Accounting diversity and the implied cost of capital in Europe

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Abstract

This study employs a “capitalised expected earnings” valuation model to infer the discount rate as a proxy for the *ex-ante* cost of equity capital, taking into consideration the properties of earnings using analysts' earnings forecasts. Focusing on the principal financial markets in Europe, the sample includes both internationally cross listed equities and other equities that are traded only on the issuer's domestic stock exchange. In general, it is found that implied discount rates in European countries are relatively homogeneous across markets. However, the differences that are found across firms suggest a lower cost of capital for international firms than for those firms that only issue equity domestically. With regard to the impact of international accounting differences, estimates of the cost of capital derived from the capitalisation of expected growth in earnings suggest a degree of homogeneity amongst risk premia in Europe.

Key words: Implied discount rates; *ex-ante* cost of capital; capitalised expected earnings; international accounting; cross listing; analysts' forecasts.

1. Introduction

This study focuses on expected earnings and the implications for the cost of capital in a context where conservatism in earnings measurement varies across accounting regimes. Ideally, holding risk and growth factors stable, investors should be able to see through this bias and accordingly adjust forward earnings multiples (*i.e.* the ratio of the forthcoming year's expected earnings per share to current price, or *EP*). Basically, comparability of forward earnings multiples acknowledges that any bias in forthcoming earnings will reverse in subsequent years so that the accounting method that is used should not affect intrinsic value estimates. On the other hand, the inability of investors to fully restore the effects of conservatism in expected earnings will lead to projections that are biased, earnings multiples that are not comparable and prices that are not set in a homogeneous way. The focus of our research is whether different accounting regimes lead to biased projections with regard to the reversal of conservatism in expected earnings, resulting in cost of capital effects.

In the current study, *ex-ante* cost of capital is estimated for a sample of firms that are listed only on their domestic stock exchanges in the UK, France, Germany, the Netherlands and Switzerland and a sample of firms that originate in these countries but are internationally cross listed. The estimates are quite reasonable, the cross listed firms enjoying a lower cost of capital as expected and the estimates being correlated in the predicted way with risk proxies. The study then provides evidence of the association of these estimates of expected cost of capital with forward earnings multiples, *EP*. Accounting diversity suggests differences in the association between *EP* and cost of capital. However, such differences should disappear after controlling, first, for future earnings potential in each country (the reversal of the conservatism bias in next year's expected earnings) and, second, for risk characteristics.

Although the initial diversity is mitigated, some differences persist in spite of these controls, suggesting eventual biased projections in future expected earnings with a longer horizon. The results point to the existence of biases in the projection of future expected earnings. The study shows that, when comparing earnings multiples in an international context, account should be taken of the evolution of earnings that is suggested by each country’s accounting regime, where one accounting system may be more timely than another and capable therefore of capturing firm value more “quickly”, *i.e.* using fewer earnings forecast periods (Frankel and Lee, 1999).

2. Accounting diversity and analysts’ earnings forecasts

Financial reporting reflects contracting objectives as well as the broad investor information incentive (Holthausen and Watts, 2000). During the accounting standard setting process, competing constituencies attempt to influence the process towards the adoption of rules that favour their self-interest (Ely and Waymire, 1998). In a later stage, preparers of financial statements, in their turn, may influence financial reporting in accordance with their incentives (Ball, Robin and Wu, 2000). Therefore, financial reporting is the result of both the standard setting process and preparers’ incentives. To the extent that the nature of contracting objectives differs among regimes, the properties of reported accounting numbers are expected to differ likewise. For example, in countries where methods of financial accounting are linked directly to the calculation of taxable income, managers are expected to compute earnings on a more conservative basis than otherwise, delaying the recognition of profit wherever possible (Capstaff, Paudyal, Rees, 2001*a*).

Recent international accounting research provides evidence of accounting diversity in terms of different degrees of conservatism in current reported earnings (Pope and Walker, 1999; Ball, Kothari and Robin, 2000; Ball, Robin and Wu, 2000; Giner and Rees, 2001), where accounting income diverges from economic (mark-to-market) income due to differences in the speed of recognition of “bad” and “good” news (Basu, 1997). The question asked here is whether such accounting diversity affects the way in which investors form expectations of future earnings and to what extent this might influence the cost of capital implied by stock market valuations based upon such expectations.

Since investors' expectations are unobservable, analysts' forecasts are used instead as a proxy. The main body of literature on analysts' forecasts shows them to be both biased and inaccurate. Is this an indication of irrationality? Probably not. Research on earnings management (Abarbanell and Lehavy, 2000) shows that the inaccuracy is usually due to earnings' management practices. That is, managers usually try either to improve marginally upon the earnings forecast or to take an "earnings bath", depending on their knowledge of the firm's future earnings power. The extent to which the market is misled temporarily by these practices is not the subject of this study, given the focus on long term expected returns. On the other hand, the fact that analysts' earnings forecasts are biased is of more importance. For instance, Helbok and Walker (2001) show that analysts are aware of the conservative nature of reported earnings and its effects on future earnings. They show that analysts revise current period forecasts to reflect current period bad news, and one period ahead forecasts to account for the reversal in the over/under recognition of current news in reported earnings. Overall, their evidence indicates that previous findings of systematic optimism in analysts' forecasts can be explained, at least in part, by the conservative nature of reported earnings. Indirect evidence in terms of international accounting comes from Capstaff, Paudyal and Rees (2001*b*) who find that forecast revisions follow significant abnormal returns, either bad news or good news, and that this phenomenon is stronger for the UK than for France or Germany and is also stronger for downward revisions than upward revisions.

3. Implied discount rates and expected earnings

In finance, it is usual to determine the share price as the present value of future cash flows, consisting of the dividends that are expected per share and the price to be received when the share is sold. However, the price at the end of the holding period depends in turn on dividends expected after that date. Therefore, in the most basic valuation model, an infinite stream of expected dividends values share price as follows:

$$P_0 = dps_1(1+r)^{-1} + dps_2(1+r)^{-2} + ... + dps_\infty(1+r)^{-\infty} = \sum_{t=1}^{\infty} dps_t(1+r)^{-t} \quad (1)$$

where dps_t is the dividend per share in each future period t and P_0 is the current share price. The implied discount rate, r, is a proxy for the *ex-ante* cost of capital, and may be inferred directly from (1) if the current price and the stream of dividends to infinity is known. This basic model can be rewritten as the Gordon growth model if it is assumed that dividends grow in perpetuity at a constant growth rate g, as follows:

$$P_0 = dps_1(r-g)^{-1} \quad (2)$$

Recent research that uses dividends and current price in this way to infer estimates of the cost of capital can be found in Botosan and Plumlee (2001), Fama and French (2001) and Claus and Thomas (2001). However, although the method seems straightforward, it relies considerably on assumptions about the growth rate in dividends.

An alternative model that reduces the importance of assumed growth rates in dividends is the Residual Income Valuation (RIV) model. This model restates the dividend discount model in terms of today's expectation of future earnings per share, *eps*, less a capital charge based on the respective book value of equity per share, *bps*:

$$P_0 = bps_0 + \sum_{t=1}^{\infty}(1+r)^{-t} E_0\left[eps_t - r \cdot bps_{t-1}\right] \quad (3)$$

A major advantage of this valuation model is that book value of equity is currently available information. Another is that the model is able to narrow considerably the range of allowable growth rates by focusing on growth in abnormal earnings rather than dividends. Recent research that uses RIV to estimate cost of capital includes Botosan (1997), Claus and Thomas (2000) and Gebhardt, Lee and Swaminathan (2001).

Although the RIV model is not subject to the usual limitations concerning dividend growth rates, some other important assumptions are still necessary, relating in particular to book value and the calculation of the terminal value of abnormal earnings beyond the prediction horizon. Although the terminal value assumption can be circumvented through simultaneous estimation of the cost of capital and the growth rate in abnormal earnings (Easton, Taylor, Shroff and Sougiannis, 2001), the book value of equity presents other problems as it accumulates past measurement errors and also might be uninformative about growth options available to the firm.

Recent progress in valuation modelling (Zhang, 2000; Ohlson, 2000) shows that capitalised expected earnings are a less biased predictor of firm value than book value. Therefore, it makes more sense to use as a starting point in the valuation process the capitalised expected earnings instead of the current book value and calibrate the valuation process accordingly.

<u>The capitalised expected earnings approach</u>

This category of model uses short term earnings forecasts and is based on the assumption in (1) that the market value of the firm equals discounted expected cash flows in terms of expected dividends.

Generally, let $\{y_t\}$ be any sequence of numbers that satisfy $(1+r)^{-t} y_t \rightarrow 0$. As $t \rightarrow \infty$, then

$$0 = y_0 + (1+r)^{-1}\left[y_t - (1+r)\,y_0\right] + (1+r)^{-2}\left[y_2 - (1+r)\,y_1\right] + \ldots \tag{4}$$

and, given (1),

$$P_0 = y_0 + \sum_{t=1}^{\infty} (1+r)^{-t} (y_t + dps_t - (1+r)\,y_{t-1}) \tag{5}$$

where y_t can be any number that satisfies condition (4) and, as above, r is the cost of capital, dps_t is dividends per share and P_0 is the current share price. This is a general formula for any valuation model that is derived from (1). For example, if y_t equals 0, then (5) transforms to the dividend discount model (1). If y_t equals book value per share, then (5) transforms to the RIV model (3).

Now consider expected earnings in the forthcoming period and let

$$y_t = \frac{eps_{t+1}}{r}, \quad t = 0,1,2...$$

Condition (4) still holds but (5) transforms to

$$P_0 = \frac{eps_1}{r} + \sum_{t=1}^{\infty}(1+r)^{-t} z_t$$

where

$$z_t = \frac{1}{r}\left[eps_{t+1} + r \cdot dps_t - (1+r)\, eps_t\right], \quad t = 1,2,...$$

(6)

The z sequence represents capitalised expected “excess earnings”, that is the surplus over the normal earnings expected from the reinvestment of the previous period’s earnings. In this formulation, the dividend irrelevancy property is satisfied by adding the term $r{\cdot}dps_t$ to represent the foregone investment opportunity at the cost of capital r of having paid dividends dps_t. Note that the model allows any dividend payout ratio.

By introducing the growth rate of the z sequence, that is the long term growth rate g_L of excess earnings such that $z_{t+1} = (1+ g_L)\, z_t$, t = 1, 2…., $0< g_L<r$ and $z_1>0$, equation (6) can be restated as:

$$P_0 = \frac{eps_1}{r} + \frac{z_1}{r - g_L} \qquad (7)$$

The restrictions $0<g_L<r$ and $z_1>0$ are necessary in an accounting context, as negative z_1 would lead to decreasing expected excess earnings in infinity, which is not plausible. Nor is $g_L< 0$ plausible in a context where accounting is conservative and the firm is expected to grow in sales or operating assets in the long run (Ohlson Juettner–Nauroth, 2000). Finally, as prices are non-negative, the restriction $r>g_L$ is obvious from (7).

The price P_0 consists of two parts: the capitalised earnings for next year (eps_1/r) and a valuation premium $z_1/(r-g_L)$. This valuation premium is perpetuity of next years’ excess earnings, growing in the long term at the rate g_L. As Easton (2001) points out,

z_t reflects the effects of generally accepted accounting principles that lead to a divergence of accounting earnings from economic earnings. In the same spirit, Ohlson (2000) claims that deviations of expected earnings from "permanent earnings in expectations" will cause z_t to be different from zero and, of course, P_0 to be different from eps_1/r. Therefore, firms that use conservative accounting and grow their size of operations will also generally grow their earnings beyond that which is implied by the normal earnings relation, *i.e.*, $z_t > 0$.

It is important to note that, when accounting is biased, the valuation premium $z_1/(r-g_L)$ is necessary in the valuation model to restore the effect of conservative accounting in the primary ratio eps_1/r. In this sense, and as Easton (2001) points out, the growth rate of excess earnings g_L captures the growth in future accounting earnings and adjusts for the difference between accounting and economic earnings.[1] In other words, it is g_L that adjusts for the effect of conservatism in accounting earnings. Ohlson and Juettner-Nauroth (2000) also suggest that the expected superior performance z_t (and consequently, g_L) can equally be due to either the accounting rules or the anticipation of positive NPV projects. However, conservatism affects earnings asymptotically only under growth (Zhang, 2000) and therefore it may be assumed that g_L reflects the long-term effect of conservatism that arises jointly from expected long-term growth in earnings and positive NPV.

In addition to the above, Ohlson and Juettner-Nauroth (2000) introduce short term growth in expected earnings, g_S. Derived from excess earnings z_1, g_S is the earnings growth from eps_1 to eps_2 after taking dividend displacement into account. The valuation model now describes the price as a function of expected earnings eps_1, short term growth in expected earnings g_S and long term growth in excess earnings g_L, as

[1] Elsewhere, Gode and Mohanram (2001) claim that g_L may be represented by a "normal real growth rate" such as the risk free rate minus an estimate of inflation.

follows:

$$P_0 = \frac{eps_1(g_S - g_L)}{r(r - g_L)} \tag{8}$$

where

$$g_S = \frac{eps_2 + r \cdot dps_1 - eps_1}{eps_1}$$

Since $r^2 - r \cdot g_L - \frac{eps_1}{P_0}(g_S - g_L) = 0$, the *ex-ante* cost of capital may be inferred by solving the positive root of the quadratic equation for r, as follows:

$$r = \frac{g_L}{2} + \sqrt{\left(\frac{g_L}{2}\right)^2 + \frac{eps_1}{P_0}(g_S - g_L)} \tag{9}$$

4. Research design

Since it is difficult to obtain a good proxy for g_L, which as shown above has an important role in cost of capital estimation, we employ a technique introduced by Easton (2001) whereby the Ohlson and Juettner-Nauroth (2000) model is modified to estimate simultaneously the cost of capital r and the long term growth in excess earnings g_L in a portfolio level. Decomposing short term growth in earnings g_S to its components eps_1, $r \cdot dps_t$ and eps_2, equation (8) can be rewritten so that

$$\frac{eps_2 + r \cdot dps_1}{P_0} = r(r - g_L) + (1 + g_L)(\frac{eps_1}{P_0}) \tag{10}$$

The corresponding regression for the j^{th} portfolio of firms is :

$$\frac{(eps_2 + r \cdot dps_1)}{P_0} = \gamma_0 + \gamma_1 \frac{eps_1}{P_0} + e_0 \tag{11}$$

where γ_0 provides an estimate for $r(r\text{-}g_L)$, and γ_1 for $(1+ g_L)$. Consequently, r and g_L implied by γ_0 and γ_1 are the mean estimates of cost of capital and long term growth in excess earnings for the portfolio.[2]

To avoid the "errors in variables" problem arising from the use of analysts' forecasts in both the dependent and independent variable in (11), portfolios are formed on the basis of the magnitude of the ratio of current price to expected earnings divided by the expected short-term growth in earnings (the PEG ratio), and thus coefficient bias is minimised.[3] Also, since r is a component of the dependent variable, consistent estimates of r and g_L are obtained using an iterative process where

$$r = \frac{\gamma_1 - 1}{2} + \sqrt{\left(\frac{\gamma_1 - 1}{2}\right)^2 + \gamma_0} \tag{12}$$

Risk proxies

Motivated by previous research, we expect the cost of capital estimates to be correlated with factors at the firm level that have been found to explain returns in similar studies in the US (Claus and Thomas, 2001; Gebhardt, Lee and Swaminathan, 2001; and Easton, 2001). More specifically, we examine the association of the implied cost of capital r with the book to market ratio (*bm*) and firm size (*size*), which

[2] Easton (2001) runs this regression in portfolios of 20 firms. In this way, estimates of the coefficients γ_0 and γ_1 are obtained that are non-stochastic and may be regarded as the mean of the firm-specific coefficients (see Judge *et al*, 1988, p.437). The same approach is adopted here.

[3] If we adopt the assumption that analysts' forecasts proxy for market expectations, then there is an error in both the dependent and the independent variables. This error in both variables leads to an underestimate of the slope coefficient and the R^2 (Pindyck and Rubinfield, 1998), with a downward bias in the estimate of the slope coefficient that is proportional to the decrease in R^2 from 1 (Maddala 1989). Easton (2001) addresses this problem by forming portfolios on the basis of the magnitude of the PEG-ratio (the price to earnings ratio PE divided by the short-term growth in earnings), and obtains R^2s close to 1.

are suggested as risk proxies by Fama and French (1992).[4] Second, we examine the association between leverage (*lev*) and *r*, since risk increases with the proportion of debt in the capital structure of the firm (Modigliani and Miller, 1958). Additionally, we examine the dispersion of analysts' forecasts as a measure of the uncertainty regarding the distribution of future possible returns, as proposed by Olsen and Troughton (2000). The predicted sign of the estimated correlation between the implied cost of capital and each variable is presented in Table 1.

Market integration

In a cross national study, we would expect cost of capital effects from market integration to be evident at the firm level. That is, firms that originate in one European country and trade their equity in others would enjoy a lower cost of capital. Prior research by Karolyi (1996) suggests that risk premia for such firms will be lower, as the impact of cross listing on the cost of equity capital using a sample of non-U.S. companies listing in the U.S. for the first time shows that, after the cross-listing, home betas generally decline, decreasing the cost of capital. In fact, foreign betas increase although not by the same magnitude, and since the home market risk premium is typically higher than the foreign market risk premium, the net change in the cost of capital tends to be negative. In the present study, cross listed firms are treated as a control group that is compared with firms listed only in their domicile.

Accounting diversity

We examine whether accounting diversity entails differences in the cost of capital by comparing the association between the forward earnings multiple *EP* and the estimated cost of capital *r* on a country by country basis, thus differentiating between

[4] Due to its high correlation with the other variables, the book to market ratio (*bm*) is omitted in the analysis reported later.

national financial reporting environments. Country effects are estimated for the UK as the reference group (i=0), where the effect for country $i \neq 0$ (1 France, 2 Germany, 3 Netherlands and 4 Switzerland) is defined as the difference between the country and reference group means. The regression of means is estimated as

$$r_{ij} = \alpha_i + \beta_i EP_{ij} + e_{ij} \tag{13}$$

where, for the j^{th} portfolio in the i^{th} country, r_{ij} is the average cost of capital and EP_{ij} is the average ratio of expected earnings in the forthcoming period to price.

If accounting under the i^{th} regime were to be unbiased, the coefficient β_i is expected to equal 1 in the case the reference group and 0 otherwise. However, as accounting systems tend not only to be biased but also idiosyncratic in spite of EU harmonisation efforts, the slope coefficients $\beta_{i \neq 0}$ are expected to be significant whichever accounting regime is taken as the reference group.

Now consider this in the context of the Ohlson and Juettner-Nauroth model where rearranging (7) $P_0 = \frac{eps_1}{r} + \frac{z_1}{r - g_L}$ and defining short term growth, as above, as $g_S = \frac{(eps_2 + r \cdot dps_1)}{eps_1} - 1$ leads to

$$r = \frac{g_S - g_L}{r - g_L} EP \tag{14}$$

Given biased accounting and growth, g_L is greater than 0. Restricting excess earnings z_1 to be also positive implies that g_S is larger than r. Under these circumstances, in the regression in (13), the coefficient of EP is expected to be larger than 1. As g_S and g_L offset the effect of conservatism to produce an unbiased estimate of the cost of capital, the magnitude of the coefficient βi depends therefore on the spread between g_S and r and on the level of g_L.

Following the initial estimation, the earnings potential control variables g_S and g_L are added, and risk and uncertainty are then included in a similar fashion. The full model for the j^{th} portfolio in country i may be expressed as follows:

$$r_{ij} = \alpha_i + \beta_i EP_{ij} + \boldsymbol{\gamma}_i \boldsymbol{Growth}_{ij} + \boldsymbol{\delta}_i \boldsymbol{Risk}_{ij} + e_{ij} \tag{15}$$

where

Growth denotes the set of forecast-based variables that describe expectations in earnings, specifically short term growth in expected earnings (g_S) and long term growth in excess earnings (g_L); and

Risk denotes the set of covariates that may explain returns, specifically book value of long term debt to market value of equity (*lev*), analysts' forecast dispersion (*af*), and log market capitalisation (*size*).[5]

As noted above, the country effects are estimated with respect to a reference group (0 for the UK), and the effect for country $i \neq 0$ (1 France, 2 Germany, 3 the Netherlands and 4 Switzerland) is defined as the difference between the country mean and the reference group mean. These country effects are estimated for α and β and for each of the growth parameters (**γ**) and risk parameters (**δ**).

Finally, (15) is repeated with the risk premium *rp* (*r* minus the ten year government bond yield, *rf*) as the dependent variable, to control for differences among local risk free rates.

5. Analysis

The sample consists of firms that are listed on their domestic stock market in the UK, France, Germany, Netherlands and Switzerland, together with cross listed companies

[5] As mentioned previously, the book to market ratio is omitted given the significant correlation with other variables.

that are not only registered in these countries but also trade their equity on one or more foreign stock exchanges. Although there is a larger pool of European listed companies, the country subsamples included in this study are those that provide sufficiently large numbers of both domestic and cross listed companies.

The period examined in the study is from 1993 to 1999. Although a longer time frame may be considered, the process of implementing harmonised company laws that were influenced by EC directives (including Switzerland even though not a member of the EU) extended for about ten years up to 1992.

Share price, dividends, market capitalisation, the book to market ratio and long term debt to equity are taken from the Worldscope database. Earnings expectations are proxied by IBES summary forecasts. The sample is restricted to firms that report with a December year end. As at the end of December, the current forecast (*FY*1 in IBES terminology) is for the accounting year ending on that date. The model requires earnings forecasts for the year following the current forecast (*FY*2) and for the year after that (*FY*3). For these predictions of forthcoming earnings, the median of December forecasts is employed for each of the two accounting years ending 12 months and 24 months later.

Firms whose *FY*2 is negative are excluded since a negative *EP* is not meaningful in the Ohlson Juettner-Nauroth framework (*i.e.*, it is not possible to reinvest negative earnings). In a second stage, those firms whose short term growth (from *FY*2 to *FY*3) is negative are also excluded since the Ohlson Juettner-Nauroth model restricts $z_1>0$. Thus, the cost of capital estimates reported later are estimates for firms that are expected to have positive expected earnings and positive expected short term growth. As assumptions about short-term growth are not imposed, the analysis covers only those firms for which forecasts *FY*2 and *FY*3 are available. Nevertheless, as a sensitivity test, the cost of capital estimation is repeated using all firms for which *FY*2 forecasts are available, assuming where *FY*3 is missing that short term growth in earnings is the rate of growth from *FY*1 to *FY*2. The results are similar though not identical.

As mentioned previously, portfolios were constructed by assigning 20 firms to each portfolio ranked by the ratio of the current price P_0 to expected earnings *FY*2 divided by short term growth from *FY*2 to *FY*3, the last portfolio for each year usually containing less than 20 observations. The total number of observations initially was 4949 firm years with positive *FY*1 and positive growth between *FY*2 and *FY3,* yielding 265 portfolios. Of these, 23 portfolios with less than 13 observations were discarded after the iterative process, at each step of which outlying observations indicated by a Cook's statistic greater than 2 were deleted (58 firm years in total). Furthermore, in 2 cases where *r* did not converge to a reasonable estimate (r>100%) after 30 iterations, these portfolios were also discarded.[6] The final sample on which the results in Tables 2 to 4 are based comprised 240 portfolios and 4746 firm years.

Results

Table 2 presents the results of the iterative calculations of the cost of capital *r* and the growth in expected excess earnings g_L, as well as descriptive statistics for the variables used in the calculations, *EP* and g_S, and the risk proxies *mb, lev, af* and *size.* Cross listed firms (Table 2, Panel 1) tend to be larger than firms that are listed on their domestic stock market only. Furthermore, although the cross listed firms originate from the same countries as the firms that are not cross listed, the standard deviations of the value drivers (*EP,* g_S, g_L) suggest greater homogeneity between cross listed firms than amongst those with shares traded only on their national stock exchange. Most important, and as expected from the results of previous research, cross listed firms enjoy a lower cost of capital than domestically listed firms (Figure 1).

The estimates of cost of capital are relatively stable across the EU countries in the sample, at 14.7% in the case of French companies, 13.7% in the Netherlands, 13.4% in the UK, and 13.3% in Germany, but slightly lower at 11.8% in the case of

[6] The iterative process was tested with high and low starting values, and converged nevertheless to the same levels.

Switzerland (see the median values of *r* in Table 2, Panel 2). However, by taking into account a proxy for the risk free rate (the ten year government bond yield, *rf*), it is evident that the difference between the EU countries and Switzerland could be attributed to this factor.[7]

Table 3 indicates that our estimates of the cost of capital are correlated in the expected way with the growth and risk proxies. These characteristics are significant in all cases for the cross listed companies, and associated in the predicted way. That is not always the case for the firms that are listed only domestically however, although the lack of power in the association could be attributed to small sample effects. Overall, the relationship between *r* and the selected predictors is consistent with prior research.

The Ohlson and Juettner-Nauroth (2000) framework shows that the short term growth rate in earnings (g_S) and the long term growth rate in excess earnings (g_L) correct the initial bias in the *EP* ratio. Accordingly, the financial reporting jurisdiction with the lowest mean *EP* (Germany) has the highest mean g_S. Previous research by Joos and Lang (1994) that that is based on rankings of current PE ratios characterises Germany as the most conservative regime and the UK as the least conservative, with France in between.[8] Our forward looking analysis leads to a similar ordering, given the following summary statistics (the *EP* and g_S medians reported in Table 2): UK:- *EP* 0.078, g_S 0.200; France:- *EP* 0.073, g_S 0.267; Germany:- *EP* 0.067, g_S 0.268.

Figure 2 shows the relationship between the three cost of capital drivers *EP*, g_S and g_L in each country. It is obvious that each country is characterised by a different mix of these value drivers and that g_S and g_L balance the initial bias in the *EP* ratio. It seems that despite this diversity, the risk premium is reasonably homogeneous.

[7] The median cost of capital over all years for companies from the EU countries in the sample is 13.8%, and the median risk free rate is 5.5%. The corresponding median risk premium in the EU (8.7%) is quite close to that in Switzerland (8.5%)

[8] Further research that supports this; see Lang and Land (2002) for a more detailed discussion.

Statistical evidence on the association between the value drivers and the cost of capital is provided by means of the regressions described earlier in equations (13) and (15), the reduced and full models respectively. The results are provided in Table 4. Model 1 compares the association between *r* and the *EP* ratio, and the results are given for domestically listed firms in the five countries (UK, France, Germany, Netherlands and Switzerland). If expected earnings were permanent, we would expect no intercept and the *EP* coefficients to equal 1. Since accounting conventions such as conservatism induce downward bias in earnings, a coefficient larger than 1 is predicted. Consistent with our prediction, *EP* coefficients are larger than 1 in all countries with the exception of the Netherlands, where *EP* is higher than elsewhere. These differences should be mitigated once the information about the earnings' potential of each portfolio is included in the model. In this respect, Model 2 adds short term growth, g_S. Long term growth in earnings in excess, g_L, is subsequently included in Model 3. When g_S and g_L are added, the explanatory power of the model increases dramatically to Adj R^2 = 93.30. The differences in *EP* coefficients are reduced substantially. Although the coefficient for the German sample persists, it is interesting that the Swiss firms' coefficient appears contrary to prior predictions. Whereas the differential coefficient for Germany might be attributed to the extensive adjustments to earnings carried out by analysts in accordance with DVFA guidelines (Harris, Lang and Möller, 1994), there is no similar apparent explanation for the Swiss sample.

Including the risk characteristics as control variables in Model 4 does not increase explanatory power, neither in 4(a) where the dependent variable is the cost of capital, *r*, nor in 4(b) where the dependent variable is the risk premium, *rp*. In other words, earnings growth captures much of the variation in both cases.

Finally, Table 5 compares the estimates of cost of capital with prior research findings on an indicative basis. In all cases, the estimates found here lie between prior estimates obtained using either the Dividend Discount model or the Residual Income Valuation model, as reported by Claus and Thomas (2001).

6. Concluding remarks

In this paper, the implied cost of equity is estimated using a framework that is based on earnings expectations. The resulting estimates are reasonably stable, are comparable with prior research and correlate with risk proxies in the expected way. Furthermore, the results confirm that cross-listed firms enjoy a lower cost of capital than firms that are listed only on their domestic stock exchange. However, some caution is suggested in interpreting the levels of cost of capital reported here since these results concern only firms with positive expected earnings and earnings growth.

The importance of expected earnings and their future potential for the cost of capital is explored under different accounting regimes. As predicted, *EP* is associated with the cost of capital in different ways. Controlling for risk, differences in the association between earnings multiples and the cost of capital are mitigated but not in all cases, suggesting that there might indeed be cost of capital effects from accounting.

The current study is a first step towards the recognition of accounting patterns that might bias earnings expectations and investment decisions in which they are used. Further research could focus on specific accounting practices that affect earnings potential and are most suspect to the introduction of bias into earnings forecasts. This approach might be preferable to value relevance studies, since it does not rely on noisy short term realised returns but on implied long term expected returns or, in other words, the discount rates that investors are most likely to apply.

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Table 1. Predicted association of implied cost of capital *r* and risk proxies

Risk Characteristics	Measure	Predicted sign of correlation	Prior evidence for USA (Easton, 2001)
Leverage *(lev)*	**long term debt to market value of equity**	+	**0.15**
Book to market *(bm)*	**book value of equity to market value of equity**	+	**0.29**
Firm size (*size*)	**log (market capitalisation)**	**-**	**-0.64**
Uncertainty (*af*)	**standard deviation of analysts' forecasts of forthcoming earnings**	+	**0.64**

Table 2. Descriptive statistics

Panel 1. Pooled samples

Cross listed firms (49 portfolios)

Variable	Mean	Median	StDev	Min	Max	Q1	Q3
EP	0.063	0.064	0.018	0.019	0.108	0.052	0.075
r	0.125	0.112	0.045	0.063	0.320	0.099	0.135
g_L	0.049	0.041	0.045	-0.038	0.248	0.030	0.056
g_S	0.244	0.200	0.117	0.130	0.727	0.175	0.269
bm	0.443	0.441	0.136	0.019	0.219	0.729	0.538
lev	0.344	0.296	0.163	0.087	0.875	0.234	0.450
af	0.927	0.866	0.344	0.420	1.911	0.679	1.184
size	15.436	15.368	0.599	14.427	19.967	14.971	15.762

Single listing only (191 portfolios)

Variable	Mean	Median	StDev	Min	Max	Q1	Q3
EP	0.080	0.075	0.025	0.036	0.199	0.065	0.089
r	0.147	0.134	0.054	0.054	0.348	0.111	0.174
g_L	0.044	0.051	0.089	-0.638	0.274	0.031	0.079
g_S	0.291	0.224	0.187	0.092	1.168	0.165	0.345
bm	0.600	0.543	0.156	0.281	1.166	0.458	0.666
lev	0.293	0.245	0.218	0.046	1.503	0.166	0.350
af	1.688	1.065	1.612	0.178	8.012	0.600	2.054
size	12.759	12.942	0.765	10.780	14.406	12.117	13.369

Panel 2. Country Samples

UK (67 portfolios)

Variable	Mean	Median	StDev	Min	Max	Q1	Q3
EP	0.087	0.078	0.029	0.045	0.199	0.070	0.095
r	0.148	0.134	0.056	0.063	0.348	0.108	0.183
g_L	0.055	0.054	0.069	-0.215	0.193	0.034	0.083
g_S	0.253	0.200	0.148	0.100	0.834	0.158	0.286
bm	0.555	0.516	0.176	0.281	1.133	0.419	0.647
lev	0.226	0.223	0.100	0.081	0.734	0.148	0.278
af	1.180	1.056	0.444	0.528	2.222	0.827	1.473
size	12.949	13.182	0.617	10.966	13.851	12.508	13.369
rf	0.063	0.063	0.013	0.043	0.087	0.055	0.074
rp	0.086	0.074	0.057	-0.008	0.304	0.042	0.116

France (45 portfolios)

Variable	Mean	Median	StDev	Min	Max	Q1	Q3
EP	0.073	0.073	0.018	0.045	0.125	0.059	0.083
r	0.157	0.147	0.055	0.0733	0.321	0.121	0.183
g_L	0.055	0.058	0.081	-0.269	0.274	0.029	0.089
g_S	0.330	0.267	0.205	0.145	1.064	0.202	0.359
bm	0.590	0.573	0.162	0.312	1.166	0.468	0.718
lev	0.402	0.316	0.277	0.093	1.459	0.230	0.445
af	2.209	1.942	1.493	0.271	6.411	1.293	3.070
size	12.695	12.843	0.773	10.788	13.872	12.053	13.403
rf	0.055	0.055	0.012	0.039	0.083	0.053	0.058
rp	0.102	0.093	0.054	0.020	0.262	0.059	0.135

Germany (33 portfolios)

Variable	Mean	Median	StDev	Min	Max	Q1	Q3
EP	0.068	0.067	0.020	0.036	0.132	0.056	0.073
r	0.145	0.133	0.063	0.054	0.347	0.105	0.171
g_L	0.026	0.044	0.141	-0.638	0.161	0.025	0.079
g_S	0.346	0.268	0.231	0.120	1.168	0.184	0.480
bm	0.487	0.472	0.108	0.284	0.768	0.428	0.545
lev	0.283	0.182	0.310	0.046	1.503	0.116	0.335
af	0.958	0.694	0.861	0.150	0.220	3.488	0.994
size	13.111	13.146	0.764	11.390	14.406	12.543	13.723
rf	0.054	0.053	0.010	0.041	0.076	0.052	0.058
rp	0.091	0.081	0.065	0.014	0.300	0.044	0.118

Netherlands (25 portfolios)

Variable	Mean	Median	StDev	Min	Max	Q1	Q3
EP	0.096	0.099	0.016	0.069	0.125	0.083	0.107
r	0.147	0.137	0.046	0.076	0.257	0.116	0.172
g_L	0.047	0.052	0.0706	-0.190	0.178	0.037	0.077
g_S	0.278	0.177	0.215	0.092	0.879	0.146	0.397
bm	0.598	0.602	0.099	0.458	0.806	0.509	0.671
lev	0.210	0.203	0.089	0.099	0.429	0.138	0.251
af	0.304	0.273	0.100	0.178	0.505	0.230	0.382
size	11.741	11.765	0.434	10.780	12.627	11.448	12.030
rf	0.055	0.055	0.011	0.039	0.078	0.053	0.060
rp	0.091	0.089	0.046	0.022	0.203	0.061	0.114

Switzerland (21 portfolios)

Variable	Mean	Median	StDev	Min	Max	Q1	Q3
EP	0.077	0.073	0.021	0.038	0.123	0.066	0.089
r	0.122	0.118	0.039	0.061	0.208	0.091	0.146
g_L	0.015	0.033	0.077	-0.196	0.152	0.021	0.047
g_S	0.253	0.227	0.107	0.129	0.490	0.165	0.325
bm	0.669	0.666	0.131	0.467	0.962	0.565	0.757
lev	0.386	0.359	0.157	0.104	0.737	0.313	0.491
af	4.985	4.414	1.328	3.234	8.012	4.021	6.173
size	12.945	12.956	0.401	11.955	13.591	12.667	13.284
rf	0.0352	0.0351	0.007	0.025	0.052	0.033	0.038
rp	0.086	0.085	0.039	0.029	0.175	0.055	0.109

The table reports the mean, median, standard deviation, minimum, maximum, first and third quartile of portfolio estimates for each subsample, together with the number of portfolios. The portfolio estimates on each variable were obtained by averaging across the 20 firms in each portfolio.

EP ratio of the forthcoming year's expected earnings per share divided by price at the at end of the current year (FY_2/P_0)
r estimated cost of equity capital
g_L estimated long-term growth rate in expected earnings-in-excess
g_S short term growth rate in expected earnings per share (FY_2 to FY_3)
bm ratio of book value of equity to market capitalisation at the end of the current year
lev ratio of long term debt to market capitalisation
af dispersion of the forthcoming expectations of earnings per share
size log of market capitalisation
rf 10 year government bond's yield
rp Estimated cost of capital minus *rf*

Table 3. Pearson correlations between the implied cost of capital *r* and other variables

	EP	g_L	g_S	*size*	*bm*	*Lev*	*af*
Cross-listed	0.681***	0.676***	0.658***	-0.572***	0.708***	0.625***	0.438***
Single listing only	0.641***	0.217***	0.698***	-0.604***	0.514***	0.341***	0.077
• UK	0.763***	0.120	0.847***	-0.788***	0.632***	0.477***	0.414***
• France	0.730***	0.350**	0.692***	-0.608***	0.462***	0.377**	0.433***
• Germany	0.846***	0.240	0.628***	-0.822***	0.759***	0.393**	0.120
• Netherlands	0.109	0.164	0.738***	-0.522***	0.495**	0.631***	0.579***
• Switzerland	0.824***	-0.042	0.581***	-0.629***	0.601***	0.284	0.258

1. *** statistical significance at 1%, ** at 5%, * at 10%.

EP ratio of the forthcoming year's expected earnings per share divided by price at the at end of the current year (FY_2/P_0)
r estimated cost of equity capital
g_L estimated long-term growth rate in expected earnings-in-excess
g_S short term growth rate in expected earnings per share (FY_2 to FY_3)
size log of market capitalisation
bm ratio of book value of equity to market capitalisation at the end of the current year
lev ratio of long term debt to market capitalisation
af dispersion of the forthcoming expectations of earnings per share

Table 4. Regression of the implied cost of capital *r* (risk premium *rp*) on the ratio of expected earnings to price

Full model: $r_{ij} = \alpha_i + \beta_i EP_{ij} + \gamma_i \boldsymbol{Growth}_{ij} + \delta_i \boldsymbol{Risk}_{ij}$

	Model 1	Model 2	Model 3	Model 4(a)	Model 4(b)
Dependent	*r*	*r*	*r*	*r*	*rp*
Intercept					
α_{UK}	0.0231	0.0293**	-0.0065	-0.0118	-0.0178
α_{FR}	-0.0284	-0.0134	0.0170*	0.0198*	0.0382***
α_{GE}	-0.0579**	-0.0609***	-0.0110	-0.0103	0.0008
α_{NL}	0.0932*	0.0324	0.0235	0.0252	0.0425**
α_{SW}	-0.0209	-0.0348	-0.0161	-0.0233	0.0102
EP					
β_{UK}	1.4366***	0.7053***	0.8356***	0.8280***	0.8285***
β_{FR}	0.7812**	0.7702*	-0.1885	-0.2499	-0.3304*
β_{GE}	1.2183***	1.5223***	0.3849**	0.3671**	0.3651*
β_{NL}	-1.1160**	-0.2784	-0.2858	-0.2788	-0.3896*
β_{SW}	0.1162	0.6230	0.4933***	0.4519**	0.4035**
Short term growth (g_S)					
$\gamma_{S\text{-}UK}$		0.2266***	0.2470***	0.2455***	0.2518***
$\gamma_{S\text{-}FR}$		-0.1259***	-0.0244	-0.0260	-0.0427*
$\gamma_{S\text{-}GE}$		-0.1526***	-0.0376*	-0.0346	-0.0410
$\gamma_{S\text{-}NL}$		-0.0669	-0.0340*	-0.0331*	-0.0465*
$\gamma_{S\text{-}SW}$		-0.1274*	-0.0910**	-0.0805**	-0.1004**
Long term growth in excess earnings (g_L)					
$\gamma_{L\text{-}UK}$			0.3642***	0.3652***	0.3471***
$\gamma_{L\text{-}FR}$			0.1062***	0.1087***	0.1101**
$\gamma_{L\text{-}GE}$			-0.0913***	-0.0910***	-0.0532
$\gamma_{L\text{-}NL}$			0.0202	0.01767	0.0151
$\gamma_{L\text{-}SW}$			-0.2004***	-0.1993***	-0.1818***
R^2	54.70%	70.9%	93.20%	93.20%	92.60%
F	26.51	34.14	173.93	150.58	108.93

Note: Model 1 is the reduced form of the full model *i.e.* the regression of the cost of capital *r* on the forward earnings multiple *EP*. Model 2 includes short term growth in expected earnings g_S and Model 3 adds long term growth in excess earnings g_L. Model 4 is the full model specified in equation (13) which includes risk factors. As the latter are mostly insignificant, however, the estimates are not reported in the table. Whereas model 4(a) employs as a dependent variable the estimate of the cost of capital *r*, in model 4(b) the dependent variable is the risk premium *rp*.

Table 5. Comparison of implied cost of capital, *r*

	UK (1993-1998)		France (1993-1998)		Germany (1993-1997)	
	Mean	(st.dev)	Mean	(st.dev)	Mean	(st.dev)
Capitalised expected earnings model	0.143	(0.012)	0.150	(0.020)	0.130	(0.018)
Dividend discount model*	0.161	(0.021)	0.172	(0.016)	0.150	(0.028)
Residual income model*	0.104	(0.014)	0.087	(0.009)	0.082	(0.008)
**Claus and Thomas(2001)*						

Figure 1

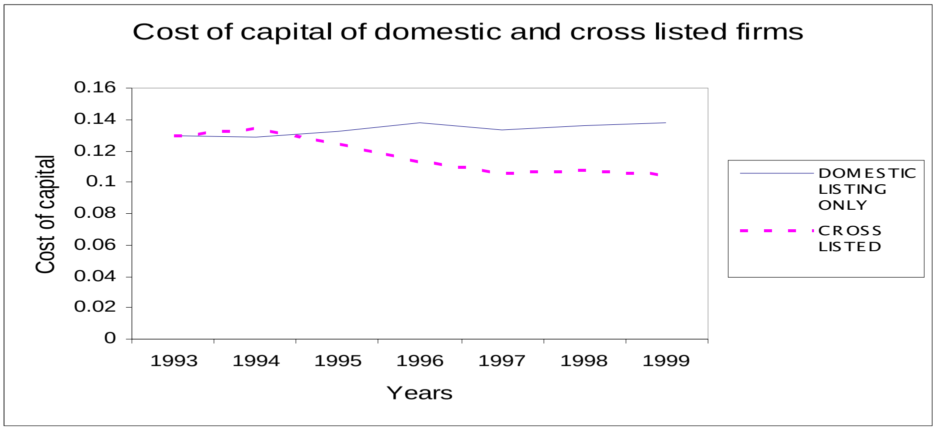

Figure 2

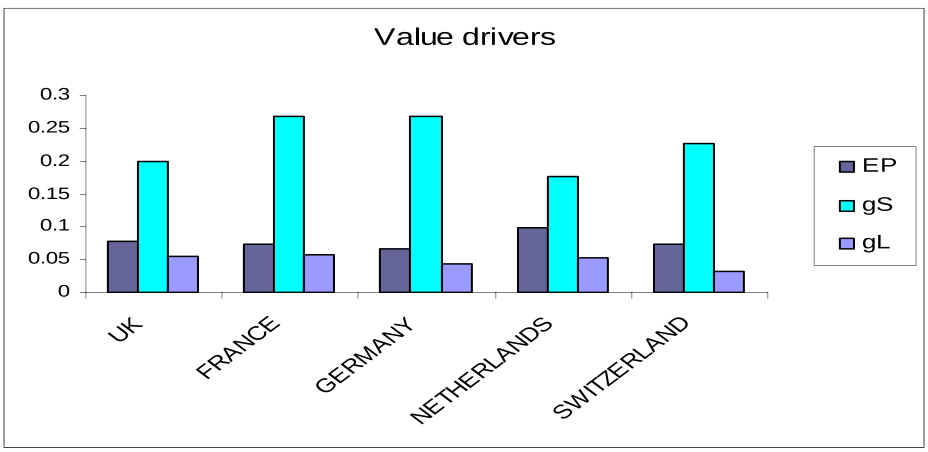

Figure 3