. Accounting variables, such as earnings, behave more similarly in countries within the same accounting system and, alternatively, this behavior differs substantially across accounting systems. For example, Ball et al. (2000) find that earnings of firms in common-law countries (US, UK, Australia and Canada) are much more asymmetric than earnings in code-law countries (Germany, France) and that smoothing of earnings is more intense in code-law based countries.

Even accounting standards that have more widespread application (such as the IAS or the US GAAP) induce significant differences in the behavior of accounting variables. In a recent paper, Ding et al. (2007) show that there are significant dissimilarities of accounting rules on loss recognition, measurement and disclosure between domestic standards and the IAS, and therefore among domestic standards themselves. These dissimilarities are a function of the level of economic development, the strength of the accounting profession and the importance of equity markets in the domestic country and are, consequently, difficult to eliminate unless the accounting procedures were explicitly homogenized. Ndubizu and Sanchez (2006) report that US GAAP numbers are more value relevant than the IAS numbers, given the different degree of conservatism. Thus, two identical companies could show very different book values under the two standards.

Given the current levels of international financial flows and the constant move towards further financial integration, the cross-country comparability of accounting information in the context of asset pricing becomes of special relevance. If analysts or researchers are to carry out international pricing exercises that require the use of accounting information, they need to know whether the use of accounting information coming from different standards will have an impact on the results of the analysis. Indeed, the fact that the information may not be directly comparable should make us cautious of possible distortions.

The existing literature on the interplay between accounting standards, financial integration, and the impact of cross-country differences in accounting on pricing and valuation is still very scarce. It is widely accepted, though, that in a global context information needs to be made available and understood by all investors, shareholders, firms, and analysts. Dowers and Lorenzo (2004) stressed the need for consistent financial market conventions and principles, particularly in light of the inconsistencies in national financial statement practices. A solution to this problem is to provide for greater harmonization and/or integration of corporate financial disclosure. Fernandez-Arias and Hausman (1999) suggest that the main solution for some of the main problems of international financial integration relies on proper valuation of the assets and liabilities sides of balance-sheets of banks and firms. Hence, harmonization of accounting standards becomes a central element of the process of integration. Eichengreen and Hausman (1999) mention explicitly that adequate accounting and auditing standards should be adopted to limit the information asymmetries that weaken market discipline. Despite this generalized agreement on the necessity for further accounting harmonization, very little work has been done that explicitly tries to examine its effects on financial markets. There is some evidence that accounting environments that lead to greater disclosure of value-relevant accounting information are associated with better forecasting, higher capital mobility and lower cost of capital, thus leading to better allocation of investment resources (see Bandyopadhyay et al., 1994, Ashbaugh and Pincus, 2001, Young and Guenther, 2003, Hail and Leuz, 2006, among others).

Martin and Rey (2000) develop one of the very few theoretical models related to our topic that we are aware of. They show that the decision by a firm to list on one or several markets depends on the relative magnitudes of the fixed and variable transaction costs the firm faces. One of the main fixed costs of cross-listing comes from differences on accounting procedures that require the adaptation of domestic financial statements to foreign regulations. Accounting integration could lower significantly the cost of cross-listing and therefore incentivize it. Some empirical analyses have mentioned the accounting dimension, although without trying to control explicitly for it. Blackman et al. (1994) suggest that accounting has acted as a significant market barrier to financial integration. In their view, it was not until the setup of the International Accounting Standards Committee that widely agreed and observed accounting standards allowed for a more accurate international pricing of securities. However, they made no effort to control for the accounting dimension in their analysis of stock market integration.

The literature regarding the effect on international asset pricing of combining heterogeneous accounting information is also quite scarce. Accounting researchers have looked at the effects of differences in accounting systems on accounting valuation (Ashbaugh and Olsson, 2002; Lin and Chen 2005; Platikanova, 2007) and it has been shown that the power of tests in pricing models that use accounting-based methods is similar to that of tests which use market-based methods (Kallunki, 1997). References for finance pricing models are even more scarce. It is indeed the case that some of the main financial models do not require the use of accounting-based information, and this may be behind the lack of empirical work in this topic.[5] However, in those models that require the use of

[5] Neither the CAPM, which uses the market return as the risk factor to be priced nor factor-pricing models that include additional risk factors such as momentum (measured using the return history), size (that uses market capitalization), liquidity (measured via trading data) or exchange rate risk require the use of accounting information.

such information, the issue of the (lack of) comparability leads to serious distortions in the output of the pricing analysis. The paper by Gomez-Biscarri and Lopez-Espinosa (2008) provides the only study we are aware of that analyzes the impact on international asset pricing models of differences in accounting systems among the firms or countries included in the analysis. Their analysis shows that the performance of the F-F model improves significantly in settings that explicitly control for the homogeneity of the accounting information.

This admittedly brief discussion should suffice to demonstrate the importance of comparability of accounting measures when a pricing analysis is to be carried out at a cross-country level: identical firms in countries subject to different accounting standards would "look different" or, alternatively, two firms with the same value of an accounting measure (for example, the market-to-book ratio) may not be necessarily comparable. As a consequence, international investors, analysts and researchers should consider the differences in accounting standards when carrying out cross-country valuation and acknowledge the need for adjustments in the accounting measures used. In particular, the empirical estimation of pricing models that utilize accounting information -such as the F-F three-factor model, which uses the book-to-market ratio, or accounting valuation models- should be adjusted so that all firms are directly comparable.

We suggest that this effect could be behind the apparent empirical failure of international versions of some pricing and valuation models that use accounting information. We carry out an exercise where we estimate three such models in a setting that allows us to control explicitly for the effect of differing accounting standards in the accuracy of the pricing analysis.

3. Integration of accounting standards and the performance of international pricing models

3.1 Factor pricing models

We first test two factor-pricing models (extensions of the CAPM) that use accounting information in the estimation of factor sensitivities and risk premiums. In a global efficient capital market there should be a unique set of risk factors that describe expected returns in all countries. Thus, if the factors included in a pricing model capture all relevant risks that are priced at the international level, the model should explain the international cross-section of returns. However, if world financial markets are not integrated in some sense the empirical validity of international versions of the model could be seriously affected. Traditionally international factor-pricing models have failed to explain correctly the cross-section of returns. Two reasons could be behind this failure. One is model misspecification -there are international risk factors not accounted for by the factors included in the model- but the other one could be the lack of comparability of international accounting data (prior studies pooled together data from countries that followed different accounting standards). In other words, financial markets might not be integrated in the "accounting sense." For example, the *Book-to-market* (*BTM*) factor in the F-F three factor model is a proxy constructed from the return of a portfolio formed on the basis of book values of firms. This measure is directly affected by accounting reporting standards, and therefore the use of non-homogeneous book values affects the composition of the BTM portfolio and, consequently, the explanatory power of the BTM factor over the cross-section of expected returns.[6]

[6] Imagine two identical firms that differ only because of the accounting standards to which they are subject. Firm A quotes in a market where the accounting standards are aggressive and firm B quotes in a market where the accounting standards are more conservative. Under rational international financial markets, the market values of both companies should be the same, but the book values would differ, given the differing degree of accounting conservatism (in particular, the BTM ratio of the company in the more conservative system is likely to be smaller) and in the construction of the F-F BTM factor these two firms would be treated as different.

We focus on this second possible source of poor performance of factor-pricing models.[7] We plan to show that traditional measures of model fit and specification improve significantly in settings where the accounting information has been homogenized.

3.1.1 DATA

In this subsection we estimate two different factor-pricing models that use accounting information in the construction of the factors. In order to control explicitly for possible distortions due to accounting differences, we collect information on three different samples.

The first sample, *USA*, contains data (firm-months) for all US firms for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available. In that sense, it represents the widest possible set of firms that follow exactly the same accounting standards (US GAAP).

The second sample, *Domestic*, is composed of data from all non-US firms for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available. These numbers are computed using each country's domestic accounting standards.[8]

Finally, the third sample, *ADR* (American Depositary Receipts), is composed of all non-US foreign firms that are listed as ADRs in the USA for which operating income (Compustat North America Data Item 178) and net operating cash flows (Compustat North America Data Item 308) are available. The ADR ratio (Compustat North America Data Item 234) has been used for the identification of these ADR firms. The database mentioned (Compustat North America) contains the accounting measures computed following the US GAAP. These numbers are directly comparable, despite the various nationalities of the firms. Additionally, we collect domestic - therefore, heterogeneous- accounting numbers for these firms, which are available in the Compustat Global database. This makes these companies the most adequate benchmark for comparison of the performance of the pricing model as a function of accounting homogenity.

We collect the following data for each firm: market value, ordinary common equity and returns (adjusted for dividends, capital increases, splits and reverse splits). Size and common equity are measured in US dollars. Returns are computed using domestic currencies. We only consider firms with positive common equity and fiscal year ending in December.

In one of the models that we test we incorporate a fourth accrual factor. Accruals are defined as operating income minus net operating cash flows. Monthly returns from July of year t to June of year $t + 1$ are matched to the accounting measures of the fiscal year that ends in calendar year $t - 1$ to ensure that investors have access to the accounting information being examined. This procedure parallels that in F-F (1993).

The sample period analyzed for the *USA* and *Domestic* samples (Compustat Global) ranges from 7/1994 to 12/2006 and for the *ADR* firms (Compustat North America) from 7/1991 to 12/2006. The selection process results in final samples of 34,205 firm-month observations for the *ADR* sample, 229,996 for the *USA* sample and 16,475 for the *Domestic* sample.

[7] Of course, the model might still have some missing international risk factor. We plan to show that the fit of the model *improves* when the data comparability issue is solved, but inclusion of some missing factor should also lead to better model fit.

[8] The Compustat Global database contains no firms that follow IASB standards and have information on data item 210.

Table 1 shows some descriptive information for all three samples. Panel A reports the number of firms and countries in each of the samples. The geographical distribution by country of origin is shown in Panel B. Panel C offers some descriptive statistics of firms' characteristics in the different samples and it confirms that the firms are quite dissimilar across countries and across samples.

3.1.2 THE FAMA-FRENCH THREE FACTOR MODEL

We first estimate a version of the F-F three factor model. [9] This pricing model augments the traditional CAPM framework with two additional risk factors, *Size* and *BTM*. The expected excess return of a stock is described by

$$E\left[R_i - r_f\right] = \beta_{1i}MKT + \beta_{2i}SMB + \beta_{3i}HML \qquad [1]$$

where *MKT* is the excess return on the market portfolio, *SMB* is the return of a portfolio constructed from a ranking of companies by *Size, HML* is the return of a portfolio constructed from a ranking of companies by the *BTM* ratio and β_{1i}, β_{2i} and β_{3i} are the sensitivities of stock *i* to the three risk factors.[10] Despite its good performance in single country settings, when this model is applied at a cross-country level it loses a significant amount of its explanatory power. The study in Griffin (2002) seems to confirm that the F-F model is probably country-specific. This study, however, has the problem of data heterogeneity in the international versions, since accounting information is used in the construction of the *BTM* risk factor. We replicate the analysis in Griffin (2002) and estimate two different versions of the F-F model. The first version, which we call *ADR*, computes the risk factors using only the sample of ADR companies and their US GAAP accounting numbers. We estimate the following equation:

$$R_{pt} - r_{ft} = \alpha_p + \beta_{pMKT}MKT_t^{ADR} + \beta_{pSMB}SMB_t^{ADR} + \beta_{pHML}HML_t^{ADR} + e_{pt} \qquad [2]$$

where R_{pt} is the return on a portfolio *p* in month *t*, r_{ft} is the return on the risk-free asset and e_{pt} is an error term, which we assume independent of the risk factors. The setup assumes that a single set of three risk factors should explain the expected returns of companies in all countries with ADR issuing companies. The two F-F risk factors SMB_t^{ADR} and HML_t^{ADR} are computed as explained in the Appendix, taking into account the complete pool of ADR firms. The equally weighted mean return of the ADR firms and the interest rate on US three-month Treasury bills have been used as proxies for market return and for the return of the risk-free asset. This version should perform well if the ADR sample is broad enough so that the risk factors can be proxied correctly from the firms in the sample. Since we use the US GAAP information provided by the companies, the accounting dimension has been homogenized in this analysis.

Second, we estimate a *Domestic (DOM)* version of the ADR analysis for the same ADR firms but using their domestic accounting numbers. Domestic data on size and book value are available for all firms in the Global Compustat database. Hence, we have a perfect setting that allows us to check the differences in performance of the pricing model as a function of accounting homogeneity.[11] We estimate:

$$R_{pt} - r_{ft} = \alpha_p + \beta_{pMKT}MKT_t^{DOM} + \beta_{pSMB}SMB_t^{DOM} + \beta_{pHML}HML_t^{DOM} + e_{pt} \qquad [3]$$

where MKT_t^{DOM} is computed in the same manner as MKT_t^{ADR}, and SMB_t^{DOM} and HML_t^{DOM} are computed, as in [2], from a ranking of the pool of ADR firms, but using the domestic –and therefore heterogeneous- accounting information. If indeed the homogeneity of accounting information is important for a good performance of the model, this version should provide a worse fit to the

[9].This analysis is similar to that in Gomez-Biscarri and Lopez-Espinosa (2008).
[10] For the construction of these two portfolios see the Appendix.
[11] In the case of the accrual-augmented four-factor model of subsection 3.1.3 we cannot compute accruals under the two different standards. In that analysis we need, therefore, to resort to alternative comparisons of accounting homogeneous and heterogeneous samples.

returns of the portfolios analyzed, since it uses a less appropriate measure of the HML_t factor. Following F-F (1993) and Griffin (2002) we only present the performance measures of the pricing equations for three composite portfolios: *HIGH* is a portfolio with the assets with the highest 30% book-to-market ratio; *LOW* is a portfolio with assets in the bottom 30% book-to-market ratio; finally, *SH-BL* is a portfolio long in small-size high-BTM assets (smallest 20% and highest 20% BTM ratio) and short in large-size low-BTM assets (largest 20% and lowest 20% BTM ratio).[12]

The main results for the F-F study are presented in Table 2. The table reports only the performance measures for both the *ADR* and the exact *Domestic* versions of ADR firms and focuses on the three composite portfolios *HIGH*, *LOW* and *SH-BL*. The performance of both models is good for the *HIGH* and *LOW* portfolios, but it is quite clear that the *ADR* model dominates the *Domestic* one. The adjusted R^2 of the *ADR* model is quite large –at levels similar to Griffin's benchmarks for single-country versions- and consistently higher than those of the *Domestic* model. Thus, the accounting homogeneous model explains more correctly the behavior of composite portfolios than the accounting heterogeneous model. It is quite noticeable that the *ADR* model is the only one that accounts for the behavior of the *SH-BL* portfolio, for which *Domestic* fails completely. This improvement in fit for the *SH-BL* portfolio is, in fact, quite striking, and suggests that the use of comparable accounting information must induce substantial differences in the behavior of the BTM ratios –the main difference between the two models. Indeed, estimated sensitivities for the BTM factor are the main source of explanatory power for this portfolio –this is a hedge portfolio, so it is not significantly related to market risk- and the reason for this large difference in explanatory power must be a consequence of BTM behavior under the different accounting standards. In untabulated results, descriptive statistics computed under the two different accounting numbers indeed show that the BTM ratio behaves quite differently and, in particular, that the rankings of companies –needed to compute the *HML* factor- are significantly different under the two measures.[13]

3.1.3 THE ACCRUAL-AUGMENTED FOUR-FACTOR MODEL

The F-F model has been augmented with additional factors that tried to capture missing risks. One of these modified versions is the accrual-augmented four-factor model (Francis et al., 2005):

$$E\left[R_i - r_f\right] = \beta_{iMKT} MKT + \beta_{2SMB} SMB + \beta_{3HML} HML + \beta_{4WMB} WMB \qquad [4]$$

where *WMB* is a factor constructed on the basis of *accruals* data (see below) and $\beta_{4\mathrm{WMB}}$ is firm *i*'s sensitivity to that factor. A stream of the accounting and finance literature has interpreted the accrual anomaly –the fact that the accrual factor explains expected returns- as a risk-based anomaly. In other words, accruals would be proxying for some –yet unidentified- risk factor that is priced in the market.[14] Francis et al. (2005) find that poorer accruals quality is associated with larger costs of debt and equity so it seems that there exists some kind of information risk associated with earnings. The results of Aboody et al. (2005) support the preference of investors for high earnings quality –low abnormal accruals- since it is associated to a lower informational risk. Liu and Wysocki (2006), however, suggest that the risk factor is not informational risk but operating volatility risk. Whatever the source of the risk is, the "accrual anomaly" still persists and given that, so far, most of the focus of the empirical work has been done on US firms, it seems warranted to apply the model to a cross-country setting while controlling for the accounting dimension.

[12] Results for separate firms or countries, factor sensitivities and alternative analyses are available in Gomez-Biscarri and Lopez-Espinosa (2008).
[13] The Spearman rank correlation between both measures is only 0.12 (although significant at the 1% level).
[14] The Fama and French (F-F, 1993) Size and Book-to-market factors have also been subject to the 'characteristics' versus 'risk factor' debate and researchers have identified risk factors for which these two variables may be proxying for (see, e.g. Vassalou, 2003, or Petkova, 2006).

In order to compute the accrual factor, we construct an accrual measure independent of *Size* and *BTM* by estimating the following regression:

$$ACC_{it} = \beta_0 + \beta_1 MV_{it} + \beta_2 BTM_{it} + \varepsilon_{it} \qquad [5]$$

where ACC_{it} are the accruals for firm *i* in month *t*, MV_{it} is the market value for firm *i* in month *t* and BTM_{it} is the BTM for firm *i* in month *t*. We take the estimated residual of this regression, ε_{it}, as the accrual measure orthogonal to Size and BTM. We use this measure in the construction of the accrual factor in a manner similar to the traditional F-F factors: accruals-based portfolios are computed using ε_{it}. We use the 30% and 70% percentile of the sorting of firms by accruals to form the Best, Medium and Worst groups. We then compute the accrual factor, *WMB*, as the difference between the simple average of the return of the portfolio that contains the highest accrual residuals (Worst) and the return of the portfolio with lowest accrual residuals (Best).

We add the accrual factor to the traditional F-F three-factor model and estimate:

$$R_{pt} - r_{ft} = \alpha_p + \beta_{pMKT} MKT_t + \beta_{pSMB} SMB_t + \beta_{pHML} HML_t + \beta_{pWMB} WMB + e_{pt} \qquad [6]$$

where *MKT*, *SMB* and *HML* are the three F-F factors and *WMB* is the accrual factor constructed as mentioned above. R_{pt} is the return of portfolio *p* in month *t*, r_{ft} is the return of the risk-free asset in month *t*.[15] We study three *BTM* portfolios (Table 3) and seven Size/BTM portfolios (Tables 4, 5 and 6). The three *BTM* portfolios are: *HIGH*, which is a portfolio with the assets with the highest 30% BTM ratio; *LOW* is a portfolio with assets in the bottom 30% BTM ratio; finally, *L-H* is a portfolio long in low BTM assets (lowest 30% BTM ratio) and short in high BTM assets (highest 30% BTM ratio). The seven *Size/BTM* portfolios are: *S/L*, *S/M* and *S/H* are the three portfolios containing the smallest cap stocks, sorted by the BTM ratio; *B/L*, *B/M* and *B/H* are the three portfolios containing the highest cap stocks sorted by the BTM ratio; *S/L-B/H* is the difference between the average returns on the *S/L* (small size-low BTM) and *B/H* (large size-high BTM) portfolios.

Without going into much detail, our results in Tables 3, 4, 5 and 6 show that the performance of the accrual-augmented model for the two accounting-homogeneous models, *ADR* and *USA*, is very similar. The goodness-of-fit (R^2) of the model for both samples is quite high, and the estimates of the intercepts –a measure of average mispricing- are never significant for the *ADR* sample, and only in two of the seven Size/BTM portfolios for the *USA* firms. In the case, however, of the *Domestic* sample, we find overall lower values of R^2 and many more instances of significant and larger intercepts –thus a larger average mispricing-. This is evidence that the heterogeneity of accounting data affects the performance of the model. We note that the *ADR* firms come from fifty different countries but they have to apply US GAAP in order to quote in the US capital market.[16]

Our results are, thus, again quite in line with our main hypothesis about the importance of accounting homogeneity for an adequate performance of pricing models. Correct investment and fund allocation hinges in a correct pricing of assets –and in correct estimates of cost of capital -, and thus as financial integration progresses the need for accounting harmonization becomes more pressing.

3.2 An application to accounting valuation: Ohlson's model

[15] F-F factors are computed for each sample used in the study. The return of the risk-free asset is extracted from Ken French's website for US market.

[16] It is not possible to implement the accrual-augmented four-factor model to the domestic accounting data of ADR firms because in Compustat Global the data item 210 is not available for these firms. Ideally, we'd apply the model to the domestic setting in order to check that its performance is indeed lower, as the *Domestic* sample in our analysis is showing.

3.2.1 DATA AND METHODOLOGY

This subsection departs from finance factor-pricing models and estimates the model in Ohlson (1995), a traditional valuation model widely used in the accounting literature. Ohlson's model is based on the relation between the market value of equity and accounting variables (book value and earnings). Again, we plan to evaluate this model in different samples to see whether there exist differences in the estimated coefficients and R^2 caused by the different level of financial integration in the sample. The equation of the model, which can be estimated by Ordinary Least Squares (OLS), is:

$$\frac{V_{it}}{V_{it-1}} = \beta_0 + \beta_1 \frac{bv_{it}}{V_{it-1}} + \beta_2 \frac{x_{it}}{V_{it-1}} + \varepsilon_{it} \qquad [7]$$

where V_{it} is market value of firm i at the end of fiscal year t, bv_{it} is book value of firm I in year t, x_{it} are earnings before extraordinary items of firm i in year t less any type of dividends, ε_{it} is residual error on firm i in year t and V_{it-1} is market value in year t-1. The variables are deflated to avoid the scale-effect problems evidenced by the accounting literature.

We use information from our three previous samples. The availability of data allows us to apply this accounting model to firms following domestic accounting standards (*Domestic* sample), the set of firms following *IASB* standards (an accounting homogeneous international sample) and foreign firms listed as *ADR* in USA. This last sample is, again, very important for our purposes of analyzing the interplay between financial and accounting integration given that we can apply the model to these ADR firms using both their US GAAP and their domestic accounting numbers. This allows us to compare the performance of the valuation model in a similar manner to what we did in subsection 3.1.2. with the F-F model.

The *Domestic* sample is based on all sample observations (firm-year) for firms that follow their own domestic accounting standards. This information is obtained from the Compustat Global database. We restrict the results to countries for which the number of observations is higher than 1,000. The second one, *IASB* sample, is composed of firms that follow IAS/IFRS. Data on these firms come from the Compustat Global database. The item number "GF66" of Compustat has been used to identify the firms in each sample.

The third sample is based on firms listed on the US as *ADR* firms, using the numbers computed following US GAAP. We use the ADR ratio from Compustat North America for identification purposes. Finally, the fourth sample contains the *ADR* firms for which accounting information following domestic accounting standards is available. We use the Compustat Global database for this information. Since the ADR firms are required to report their financial statements following the US GAAP but they also report using domestic GAAP in their original countries, we can directly compare the performance of the Ohlson model in two *cross-country* settings, one which uses accounting homogeneous –US GAAP- data and one which uses domestic, and therefore heterogeneous, data.

The samples consist of annual accounting data over the period 1994-2005, except for the US GAAP *ADR* sample for which the data cover the period 1992-2005.

3.2.2 RESULTS OF OHLSON'S MODEL

Table 7 shows the results of the estimation of Ohlson's model for the firms in the different samples: single-country domestic samples, firms following *IASB* standards and *ADR* firms using both their US GAAP and their domestic accounting standards. As it can be seen, in the two cases where we have accounting homogeneity and firms coming from different countries, *IASB* and *US GAAP ADR*,

the performance of the model in terms of R^2 is very similar to that of domestic versions based on domestic accounting standards, which are by definition homogeneous. The performance of the model in the case of domestic accounting data for ADR firms, an accounting heterogeneous setting, is lower than in the majority of the countries and significantly lower than both the *IASB* and *US GAAP ADR*. Notice that the only difference with these last two cases is the use of heterogeneous accounting data. We believe that this represents another adequate experiment where we control for the impact of accounting heterogeneity on a valuation models and, again, the results show that the accounting dimension is an important input for the process of financial integration.

3.3 Sensitivity Analyses

Several additional analyses were performed in order to check the robustness of the results:[17]

1) We deleted the 0.5% extreme returns on each side in order to check whether outliers could affect the results. The main tenor of our results remains the same.

2) We examined whether the results are sensitive to the use of F-F (1993) value-weighted or equally-weighted factors. We found no significant differences.

3) We computed alternative measures of accruals as Net Income (Compustat Global Data Item 32) minus net operating cash flows (Compustat Global Data Item 210). For ADR firms, we defined accruals as Net Income (Compustat North America Data Item 172) minus net operating cash flows (Compustat North America Data Item 308). The main results remain comparable to those reported above.

4) We use the F-F (1993) factors extracted from Ken French's website as an alternative to those computed directly from the sample. The main tenor of our results remains the same, except that the measures of goodness-of-fit –mostly, R^2- decrease slightly for all portfolios and samples.

5) We used the same period of analysis (July 1994 – December 2006) for all samples (*ADR*, *USA* and *Domestic*). The results remain unaltered.

6) We used alternative proxies for the market return (a value weighted mean return of the ADR firms and the return of the MSCI index for the US). The results do not change substantially.

4. Discussion

Our results suggest that homogeneity of accounting measures matters for international investment analysis: the use of comparable accounting information leads to smaller pricing errors and higher explanatory power of composite portfolios in factor-pricing models, and to comparable – and better- fits of Ohlson's valuation model.

We do not want to imply that the models tested are correct, in the sense that they are sufficient to explain the cross-section of international expected returns or of firm values: the models might still be missing risk factors or value components that account for the unexplained part of the return variation. We believe, however, that we have shown convincing evidence that the use of cross-country accounting numbers computed under the same accounting standards reduces quite noticeably the size of the pricing errors. Therefore we are quite confident in saying that accounting heterogeneity is, at least partly, to blame for previous failures of international versions of the pricing models and for the relatively poor performance of Ohlson's model.

The analysis sheds some light on the possible effects of furthering financial integration along the "accounting dimension". Moves towards international adoption of a set of common accounting standards, maybe through the widespread adoption of IAS/IFRS, or through common projects that lead to convergence in accounting standards –such as the "Liabilities and Equity

[17] The results of all these analyses are available from the authors.

(L&E)" project undertaken by the FASB and IASB– would lead to an improvement of the international comparability of accounting measures (and of accounting-based ratios such as BTM) and, according to our results, to a better performance of international pricing and valuation models. This should result in better estimates of discount rates, cost of capital, etc., and therefore lead to more efficient investment and fund allocation. We indeed assumed that returns are correctly measured in the market, so that the market seems to be capable of making the adjustment of accounting standards. However, we show that the empirical relationship between accounting measures and market values does become distorted in the absence of accounting homogeneity. Therefore both academics interested in gaining a better understanding of this relationship (for example, those looking for the source of the risk factors measured by the BTM or accrual proxies: see Vassalou, 2003, or Petkova, 2006) and practitioners who use accounting information for investment decisions should be aware of this distortion and control for it in their analyses. Enhanced international accounting homogeneity reduces the extent of the distortion and therefore it has beneficial implications for the process of financial integration.

5. Conclusions

International pricing models that use accounting information have traditionally performed poorly. These failures of international pricing models may be due to model misspecification or to lack of cross-country comparability of accounting data. We have estimated several pricing and valuation models and showed that, when the accounting dimension is explicitly controlled for, the results improve significantly. In other words, using homogeneous accounting numbers leads to more correct inferences on cost of capital, firm values, etc. Our results are quite unique in that they are, to our knowledge, one of the first attempts to control for the influence of differing accounting standards. We show that, apart from possible model misspecifications, the poor performance of international pricing models may rest on the cross-country comparability of the accounting information used in the analysis.

We could extract a policy recommendation for those involved in international financial integration processes. Higher accounting harmonization across the world –either through the generation of common standards or through the adoption of already accepted standards- would result in improved international comparisons of returns and asset prices. For example, the computation of discount rates –based on estimates that come from the models' parameters- would be more correct, which in turn would generate improved ranking and selection of projects and a more efficient allocation of global funds.

We believe our results are quite relevant and open very fruitful avenues for research. In particular, further analysis on missing risk factors or on the microfoundations for the additional risk factors in factor pricing models would be facilitated if the problems derived from accounting heterogeneity were controlled for. Also, practitioners should benefit from our results by explicitly controlling for the accounting dimension in the selection and valuation of companies around the world.

Appendix: Computation of F-F factors

The market factor, MKT_t, is measured as the excess return on the market portfolio over the risk-free rate. This is the traditional factor used in CAPM-type analyses. In order to obtain the measures for the *Size* and *BTM* factors we follow exactly the procedure described by F-F (1993). This procedure is based on constructing portfolios based on both the size and book-to-market measures. First, firms are ranked by size, using the median size to classify firms as Small (S) or Big (B). Second, firms are ranked by BTM, using the 30% and 70% percentiles to classify firms as Low (L), Medium (M) and High (H) book-to-market. With these two classifications, six portfolios are formed that correspond to the six possible groups of firms. SMB_t, the proxy for the Size factor, is measured as the difference between the average value-weighted return on the three portfolios containing the *smallest cap* stocks (S/L, S/M and S/H) and the average value-weighted return of the three portfolios containing the *largest cap* stocks (B/L, B/M and B/H). HML_t, the proxy for the BTM factor, is measured as the difference between the average value-weighted return of the two stock portfolios with a *high BTM ratio* (S/H and B/H) and the average value-weighted return of the stock portfolios with a *low BM ratio* (S/L and B/L). As it can be seen, the two factors are trying to account for the effect of being a small company as opposed to a big one (SMB) and for the effect of having a high BTM ratio as opposed to a low one (HML).

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Table 1
Descriptive statistics on ADR, USA and Domestic sample.

Panel A: Firms and Countries

	ADR	USA	DOMESTIC
Firms	833	2,444	246
Countries	50	1	10

Panel B: ADR and Domestic Distribution among countries

ADR

AUS	BRA	CHL	DEU	FRA	GBR	JPN	MEX	NLD	Rest
6.68%	5.77%	3.64%	5.16%	6.53%	26.40%	7.44%	6.22%	6.22%	25.95%

Domestic

ANT	BEL	BMU	CAN	CYM	GBR	ISR	MHL	NLD	PAN
0.41%	0.41%	3.25%	86.59%	3.66%	0.41%	3.66%	0.41%	0.41%	0.81%

Panel C: Descriptives

ADR

N		Assets (MM$)	ACCR	BTM	SIZE (MM$)	Return (%)
34,205	**Mean**	16,775.02	0.00	0.86	9,849.21	1.37
	Std. Dev.	358.34	14.55	0.00	379.18	0.12

USA

N		Assets (MM$)	ACCR	BTM	SIZE (MM$)	Return (%)
229,996	**Mean**	3,393.68	0.00	0.58	3,786.20	2.50
	Std. Dev.	33.39	0.93	0.00	34.25	0.47

DOMESTIC

N		Assets (MM$)	ACCR	BTM	SIZE (MM$)	Return (%)
16,475	**Mean**	2,464.18	0.00	0.66	2,664.27	2.13
	Std. Dev.	45.12	1.74	0.00	93.71	0.16

Notes:

1. This table describes the three samples in Section 3. The *USA* sample is based on all firm-month observations for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available. The second sample, *Domestic*, is extracted using non-US firms for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available, computed using their own domestic accounting standards. Finally, the third sample, *ADR*, is extracted using foreign firms listed as ADRs in the USA for which operating income (Compustat North America Data Item 178) and net operating cash flows (Compustat North America Data Item 308) are available. Accruals are defined as operating income minus net operating cash flows.
2. Monthly returns from July of year *t* to June of year *t*+1 are matched to the accounting measures of the fiscal year that ends in calendar year *t*-1 to ensure that investors have access to the accounting information being examined. This procedure is exactly the same as in F-F (1993). The resulting period for the *USA* and *Domestic* firms (Compustat Global) goes from 7/1994 to 12/2006 and for the *ADR* firms (Compustat North America) goes from 7/1991 to 12/2006.
3. Panel A shows the number of firms and countries belonging to each sample.
4. Panel B reports the countries represented on the *ADR* and *Domestic* sample. AUS: Australia; BRA:

Brazil; CHL: Chile; DEU: Germany; FRA: France; GBR: Great Britain; JPN: Japan; MEX: Mexico; NLD: Netherlands; ANT: Netherlands Antilles; BEL: Belgium; BMU: Bermuda; CAN: Canada; CYM: Caymand Islands; ISR: Israel; MHL: Marshall Islands; PAN: Panama.

5. Panel C shows descriptive statistics on the *ADR*, *USA* and *Domestic* samples. N: Number of observations; Assets: Total assets; Size: Market value. Assets and Size are in MM US$. Return is calculated using domestic currency. BTM is the book-to-market. ACCR is the residual of the following regression:

$$ACC_{it} = \beta_0 + \beta_1 MV_{it} + \beta_2 BTM_{it} + \varepsilon_{it} \qquad [5]$$

where ACC_{it} are the accruals for firm *i* in month *t*, MV_{it} is the market value for firm *i* in month *t* and BTM_{it} is the BTM for firm *i* in month *t*. ε_{it} is the accrual measure independent of size and BTM, accrual residual (ACCR).

Table 2
ADR firms - relative performance of the two versions of the Fama-French model

			US GAAP ADR		Domestic Accounting ADR	
		Average Return (%)	$\hat{\beta}_0$ (%)	Adj. R^2	$\hat{\beta}_0$ (%)	Adj. R^2
Value weighted	HIGH	2.50***	0.72**	**94.39**	1.07*	**86.77**
	LOW	0.72	0.57	**94.86**	-1.37	**64.27**
	SH-BL	1.72***	0.44**	**96.57**	2.36**	**1.39**
Equally weighted	HIGH	1.02**	0.42***	**98.76**	-0.04	**91.88**
	LOW	0.88**	0.31***	**98.85**	0.38	**90.07**
	SH-BL	-0.16	0.10	**91.33**	-0.88	**7.97**

Notes:

1. This table is based on *ADR* sample, is extracted using foreign firms listed as ADRs in the USA for which market value, common equity and returns are available. US GAAP ADR: Version of the Fama-French model taking into account only firms quoting as ADRs with factors computed using their US GAAP information; Domestic Accounting ADR: ADR firms where common equity is computed using domestic accounting standards.
2. Monthly returns from July of year *t* to June of year *t*+1 are matched to the accounting measures of the fiscal year that ends in calendar year *t*-1 to ensure that investors have access to the accounting information being examined. This procedure is exactly the same as in F-F (1993). The resulting period for the *ADR* firms (Compustat North America) using US GAAP goes from 7/1991 to 12/2006 and for the *Domestic* ADR firms (Compustat Global) goes from 7/1994 to 12/2006.
3. This table shows the results of the F-F estimation obtained for firms around the world that quote on ADRs in the US. The estimated equations are of the form: $R_{pt} - r_{ft} = \alpha_p + \beta_{pMKT} MKT_t + \beta_{pSMB} SMB_t + \beta_{pHML} HML_t + e_{pt}$. *Value weighted*: results using value weighted factors and value weighted portfolios; *Equally weighted*: results using equally weighted factors and equally weighted portfolios; *HIGH*: portfolio with assets in the highest 30% book-to-market ratio; *LOW*: portfolio with assets in the bottom 30% book-to-market ratio; *SH-BL*: portfolio long in small and high BTM assets (smallest 20% and highest 20% BTM ratio) and short in large and low BTM assets (largest 20% and lowest 20% BTM ratio).
4. Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 3
Monthly Excess Returns on the Six Size-B/M Portfolios Regressed on Market, Size, B/M and Accrual Factors

Excess Returns Regressed on Market, Size, B/M and Accrual Factors

$$R_{pt} - r_{ft} = \alpha_p + \beta_{pMKT} MKT_t + \beta_{pSMB} SMB_t + \beta_{pHML} HML_t + \beta_{pWMB} WMB + e_{pt} \quad [6]$$

R_t	α	β_{MKT}	β_{SMB}	β_{HML}	β_{WMB}	R^2
Panel A. ADR firms						
L	0.0010	1.0095***	-0.0445*	-0.2236***	0.0820***	**0.97**
H	0.0004	0.9143***	0.1232***	0.4558***	-0.3357***	**0.83**
L-H	0.0006	0.0953**	-0.1677***	-0.6794***	0.4177***	**0.85**
Panel B. USA firms						
L	-0.0003	1.0724***	-0.0519***	-0.1584***	0.1255***	**0.97**
H	0.0004	1.0217***	0.3496***	0.6118***	0.0364	**0.89**
L-H	-0.0007	0.0507	-0.4016***	-0.7701***	0.0891	**0.80**
Panel B. Domestic firms						
L	0.0033	1.0778***	-0.2033***	-0.1685***	-0.0207	**0.90**
H	-0.0066*	0.8344***	0.2593***	0.3879***	-0.2527***	**0.64**
L-H	0.0099**	0.2434***	-0.4626***	-0.5564***	0.2320***	**0.68**

Notes:

1. This table describes the three samples in Section 3. The *USA* sample is based on all firm-month observations for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available. The second sample, *Domestic*, is extracted using non-US firms for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available, computed using their own domestic accounting standards. Finally, the third sample, *ADR*, is extracted using foreign firms listed as ADRs in the USA for which operating income (Compustat North America Data Item 178) and net operating cash flows (Compustat North America Data Item 308) are available. Accruals are defined as operating income minus net operating cash flows.
2. Monthly returns from July of year *t* to June of year *t*+1 are matched to the accounting measures of the fiscal year that ends in calendar year *t*-1 to ensure that investors have access to the accounting information being examined. This procedure is exactly the same as in F-F (1993). The resulting period for the *USA* and *Domestic* firms (Compustat Global) goes from 7/1994 to 12/2006 and for the *ADR* firms (Compustat North America) goes from 7/1991 to 12/2006.
3. Portfolios are based on BTM, taking into account 30% and 70% percentile for classifying as Low (L), Medium and High (H) respectively. L-H is a portfolio long in low BTM assets and short in high BTM assets.
4. SMB is the difference between the average returns, value-weighted, on the three portfolios containing the smallest cap stocks (S/L, S/M and S/H) and the three portfolios containing the highest cap stocks (B/L, B/M and B/H), and the HML is the difference between the average returns, value-weighted, on the two stock portfolios with a high BTM ratio (S/H and B/H) and the average performance of the stock portfolios with a low BTM ratio (S/L and B/L). WMB is the difference between the average returns, value-weighted, on the portfolio containing the highest accrual residuals (Worst) and the portfolio with lowest accrual residuals (Best). RF is the return on the risk-free asset.
5. ACCR, accrual residual, is the residual of the following regression:

$$ACC_{it} = \beta_0 + \beta_1 MV_{it} + \beta_2 BTM_{it} + \varepsilon_{it} \quad [5]$$

where ACC_{it} are the accruals for firm *i* in month *t*, MV_{it} is the market value for firm *i* in month *t* and BTM_{it}

is the BTM for firm *i* in month *t*. ε_{it} is the accrual measure independent of size and BTM, accrual residual (ACCR).

6. *Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 4. ADR Firms.
Monthly Excess Returns on the Six Size-B/M Portfolios Regressed on Market, Size, B/M and Accrual Factors

Panel A. Summary Statistics				
	Mean	**Median**	**Minimun**	**Maximun**
RM-RF	0.0016	0.0118	-0.2502	0.2867
SMB	0.0033	0.0039	-0.1318	0.1602
HML	0.0057	0.0034	-0.3226	0.2676
WMB	-0.0137	-0.0034	-0.3089	0.3960
S/L-RF	0.0069	0.0067	-0.2368	0.3503
S/M-RF	0.0103	0.0129	-0.3183	0.2025
S/H-RF	0.0092	0.0051	-0.3398	0.2403
B/L-RF	0.0001	0.0093	-0.3074	0.4078
B/M-RF	0.0073	0.0115	-0.1768	0.1522
B/H-RF	0.0091	0.0125	-0.1969	0.2499
S/L-B/H	-0.0022	-0.0077	-0.2069	0.3334

Panel B. Excess Returns Regressed on Market, Size, B/M and Accrual Factors

$$R_{pt} - r_{ft} = \alpha_p + \beta_{pMKT} MKT_t + \beta_{pSMB} SMB_t + \beta_{pHML} HML_t + \beta_{pWMB} WMB + e_{pt} \quad [6]$$

	α	β_{MKT}	β_{SMB}	β_{HML}	β_{WMB}	R^2
S/L	-0.0015	0.8945***	1.0576***	-0.5683***	-0.4876***	**0.86**
S/M	0.0028	0.8291***	0.9494***	0.2824***	-0.1045**	**0.81**
S/H	-0.0005	0.9961***	0.9669***	0.7854***	-0.0359	**0.93**
B/L	0.0011	1.0093***	-0.0686**	-0.2127***	0.0891***	**0.97**
B/M	-0.0004	0.8028***	0.0204	0.2787***	-0.3544***	**0.71**
B/H	0.0001	0.9077***	0.0221	0.4335***	-0.3627***	**0.79**
S/L-B/H	-0.0016	-0.0132	1.0355***	-1.0018***	-0.1249***	**0.93**

Notes:

1. This table describes the three samples in Section 3. The *USA* sample is based on all firm-month observations for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available. The second sample, *Domestic*, is extracted using non-US firms for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available, computed using their own domestic accounting standards. Finally, the third sample, *ADR*, is extracted using foreign firms listed as ADRs in the USA for which operating income (Compustat North America Data Item 178) and net operating cash flows (Compustat North America Data Item 308) are available. Accruals are defined as operating income minus net operating cash flows.
2. Monthly returns from July of year *t* to June of year *t*+1 are matched to the accounting measures of the fiscal year that ends in calendar year *t*-1 to ensure that investors have access to the accounting information being examined. This procedure is exactly the same as in F-F (1993). The resulting period for the *USA* and *Domestic* firms (Compustat Global) goes from 7/1994 to 12/2006 and for the *ADR* firms (Compustat North America) goes from 7/1991 to 12/2006.
3. Portfolios are based on size, taking into account median size for classifying as Small or Big, and on BTM, taking into account 30% and 70% percentile for classifying as Low, Medium and High respectively. S/L-

B/H is a portfolio long in small and low B/M assets and short in large and high BTM assets.

4. SMB is the difference between the average returns, value-weighted, on the three portfolios containing the smallest cap stocks (S/L, S/M and S/H) and the three portfolios containing the highest cap stocks (B/L, B/M and B/H), and the HML is the difference between the average returns, value-weighted, on the two stock portfolios with a high BTM ratio (S/H and B/H) and the average performance of the stock portfolios with a low BTM ratio (S/L and B/L). WMB is the difference between the average returns, value-weighted, on the portfolio containing the highest accrual residuals (Worst) and the portfolio with lowest accrual residuals (Best). RF is the return on the risk-free asset.
5. ACCR, accrual residual, is the residual of the following regression:

$$ACC_{it} = \beta_0 + \beta_1 MV_{it} + \beta_2 BTM_{it} + \varepsilon_{it} \qquad [5]$$

where ACC_{it} are the accruals for firm i in month t, MV_{it} is the market value for firm i in month t and BTM_{it} is the BTM for firm i in month t. ε_{it} is the accrual measure independent of size and BTM, accrual residual (ACCR).

6. *Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 5. USA Firms.
Monthly Excess Returns on the Six Size-B/M Portfolios Regressed on Market, Size, B/M and Accrual Factors

Panel A. Summary Statistics				
	Mean	**Median**	**Minimun**	**Maximun**
RM-RF	0.0165	0.0175	-0.1186	0.1193
SMB	0.0074	0.0011	-0.1192	0.2193
HML	-0.0351	-0.0270	-0.4042	0.1649
WMB	-0.0002	0.0019	-0.1370	0.0814
S/L-RF	0.0431	0.0413	-0.2484	0.5475
S/M-RF	0.0139	0.0199	-0.1887	0.2195
S/H-RF	-0.0033	-0.0011	-0.2330	0.2544
B/L-RF	0.0223	0.0201	-0.1183	0.1396
B/M-RF	0.0106	0.0136	-0.1239	0.1233
B/H-RF	-0.0014	0.0027	-0.1978	0.1771
S/L-B/H	0.0446	0.0357	-0.3295	0.6567

Panel B. Excess Returns Regressed on Market, Size, B/M and Accrual Factors

$$R_{pt} - r_{ft} = \alpha_p + \beta_{pMKT} MKT_t + \beta_{pSMB} SMB_t + \beta_{pHML} HML_t + \beta_{pWMB} WMB + e_{pt} \quad [6]$$

	α	β_{MKT}	β_{SMB}	β_{HML}	β_{WMB}	R^2
S/L	0.0000	0.9833***	1.3277***	-0.4855***	-0.0296	**0.95**
S/M	0.0053***	0.9594***	0.9083***	0.4003***	0.0078	**0.95**
S/H	-0.0009	1.0402***	1.0004***	0.7684***	0.0669**	**0.99**
B/L	-0.0003	1.0752***	-0.0699***	-0.1534***	0.1283***	**0.97**
B/M	0.0041***	0.8894***	0.0489*	0.2440***	-0.1149**	**0.89**
B/H	0.0006	1.0183***	0.2574***	0.5927***	0.0317	**0.85**
S/L-B/H	-0.0006	-0.0350	1.0703***	-1.0782***	-0.0614*	**0.99**

Notes:

1. This table describes the three samples in Section 3. The *USA* sample is based on all firm-month observations for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available. The second sample, *Domestic*, is extracted using non-US firms for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available, computed using their own domestic accounting standards. Finally, the third sample, *ADR*, is extracted using foreign firms listed as ADRs in the USA for which operating income (Compustat North America Data Item 178) and net operating cash flows (Compustat North America Data Item 308) are available. Accruals are defined as operating income minus net operating cash flows.
2. Monthly returns from July of year *t* to June of year *t*+1 are matched to the accounting measures of the fiscal year that ends in calendar year *t*-1 to ensure that investors have access to the accounting information being examined. This procedure is exactly the same as in F-F (1993). The resulting period for the *USA* and *Domestic* firms (Compustat Global) goes from 7/1994 to 12/2006 and for the *ADR* firms (Compustat North America) goes from 7/1991 to 12/2006.
3. Portfolios are based on size, taking into account median size for classifying as Small or Big, and on BTM, taking into account 30% and 70% percentile for classifying as Low, Medium and High respectively. S/L-

B/H is a portfolio long in small and low B/M assets and short in large and high BTM assets.

4. SMB is the difference between the average returns, value-weighted, on the three portfolios containing the smallest cap stocks (S/L, S/M and S/H) and the three portfolios containing the highest cap stocks (B/L, B/M and B/H), and the HML is the difference between the average returns, value-weighted, on the two stock portfolios with a high BTM ratio (S/H and B/H) and the average performance of the stock portfolios with a low BTM ratio (S/L and B/L). WMB is the difference between the average returns, value-weighted, on the portfolio containing the highest accrual residuals (Worst) and the portfolio with lowest accrual residuals (Best). RF is the return on the risk-free asset.
5. ACCR, accrual residual, is the residual of the following regression:

$$ACC_{it} = \beta_0 + \beta_1 MV_{it} + \beta_2 BTM_{it} + \varepsilon_{it} \qquad [5]$$

where ACC_{it} are the accruals for firm i in month t, MV_{it} is the market value for firm i in month t and BTM_{it} is the BTM for firm i in month t. ε_{it} is the accrual measure independent of size and BTM, accrual residual (ACCR).

6. *Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 6. Domestic Firms.
Monthly Excess Returns on the Six Size-B/M Portfolios Regressed on Market, Size, B/M and Accrual Factors

Panel A. Summary Statistics				
	Mean	**Median**	**Minimun**	**Maximun**
RM-RF	0.0210	0.0244	-0.2124	0.2612
SMB	0.0109	-0.0002	-0.1228	0.5465
HML	-0.0531	-0.0395	-0.3027	0.2284
WMB	0.0050	0.0035	-0.3173	0.3071
S/L-RF	0.0424	0.0335	-0.2842	0.3642
S/M-RF	0.0125	0.0119	-0.2785	0.2374
S/H-RF	-0.0039	-0.0021	-0.2761	0.2072
B/L-RF	0.0315	0.0323	-0.3248	0.3917
B/M-RF	0.0152	0.0157	-0.2203	0.1600
B/H-RF	-0.0083	0.0014	-0.2628	0.2525
S/L-B/H	0.0507	0.0299	-0.3248	0.3981

Panel B. Excess Returns Regressed on Market, Size, B/M and Accrual Factors

$$R_{pt} - r_{ft} = \alpha_p + \beta_{pMKT} MKT_t + \beta_{pSMB} SMB_t + \beta_{pHML} HML_t + \beta_{pWMB} WMB + e_{pt} \quad [6]$$

	α	β_{MKT}	β_{SMB}	β_{HML}	β_{WMB}	R^2
S/L	-0.0074	0.7231***	1.3635***	-0.7805***	-0.3181***	**0.93**
S/M	0.0089**	0.8904***	0.6846***	0.4120***	-0.1279***	**0.64**
S/H	0.0016	0.9801***	0.9787***	0.6861***	-0.0518*	**0.87**
B/L	0.0023	1.0785***	-0.2473***	-0.1779***	-0.0277	**0.90**
B/M	0.0075**	0.6937***	0.1366**	0.1400***	-0.1761***	**0.60**
B/H	-0.0067	0.8215***	0.1375*	0.3555***	-0.2940***	**0.57**
S/L-B/H	-0.0007	-0.0983**	1.2260***	-1.1360***	-0.0241	**0.98**

Notes:

1. This table describes the three samples in Section 3. The *USA* sample is based on all firm-month observations for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available. The second sample, *Domestic*, is extracted using non-US firms for which operating income (Compustat Global Data Item 14) and net operating cash flows (Compustat Global Data Item 210) are available, computed using their own domestic accounting standards. Finally, the third sample, *ADR*, is extracted using foreign firms listed as ADRs in the USA for which operating income (Compustat North America Data Item 178) and net operating cash flows (Compustat North America Data Item 308) are available. Accruals are defined as operating income minus net operating cash flows.
2. Monthly returns from July of year *t* to June of year *t*+1 are matched to the accounting measures of the fiscal year that ends in calendar year *t*-1 to ensure that investors have access to the accounting information being examined. This procedure is exactly the same as in F-F (1993). The resulting period for the *USA* and *Domestic* firms (Compustat Global) goes from 7/1994 to 12/2006 and for the *ADR* firms (Compustat North America) goes from 7/1991 to 12/2006.
3. Portfolios are based on size, taking into account median size for classifying as Small or Big, and on BTM, taking into account 30% and 70% percentile for classifying as Low, Medium and High respectively. S/L-

B/H is a portfolio long in small and low B/M assets and short in large and high BTM assets.

4. SMB is the difference between the average returns, value-weighted, on the three portfolios containing the smallest cap stocks (S/L, S/M and S/H) and the three portfolios containing the highest cap stocks (B/L, B/M and B/H), and the HML is the difference between the average returns, value-weighted, on the two stock portfolios with a high BTM ratio (S/H and B/H) and the average performance of the stock portfolios with a low BTM ratio (S/L and B/L). WMB is the difference between the average returns, value-weighted, on the portfolio containing the highest accrual residuals (Worst) and the portfolio with lowest accrual residuals (Best). RF is the return on the risk-free asset.
5. ACCR, accrual residual, is the residual of the following regression:

$$ACC_{it} = \beta_0 + \beta_1 MV_{it} + \beta_2 BTM_{it} + \varepsilon_{it} \qquad [5]$$

where ACC_{it} are the accruals for firm i in month t, MV_{it} is the market value for firm i in month t and BTM_{it} is the BTM for firm i in month t. ε_{it} is the accrual measure independent of size and BTM, accrual residual (ACCR).

6. *Significant at 10%, ** Significant at 5%, *** Significant at 1%.

Table 7. Domestic, IAS, US GAAP ADR and Domestic ADR Accounting. Regression Results Based on Ohlson's Model.

	β_0	β_1	β_2	R^2	N
Country	**Panel A: Firms following Domestic Accounting**				
AUS	0.96670***	0.23216***	0.56489***	**0.0850**	1,599
CAN	1.06873***	0.14426***	0.37372***	**0.0574**	2,036
CHN	0.84325***	0.06889***	0.76262***	**0.1000**	1,672
DEU	0.81618***	0.15718***	0.01817**	**0.0592**	2,532
FRA	0.69842***	0.23594***	0.24494***	**0.1158**	3,283
GBR	0.99054***	0.14412***	0.49532***	**0.0544**	4,863
IDN	1.12220***	0.06323***	0.03085	**0.0084**	1,228
IND	1.04194***	0.05625***	0.43667***	**0.0481**	1,373
ITA	0.77656***	0.20744***	0.57527***	**0.0809**	1,082
KOR	1.17478***	0.02349	0.14098	**0.0021**	1,156
MYS	0.89861***	0.18448***	0.27090***	**0.0821**	2,583
NLD	0.77748***	0.31309***	0.82096***	**0.1410**	1,141
SWE	0.94257***	0.14586***	-0.00208	**0.0496**	1,341
THA	0.86184***	0.16135***	0.02466*	**0.0962**	2,056
TWN	0.83962***	0.24303***	0.57601***	**0.1292**	1,512
USA	0.98798***	0.24248***	0.35275***	**0.0749**	26,657
	Panel B: Firms following IASB accounting standards				
IASB	0.93350***	0.18634***	0.00386	**0.0550**	3,986
	Panel C: ADR Firms with US GAAP and Domestic accounting				
US GAAP ADR	1.01240***	0.17352***	0.08633***	**0.0447**	2,397
Domestic ADR	1.03665***	0.08584***	-0.00092	**0.0156**	1,177

Notes:

1. This table contains four different samples for which the necessary accounting information needed to implement Ohlson's (1995) model is available. The first sample is based on all sample observations (firm-years) for firms that follow their own domestic accounting standards. This information is obtained from Compustat Global database. Panel A shows the results by country, with the restriction that the number of observations must be higher than 1,000. The second sample, *IASB*, is composed of firms that follow IAS/IFRS. This information is obtained from Compustat Global database. The third sample is composed of firms listed in the USA as ADRs. We take the numbers computed following US GAAP. The database used for this purpose is Compustat North America. Finally, the fourth sample contains the same ADR firms from the third sample but the accounting numbers are those computed under domestic accounting standards. This information is obtained from Compustat Global database. N is the number of observations.
2. AUS: Australia; CAN: Canada; CHN: China; DEU: Germany; FRA: France; GBR: Great Britain; IDN: Indonesia; IND: India; ITA: Italy; KOR: Korea; MYS: Malaysia; NLD: Netherlands; SWE: Sweden; THA:

Thailand; TWN: Taiwan; USA: USA.

3. The sample consists of annual accounting data over the period 1994-2005, except for the US GAAP ADR sample for which the data cover the period 1992-2005.
4. The following equation is estimated using annual data:

$$\frac{V_{it}}{V_{it-1}} = \beta_0 + \beta_1 \frac{bv_{it}}{V_{it-1}} + \beta_2 \frac{x_{it}}{V_{it-1}} + \varepsilon_{it} \qquad [7]$$

where V_{it} is market value of firm *i* at the end of fiscal year *t*, bv_{it} is book value of firm *i* in year *t*, x_{it} are earnings before extraordinary items of firm *i* in year *t* minus any type of dividends, ε_{it} is residual error on firm *i* in year *t* and V_{it-1} is market value in year *t*-1.

5. Significant at 10%, ** Significant at 5%, *** Significant at 1%.