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ABSTRACT

This paper studies average and conditional expected returns in national equity markets, and their relation to a number of fundamental country attributes. The attributes are organized into three groups. The first is relative valuation ratios, such as price-to-book-value, cash-flow, earnings and dividends. The second group measures relative economic performance and the third measures industry structure. We find that average returns across countries are related to the volatility of their price-to-book ratios. Predictable variation in returns is also related to relative gross domestic product, interest rate levels and dividend-price ratios. We explore the hypothesis that cross-sectional variation in the country attributes proxy for variation in the sensitivity of national markets to global measures of economic risks. We test single-factor and two-factor models in which countries' conditional betas are assumed to be functions of the more important fundamental attributes.

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Asset pricing theories postulate that cross-sectional differences in expected returns are linearly related to the covariances or betas of securities with marginal utility, which is a function of a set of economic risk factors. Firm-specific attributes other than betas have traditionally served as alternative hypotheses in tests of these asset pricing models at the "micro" level. A well known example is the firm "size-effect," which first drew attention as an alternative to the Capital Asset Pricing Model (CAPM) of Sharpe (1964), Lintner (1965) and Black (1970). Additional examples include ratios of stock market price to earnings and the book value of equity [e.g. Basu (1977), Fama and French (1992), Chan, Lakonishok and Hamao (1991)]. In the early 1990's, a flurry of research is attempting to understand the role of such firm-specific attributes in domestic asset pricing.

In contrast to research on foreign exchange markets, which has long been interested in predictability, research on international equity pricing has traditionally focussed on average returns. Recently, however, studies have widened the focus to include the predictability of returns in different countries and the sources of this predictable variation [Harvey (1991), Dumas and Solnik (1993), Ferson and Harvey (1993a)]. This paper studies the relation between predictable variation and fundamental valuation ratios, measures of economic performance and industry structure at the country level.

It is interesting that there is a divergence between the cross-sectional fundamental analysis that is important to investment practitioners [e.g. Rosenberg, Reid and Lanstein (1985), Guerrard and Takano (1990), Wadhwani and Shah (1993)] and the perspective taken in most of the academic research on asset pricing. The evidence of Fama and French (1992) and others suggests that firm-specific attributes are important for explaining the cross-section of domestic equity returns. This, of course, would be no surprise to many practitioners. One of the objectives of this paper is to begin to bridge the gap, at the country level, between the cross-sectional analysis of attributes and the beta pricing models for expected returns that are familiar to academics.

We estimate cross-sectional models, using fundamental attributes to predict future equity market returns. For example, the regressions ask if lagged price-to-book ratios predict the next period's cross-section of returns. The simplest international asset pricing theories, based on perfect and integrated markets, imply that fundamental attributes should be useful in discriminating expected returns across countries only to the extent that they are proxies for the relevant risk exposures. We explore the hypothesis that fundamental ratios serve as proxies for conditional betas in national equity markets. We test single-factor and two-factor models in which countries' conditional betas are assumed to be functions of the fundamental attributes.

The paper is organized as follows. Section 2 describes the data. Section 3 presents some initial empirical results. Section 4 presents our empirical asset pricing models, and section 5 offers concluding remarks.

2. The Data

2.1 National equity market returns:

Total returns for 21 countries are based on indexes from Morgan Stanley Capital International (MSCI). The returns are calculated with gross dividend reinvestment. They represent value-weighted portfolios of the larger firms traded on the national equity markets, and are designed to cover a minimum of 60% of the market capitalization. Returns are available from January 1970 except for Finland, Ireland and New Zealand (which begin in February 1988). A value-weighted world market portfolio is constructed as the aggregate of the 21 countries.

2.2 Country Attributes

We examine three different groups of country attributes. The first group includes the relative valuation ratios. The second group measures country economic performance and the third reflects industry structure. The data series are available from different starting dates, the earliest of which is January of 1970. We conduct most of our analysis using the January, 1976 through May, 1993 period for which all of the series are available. Here we motivate and briefly describe the variables. A data appendix contains more detailed descriptions of the data and sources.

Valuation Ratios:

Measures of relative value have long been used by equity analysts in their attempt to discriminate high from low expected return stocks [e.g. Graham (1965)]. A number of investment services characterize the "styles" of equity managers as "value" or "growth," largely on the basis of similar valuation ratios for the stocks they buy [e.g. Haughton and Christopherson (1989)]. Quantitative stock selection models place a great deal of weight on valuation ratios for individual stocks in the United States and in other national markets [e.g. Rosenberg, Reid and Lanstein (1985), Guerrard and Takano (1990), Wadhwani and Shah (1993)]. With the recent work of Fama and French (1992), academics have become increasingly interested in valuation ratios. No previous study, however, has used such ratios at the country level to model the cross-section of conditional expected returns as we do in this paper.

The usefulness of valuation ratios to predict stock returns may be related to mean reversion in the stock markets [Poterba and Summers (1988)], time-varying risk and expected returns [Fama and French (1989)], or investor sentiment [e.g. Shleifer and Summers (1990)]. At the country level, relative valuation measures take on another dimension. For example, Stulz and Wasserfallen (1992) suggest that differences in stock market price levels across countries, other things held fixed, may proxy for their relative investability. If expected returns differ across countries with investability, we might expect differences in valuation ratios to be related to differences in expected returns.[1]

We use four valuation ratios, obtained from MSCI. These are (1) Earnings-to-price, (2) Price-to-cash-flow, (3) Price-to-book-value and (4) Dividend yield. Earnings-to-price was one of the first valuation ratios to attract attention as an alternative to the CAPM for individual stocks [Basu (1977)]. Our ratio is value-weighted across the firms in the MSCI universe. Chan, Hamao and Lakonishok (1991) found that a ratio of price to cash flow had a stronger relation to individual stock returns in Japan than a ratio of price to earnings. Our price to cash ratio defines cash as accounting earnings plus depreciation. The price-to-book-value ratio is also a value-weighted average across the firms. Finally, we examine dividend yields, which are the 12 month moving sum of dividends divided by the current MSCI index level for each country.

Economic Performance Measures:

We study four measures of country economic performance, designed to capture relative output, inflation and future expected economic growth. Unlike the relative valuation measures, these variables come from outside the stock markets. The first is the ratio of lagged, quarterly gross domestic product (GDP) per capita, to lagged quarterly GDP per capita for the OECD countries, both measured in U.S. dollars. The growth of GDP per capita is studied by Harris and Opler (1990)), who find that stock market returns reflect forecasts of growth rates. Our second measure is relative inflation, measured monthly as the ratio of country inflation (annual percentage changes in the local CPI), to OECD annual inflation. Country inflation and inflation volatility, in relation to stock returns, are studied by Mandelker and Tandon (1985). A long term interest rate and a term spread are the final economic performance measures. Harvey (1988, 1991) has shown that the slope of the term structure contains forecasts of future economic growth rates in a number of countries. Bond yields and spreads for individual countries are also used in predictive models by Ferson and Harvey (1993a), Solnik (1993) and Wadhwani and Shah (1993).[2]

Industry Structure Measures:

We measure the industry structure of a country using the coefficients from regressing the country returns on international industry indices. We use the MSCI world industry portfolios to construct the industry indices. MSCI tracks 38 industry groups. Industry factors are examined for explaining differences in stock return behavior across countries by Roll (1992) and Heston and Rouwenhorst (1993). Investment services, such as BARRA, use related industry structure measures in their models for individual stocks. They use as many as 55 industry groups. However, since our analysis is at the country level instead of the individual firm level, parsimony is important. We therefore aggregate the 38 MSCI industry returns into four groups, as shown in Figure 1. The industry groups are (1) natural resources, (2) construction and manufacturing, (3) transportation, communication, and energy, and (4) services, including financial. The correlations of the four industry-grouped portfolio returns are shown in the data appendix.

2.3 Global risk factors

We consider five global risk factors in our initial exploratory analysis, and focus on the most important two in our empirical asset pricing models. Our choice of the factors follows previous theoretical and empirical work on international asset pricing. Stulz (1981b, 1984) and Adler and Dumas (1983) provide conditions under which a single-beta capital asset pricing model (CAPM) based on a world market portfolio holds globally, which motivates the use of a world equity market risk factor. A number of empirical studies have used a similar risk factor in a conditional asset pricing context [e.g., Giovannini and Jorion (1989), Harvey (1991), Ferson and Harvey (1993a)]. The MSCI world return is the U.S. dollar world market return less the 30-day Eurodollar rate.

Solnik (1974) showed that exchange risks should be "priced" in a world otherwise similar to that of the static CAPM, when purchasing power parity fails. Adler and Dumas (1983) present a model in which the world market portfolio and exchange risks are the relevant risk factors. The exchange risks can be broken down into a separate factor for each currency, as in Dumas and Solnik (1993), or can be approximated by a single variable, as in Ferson and Harvey (1993a,b). Our second global risk factor, the G10 FX return, is the return to holding a portfolio of the currencies of the G10 countries (plus Switzerland) in excess of the 30-day Eurodollar deposit rate. The currency return is the percentage change in the spot exchange rate plus the local currency, 30-day Eurodeposit rate. The currency returns are trade-weighted to form a portfolio return [see Harvey (1993b) for details of the construction]. This measure is similar to the one used by Ferson and Harvey (1993a,b), but it is measured directly as an excess return. This avoids the need to construct a mimicking portfolio for the factor in an asset pricing model.

International equilibrium and arbitrage pricing (APT) models with several risk factors are described by Stulz (1981a), Hodrick (1981), Ross and Walsh (1983), and Bansal, Hsieh and Viswanathan (1993), among others. The central intuition of such models is that only the pervasive sources of common variation should be priced. Korajczyk and Viallet (1989) and Heston, Rouwenhorst and Wessels (1991) find evidence for several common sources of variation in U.S. and European stocks, which suggests that a number of world-wide risk factors may be important. Ferson and Harvey (1993a,b) find evidence that a number of global risk factors are useful in capturing both the cross section of average returns and the predictable variation of returns in national equity markets. Our additional factors are similar to theirs. The OIL return is the percentage change in the dollar price of oil minus the 30-day Eurodollar deposit rate. The growth in OECD production is the percentage change in the OECD index of industrial production in member countries. OECD inflation is the percentage change in the OECD index of consumer prices in member countries. The data appendix provides more detailed descriptions of these variables.

2.4 World Information Variables

We are interested in the relation between predictability in country returns over time, to the cross-sectional predictability using the fundamental attributes. We therefore include a number of world-wide information variables, similar to those which previous studies found can predict country returns over time. The variables are lagged values of the MSCI world market return, the G10 FX return, a world dividend yield, a short-term Eurodollar deposit rate and a short-term structure measure taken from the Eurodollar market. The term spread is the difference between a 90-day Eurodollar deposit rate and the 30-day Eurodollar deposit rate. The short term interest rate is the 30-day Eurodollar deposit yield which is observed on the last day of the month.

As the predetermined variables follow previous studies using similar variables, there is a natural concern that their predictive ability arises spuriously from data mining. However Solnik (1993) finds, using step ahead forecasts, that the predictability is economically significant. Ferson and Harvey (1993) find that a large fraction of the predictability is related to premiums for economic factor risks. Even so, the possibility of data mining remains an important caveat. Our methodology addresses this issue to some extent because it is robust to the specification of the expected factor premiums, as is explained below.

3. Preliminary Empirical Evidence

The Appendix Table 1 presents summary statistics for the country returns and the fundamental attributes. We report the sample means, standard deviations and autocorrelations. The monthly returns are measured in U.S. dollars. The sample period is 1975:1-1993:5, but for some of the countries and series the starting dates are later. Summary statistics are also reported for the MSCI world market index. As time-series, the valuation ratios and most of the other fundamental attributes share the high degree of persistence that is familiar from the dividend yield series. However, the autocorrelations of the other series tend to damp out at longer lags more quickly than those of the dividend yields.

The appendix table 2 reports the average correlations across countries of the valuation ratios and economic performance measures. For each country we calculate the time series correlation matrix of the attributes. We then average these matrices across the countries. The highest absolute correlations are among the valuation ratios, which range from 0.69 to 0.79. The remaining correlations are all smaller than 0.51. The correlations between the valuation ratios and the measures of economic performance are generally much smaller than the correlations among the valuation ratios, which makes sense given the common price level in all of the valuation ratios. This suggests that some of the valuation ratios will be redundant in a time-series model, but there is not likely to be serious collinearity problems between the group of valuation ratios and the measures of economic performance.

The appendix table 3 records the measures of industry structure for each of the countries. These are obtained by regressing the country returns, over time, on the industry groups. The coefficients provide a simple measure of the extent to which the returns of a given country move in association with the global industry groups. Some of the industry loadings make intuitive sense. For example, Australia and Canada load heavily on natural resources, Germany on construction and manufacturing, while Hong Kong loads heavily on services, including financial. There are also examples of loadings that do not seem so intuitive. Furthermore, some of the loadings are negative. Negative loadings can be symptomatic of collinearity, or of missing factors. There is high, but not extremely, high correlation between the industry groups (see the data appendix). If the four industry groups do not span the relevant factors, then the sum of the loadings should differ from 1.0 [Huberman and Kandel (1987)]. The coefficients are often less than 1.0, which suggests missing factors. This implies that the industry loadings should be used in conjunction with other attributes in an asset pricing model.

Time-series plots of the valuation ratios for each country are shown in the Appendix Figures 1-4. Each ratio is plotted on a graph with the corresponding ratio for the MCSI world market index as a reference series. The valuation ratios typically show no strong trends over the sample period. A number of the series show episodes of relatively high and low volatility, suggestive of conditional heteroskedasticity. The price-to-earnings ratios are the most volatile of the valuation ratios and are sometimes negative, due in large part to low and negative earnings during the world recession in 1992 (these graphs are truncated at zero and 50).

We examine scatter plots of the average returns across countries, against the means and standard deviations of the fundamental attributes. Some of these are displayed in figure 2. Most of the plots show little relation among the variables. The plots do suggest a weak positive relation of average returns to the ratio of price to book value. Previous studies [e.g. Jaffe, Keim, and Westerfield (1989), Fama and French (1992)] find a U-shaped relation between U.S. stock returns and their earnings-to-price ratios. We find no such pattern at the country level.

The strongest relations revealed by the scatter plots is between average returns and the standard deviation of the price-to-book ratio, and between average returns and the average term spread. The regression equations (standard errors in parentheses) are:[3]

$$\text{avg}(R_i) = 6.7 + \underset{(7.4)}{17.7}\ \text{sd}(P/B)_i + \epsilon_i, \quad R^2 = .23$$

and

$$\text{avg}(R_i) = 13.1 + \underset{(1.2)}{3.9}\ \text{TERM}_i + \epsilon_i, \quad R^2 = .34$$

These relations are stronger than the relation between the average returns and the standard deviation of the returns. The slope coefficient in that relation is 0.22 (standard error=0.39) and the R^2 is 1.6%.[4] The positive relation of average returns to the term spreads should not be surprising, given previous evidence that both the slope of the term structure [Harvey (1991)] and stock returns [Harris and Opler (1990)] forecast future economic growth in many countries.

It is interesting that the volatility of the price-to-book-value ratio is so strongly related to average returns, while stock return volatility shows little relation over this period. If variation over time in price-to-book ratios captures fluctuations of stock prices around "fundamental" values, then countries with higher price-to-book volatility may be countries where the risk of stock price departures from fundamentals is greater. If such deviations from fundamental values represents a risk that is priced in the market [e.g. Shleifer and Summers (1990)], we would expect countries with higher volatility of price-to-fundamentals to have higher average returns.

The average relations shown in the scatter plots can be misleading if expected returns vary over time, as recent evidence suggests. The slopes in the cross-sectional relations represent a return premium associated with the attribute. Ferson and Harvey (1991) note that if the expected risk premium is time-varying, it is possible to find an average slope close to zero even though the conditional expected premium is important at some times. Table 1 summarizes cross-sectional predictive regressions of the country returns each month on the predetermined, fundamental attributes. The regression equation for month t is:

$$(1) \qquad R_{it+1} = \gamma_{ot+1} + + \Sigma_{j=1}^{K} \gamma_{jt+1} A_{ij,t} + \epsilon_{it+1} \quad ; i = 1, ..., N,$$

where γ_{ot+1} is the intercept, the γ_{jt+1} are the slope coefficients, and $A_{ij,t}$ is the fundamental ratio j, j=1,..,K, for the country *i* in month t. The dating convention indicates that the fundamental attribute is public information at time t.[5] The slope coefficient γ_{jt+1}, j=1,...,K is the return on a maximum correlation, zero net investment portfolio for the j-th attribute, subject to zero cross-sectional correlation with the other attributes.[6] The portfolio weights depend only on the cross-section of the fundamental attributes observed at time t. The expected values of the coefficients therefore represent expected returns premia associated with the attributes.

Table 1 reports the mean, standard deviation, and other summary statistics for time series of the cross-sectional regression slopes and for the coefficients of determination of the regressions. There are 205 regressions, one for each month over the 1976:01-1993:01 sample period. To avoid the extreme outliers caused by near zero earnings, we use the ratio of earnings to price, rather than the inverse ratio, in these regressions. Panel A of Table 1 reports univariate regressions. In panel B, multivariate regressions are show, with each regression reported in a subpanel. The first three subpanels show regressions using the three main groups of fundamental attributes. The remaining subpanels show regressions which combine attributes across the three main groups. For the univariate regressions, the average of the cross-sectional R-squares varies from 6.4 to 9.9%. For the mutivariate regressions, the average R-squares vary from 22.1 to 31.7%. While the average R-squares suggest that the cross-sectional predictive regressions have explanatory power, they should be interpreted with caution because they do not control for cross-sectional dependence of the error terms.

Table 1 reports t-ratios for the time series average of each slope coefficient. The time series average of the slopes is the same as the slope in the average relation, similar to those shown in figures 2. (However, the numbers in Table 1 and the figures 2 are multiplied by 1200, while those in the regressions are not, and the samples of firms differ between the table 1 and the figures 2.) The t-ratios are calculated as in Fama and MacBeth (1973), an approach which controls for cross-sectional dependence of the error terms. The t-ratios should be a better guide as to the significance of the average premia than the scatter plots of the figures 2 [see Shanken (1992)]. For example, based on the scatter plots, the term spread showed a strong relation to average returns. However, term structure slopes are strongly positively dependent across countries, so the Fama-MacBeth t-ratios are reduced.[7] Table 1 also reports the standard deviations and the minimum and maximum values of the coefficients. The return premiums for the fundamental ratios vary substantially over the sample. This is not surprising, since the premiums are the realized excess returns of portfolios. Some of the premiums show significant autocorrelation, suggestive of time-variation in the conditional expected premiums. Recall that if the expected risk premium is time-varying, it is possible to find a small Fama-MacBeth t-ratio, even though the conditional expected premium is important.

Overall, a few of the fundamental attributes emerge as the more important cross-sectional predictors. We retain three of them for our subsequent investigations, based on the overall evidence. These are the ratio of per capita GDP to OECD per capita GDP, the dividend-to-price ratio, and the long term interest rate. The price-to-cash-flow variable performs similarly to the dividend-to-price ratio, so we check the sensitivity of our main results to this substitution.

In Table 2 we examine sample correlations between the slope coefficients from cross-sectional regressions on the three surviving attributes, and the contemporaneous values of the five global risk factors. If the levels of the fundamental ratios are proxies for the risk sensitivity of a national market to underlying risk factors, the cross-sectional regression slopes should jointly be proxies for the risk factors. Most of the correlations in Table 2 are low, although some are statistically significant. Using the approximate standard error equal of $T^{-1/2}=0.067$, two of the fifteen simple correlations exceed three standard errors and four more exceed two standard errors. The multiple correlations, reported in the right-hand column and the bottom two rows of the table, are all less than 0.35, which corresponds to regression R-squares of about 10% or less. (The one-factor case refers to the MSCI world excess return; in the two factor case the G10 FX excess return is the second factor.)

There are a number of possible interpretations for the low correlations in Table 2. One possibility is that the factors exclude some important, priced risks. Another possibility is that the cross-sectional predictability using the attributes is not explained by a rational pricing model using the global risk factors, in an integrated capital market. Yet a third possibility is that there is so much noise in the cross-sectional regression estimates of the return premiums, that the true relation is obscured. It is likely that the cross-sectional regression slopes are noisy estimates, given the range of the values recorded in Table 1. [See also Shanken and Weinstein (1990) in a domestic asset pricing context.]

Our hypothesis is that expected returns, which are modeled in the cross-sectional regressions as a combination of the attributes multiplied by the conditional expected values of the γ's, are equal to a combination of betas multiplied by conditional expected risk premia for the global risk factors. If this view is correct, there are a number of things that can cloud the relation between the cross-sectional slopes and the risk factors. In particular, both time-series and cross-sectional variation in the ratios of betas to attributes can reduce the time-series correlation between the regression slopes and the risk factors. In order to obtain a clearer picture of the relation between the fundamental attributes and betas, we need to model the relation of the attributes to the betas explicitly.

Table 3 explores the time-series predictability of the national market returns in relation to the predetermined attributes. We report the results of time series regressions for each country, on a constant, the vector of predetermined, world information variables (denoted by Z), and on the three own-country fundamental attributes (denoted by A). F statistics examine the hypotheses that Z may be excluded or that the fundamental attributes may be excluded. The results are interesting and differ from previous studies.

Harvey (1991) found that world information variables were more important than country-specific variables for predicting the MSCI index returns over the 1970-89 period, while Ferson and Harvey (1993a) found that both global and local information variables had marginal explanatory power. Solnik (1993) chose to use only local information variables. In Table 3 we reject the hypothesis that the country attributes can be excluded when the world information variables are in the regressions, for 11 of the 21 countries at the 5% level, and five more at the 10% level. In contrast, we reject the hypothesis that the world information variables can be excluded, only for one country (Australia), at the 5% level. When we replace the dividend-to-price ratio with the ratio of price-to-cash flow, the results are similar.[8]

There are several differences between the regressions in Table 3 and previous studies. The sample period is different, as Table 3 refers to the 1976.01-1993.01 period (205 observations or fewer, depending on the country). The importance of the world information variables as predictors seems to diminish in such regressions when the 1970-75 period is excluded [see Ferson and Harvey (1993a)]. Our fundamental attributes differ from the local information variables used in previous studies. In particular, the measure of relative GDP is a strong predictor of future stock returns in our regressions. The coefficient on this variable has a t-statistic larger than two for 14 of the 21 countries.

We conclude from Table 3 that the fundamental attributes are important in time-series as well as in cross-sectional predictive models. In time-series, they largely subsume the global information variables over this sample period. Ferson and Harvey (1993a) found that beta variation contributed less to the time-series predictability of returns than risk premium variation for most countries, but they modelled the effect of local information variables through betas, and the effect of world information variables through the expected risk premia.[9] The results of tables 2 and 3 lead us to an asset pricing model in which global expected risk premiums are not restricted to depend only on our world information variables.

4. Conditional Asset Pricing

4.1 The Models

While international beta pricing models make strong assumptions about market integration, lack of frictions and information efficiency, it is interesting to see how far one can go in modelling the relation of conditional returns to fundamental attributes and world information variables by using this standard framework. We hypothesize that conditional expected returns can be written as:

$$(2) \qquad E(R_{it+1} | \Omega_t) = \lambda_0(\Omega_t) + \Sigma_j{}^K{}_{=1}\, b_{ij}(\Omega_t)\, \lambda_j(\Omega_t),$$

where the $b_{ij}(\Omega_t)$ are the conditional regression betas of the country returns, R_{it+1}, measured in a common currency, on K global risk factors, $j=1,\ldots, K$. The expected risk premia, $\lambda_j(\Omega_t)$, $j=1,\ldots,K$, are the expected excess returns on *mimicking portfolios* for the risk factors.[10] The expectations are conditioned on a public information set, denoted by Ω_t. The intercept, $\lambda_0(\Omega_t)$, is the expected return of portfolios with all of their betas equal to zero. Equation (2) implies an expression for the expected *excess* returns:

(3) $$E(r_{it+1}|\Omega_t)= \Sigma_j{}^K{}_{=1}\, \beta_{ij}(\Omega_t)\, \lambda_j(\Omega_t),$$

where the $\beta_{ij}(\Omega_t) = b_{ij}(\Omega_t) - b_{fj}(\Omega_t)$ are the conditional betas of the excess returns and the $b_{fj}(\Omega_t)$, $j=1,...,K$, are the conditional betas of a 30-day Eurodollar deposit. Note that, according to equations (2) and (3), the only variables which differ across countries in the expressions for expected returns are the conditional betas of the country on the underlying risk factors. If rational expectations are assumed, then the difference between the actual returns at time t+1 and the conditional expected returns, using information at time t, should not be predictable using information at time t. Therefore, if a cross sectional regression of time t+1 returns on variables known at time t, such as the fundamental attributes, has explanatory power, the model implies that the attributes measure the underlying betas.

In addition to evidence that expected country returns vary over time, there is evidence that the conditional covariances move over time in association with lagged variables [e.g. King, Sentana and Wadhani (1990), Harvey (1991)], and evidence of time-varying betas for international asset returns [e.g. Giovannini and Jorion (1987, 1989), Mark (1985), Ferson and Harvey (1993a)]. Given the evidence in these studies and our tables, we allow for time-variation in both the expected risk premia and the conditional betas. Let $\Omega_t = \{Z_t, A^i{}_t, i=1,...,n, \phi_t\}$, where Z_t represents our global information variables, $A^i{}_t$

the fundamental attributes of country *i* at time t, and ϕ_t any remaining public information that is relevant for conditional expected returns. We isolate the fundamental attributes from the other information to incorporate the idea that the variables with cross-sectional explanatory power for future returns are the variables which drive the conditional betas, $\beta_{ij}(\Omega_t)$. A parsimonious model, similar to one suggested by Ferson and Harvey (1993a), assumes that the betas are functions only of the fundamental attributes. That is, we assume $\beta_{ij}(\Omega_t) = \beta_{ij}(A^i_t)$.[11] Taking the first term of a Taylor series, we use a linear function and model the conditional betas as:

$$(4) \qquad \beta_{ij}(A^i_t) = b_{0ij} + B_{ij}'\, A^i_t,$$

The elements of the vector B_{ij} describe the response of the conditional beta of country i on factor j to the attributes which are the components of A^i_t.

Equation (4) allows the functional relation between the fundamental attributes and the betas to differ across countries, as was suggested by the evidence of Tables 2 and 3. The relation between attributes and betas for a given country is assumed to be stable over time, however, as B_{ij} is a vector of fixed coefficients. The relation may differ across countries because of differences in the accounting conventions used to compute earnings, depreciation and book values, as well as other factors. For example, Kester and Luehrman (1989) and Ando and Auerbach (1990) argue that high cross-holdings of corporate shares in Japan inflates measured Price-to-earnings ratios in that country.

The global beta pricing model (3), our model of the conditional betas (4), and rational expectations implies the following econometric model:

$$r_{it+1} = \alpha_i + \Sigma_j \{b_{0ij} F_{jt+1} + B_{ij}' [A^i_t F_{jt+1}]\} + u_{i,t+1}, \tag{5}$$

where F_{jt+1} is the excess return on the j-th risk factor-mimicking portfolio. The intercept, α_i, is an average pricing error similar to a Jensen's (1968) alpha, and should be zero if the model is well specified.

Using an OLS regression to estimate (5) imposes moment conditions that identify $b_{0ij} + B_{ij}'A^i_t$ as a conditional beta. Indeed, these are the same conditions that would be imposed if the Generalized Method of Moments (GMM) is used. To see this informally, consider the normal equations for a conditional beta given A, $\beta(A)$, where the time and other subscripts are suppressed and the variables are demeaned:

$$\begin{aligned} &(F\ F')\ \beta(A) - F\ r' = w \\ &E(w|A)=0. \end{aligned} \tag{6}$$

Using the GMM, the standard approach is to work with the weaker condition $E(w'A)=0$, finding parameters which make the corresponding sample means close to zero. If the model is exactly identified, the sample means can be set equal to zero. Using the regression (5) to substitute for the term r in (6), it follows that $E(w'A)=0$ if and only if $E(uF'A)=0$. Since the OLS regression imposes the conditions that

$E(u'F)=E(u)=E(uF'A)=0$, it implies that $E(w'A)=0$. Hence, $b_{0ij} + B_{ij}'A^i_t$, as estimated by regression (5), is a conditional beta.

To improve the power of tests using regression (5), we generalize the regression to provide specific alternative hypotheses. One interesting alternative hypothesis is that the fundamental attributes can predict returns, over and above their role as instruments for the betas. This alternative may provide powerful tests, in view of the traditional role of the attributes as alternatives to beta. In other words, we can address the question of whether the attributes represent country-specific determinants of expected returns, as in segmented capital markets, or proxies for country exposures to global risk factors. For this alternative we replace the intercept in (5) with: $\alpha_{it} = \alpha_{i0} + D_i'A^i_t$, and test the hypothesis that $D_i=0$. A second alternative posits that the deviations between the "true" expected country returns and the model are linear functions of the world information variables. That is, we consider an alternative hypothesis with a time-varying conditional alpha: $\alpha_{it} = \alpha_{i0} + C_i'Z_t$.[12]

Under the null hypothesis, the regression model (5) should be robust to the form of the expected risk premiums, $E(F_{jt+1}|\Omega_t)$. To see this, write $F_{jt+1} = E(F_{jt+1}|\Omega_t) + \epsilon_{jt+1}$ and note that the error term in (5) may be written, under the null hypothesis, as:

$$(7) \qquad u_{it+1} = \{r_{it+1} - E(r_{it+1}|\Omega_t)\} - \beta(A^i_t)'\epsilon_{t+1},$$

where $\beta(A^i_t)$ is the vector of conditional betas for country i and ϵ_{t+1} is the vector of unexpected factor excess returns. Since the $\beta(A^i_t)$ are, under the null hypothesis, the conditional betas given Ω_t, equation (7) implies that u_{it+1} is the error from projecting the unanticipated country return $\{r_{it+1} - E(r_{it+1}|\Omega_t)\}$ on the unanticipated factor excess returns, where $\beta(A^i_t)'\epsilon_{t+1}$ is the projection. The error term u_{it+1} in (7) should be orthogonal to both the public information set Ω_t and the ex post factors, F_{jt+1}, and therefore to the right-hand side variables in the regression (5). The expected risk premiums, $E(F_{jt+1}|\Omega_t)$, may depend on the world information variables, as in Ferson and Harvey (1993a), or they may depend on the world variables and the country attributes, or possibly on all of Ω_t. The risk conditional premia could even be constant over time, and the regression (5) should still be well-specified.

The robustness of the regression (5) is attractive, since the evidence suggests that it is restrictive to model the risk premia as functions only of our world information variables. Robustness to the functional form of the expected risk premia is also attractive given that linearity may be restrictive, and in view of the possibility that the relation between the expected factor risk premia and the predetermined variables could be subject to a data mining bias.

4.2 Asset Pricing Results

Table 4 records the results of estimating the conditional asset pricing models. The first panel shows results for a one-factor model, in which the MSCI world excess return is the factor. The second panel presents a two-factor model, using the world market portfolio and the G10 FX excess return as the second factor. F statistics test for the significance of the products of the factors with the lagged fundamental attributes.

The results for the one-factor model confirm that the fundamental attributes are important when they enter the regression through the conditional betas. The tests reject the hypothesis of constant conditional betas, for 7 countries at the 5% level and one more at the 10% level. In the two factor model, the F tests reject the exclusion of the product terms for 10 of the countries, using a 5% level, and two more using a 10% level. The tests therefore show that using the attributes to model conditional betas improves the explanatory power of the regressions.[13]

Table 5 reports tests of the asset pricing models against three alternative hypotheses. Testing for exclusion of the intercept α_i in equation (5), the tests produce only weak evidence against the models. In the one factor model, the average pricing errors are significant at the 5% level for two countries, and at the 10% level for two more. These results are similar to those of Harvey (1991) in testing a conditional version of a world CAPM.[14] In the two-factor model, none of the intercepts are significant at the 5% level, while three are significant at the 10% level.

Table 5 also reports the results of the tests against the alternative of a time-varying conditional alpha, using the fundamental attributes to model the time variation. These tests ask if the attributes represent country-specific determinants of expected returns, as in segmented capital markets, or proxies for country exposures to global risk factors. If the model captures the role of the fundamental attributes adequately through the conditional betas, we should find that the attribute variables do not provide additional explanatory power when added to the regression in an unrestricted way. In the one-factor model, the hypothesis that the model captures the information in the attributes through the betas is rejected at the 5% level for five countries, and at the 10% level for three more. In the two factor model, the hypothesis can be rejected at the 5% level for only two countries, although it can be rejected at the 10% level for seven more. Thus, it appears that the conditional beta pricing model is only partially successful at capturing the explanatory power of the fundamental attributes.

The final tests in Table 5 consider the alternative in which the model pricing errors are assumed to be a function of the world information variables. In the one-factor model, the exclusion hypothesis for these variables is rejected at the 5% level for five countries, and in the two-factor model the hypothesis is rejected for four countries.

5. Concluding Remarks

We studied average and conditional expected returns in national equity markets, and their relation to a number of fundamental country attributes. The attributes included relative valuation ratios, such as price-to-book-value, cash-flow, earnings and dividends; measures of relative economic performance and industry structure. We found that average returns across countries are related to the volatility of their price-to-book ratios. Time-variation in expected returns is also related to relative gross domestic product, interest rate levels and dividend-price ratios. We explored the hypothesis that cross-sectional variation in the country attributes proxy for variation in the sensitivity of national markets to global measures of economic risk. We tested single-factor and two-factor models in which countries' conditional betas were assumed to be stable, country-specific functions of the more important attributes. Such models are partially successful at capturing the relation of future returns to the fundamental attributes, but there is evidence of misspecification in the models. Our results suggest a number of directions for future research. A natural extension is to allow the structural relation between fundamental attributes and risk exposures to vary through time. The role of industry structure and of price-to-book value volatility should also be further explored. Our framework can be used to examine the links between attributes and risk factors at the firm level.

Data Appendix

Ferson and Harvey

This appendix describes our data and sources in more detail. IFS refers to International Financial Statistics. DataSt refers to Datastream, Ltd. OECD refers to the Organization for Economic Cooperation and Development.

Valuation Ratios:

Value-weighted price to earnings ratios are available from MSCI starting in January 1970 except for Austria (January 1977), Finland (January 1988), Italy (April 1984), Ireland (May 1990), New Zealand (January 1988), Singapore/Malaysia (December 1972), and Spain (January 1977). These are value-weighted averages of the ratios for the firms in the MSCI universe, based on the most recently available accounting data each month. Value-weighted price to cash earnings are defined as accounting earnings plus depreciation. These ratios are available beginning in January of 1970 except for Canada (December 1974), Finland (January 1988), France (September 1971), Hong Kong (December 1972), Ireland (May 1990), New Zealand (January 1988), Singapore/Malaysia (December 1972), Spain (September 1971), and Switzerland (January 1977). Value-weighted price to book value ratios are available from January 1974 for all countries except Finland and New Zealand (both begin January 1988) and Ireland, which begins in May of 1990. Dividend yields are the 12 month moving sum of dividends divided by the current index level. The lagged value of the dividend yields are used. Dividend yields are available from January 1970 except for Finland and New Zealand (which both begin January 1988), Hong Kong (January 1973), Ireland (May 1990) and Singapore/Malaysia (December 1972).

Economic Performance Measures:

The ratio of lagged, gross domestic product (GDP) per capita, to lagged GDP per capita for the OECD countries is provided by the OECD, which provides quarterly OECD GDP figures for most of the countries. For some countries, the GDP data are only available on an annual basis. The ratio is lagged five quarters to account for publication lag. Since the data are observed quarterly (or annually), the monthly observations for each month in a quarter (or year) are the same. The population data are observed annually. The data sources and retrieval codes for the GDP data are listed below:

Country	Period	Frequency	Source	Code
AUS	1960Q1-1992Q4	Quarter	IFS	19399B.CZF...
AUT	1960Q1-1963Q4	Annual	IFS	12299B..ZF...
	1964Q1-1992Q4	Quarter	OECD	OE020000A
BEL	1960Q1-1969Q4	Annual	IFS	12499B..ZF...
	1970Q1-1992Q4	Annual	OECD	BGGDPCR.
CAN	1960Q1-1992Q4	Quarter	IFS	15699B.CZF...
DEN	1960Q1-1986Q4	Annual	IFS	12899B..ZF...
	1987Q1-1992Q4	Quarter	IFS	12899B..ZF...

FIN	1960Q1-1964Q4	Annual	IFS	17299B..ZF...
	1965Q1-1969Q4	Quarter	IMF	FNI99B..A
	1970Q1-1992Q4	Quarter	IFS	17299B..ZF...
FRA	1960Q1-1964Q4	Annual	IFS	13299B.CZF...
	1965Q1-1969Q4	Quarter	IFS	13299B.CZF...
	1970Q1-1992Q4	Quarter	OECD	FR104000B
GER	1960Q1-1992Q4	Quarter	IFS	13499A.CZF...
HKG	1960Q1-1992Q5	Annual	DataSt	HKEXTOTL
IRE	1960Q1-1969Q4	Annual	IFS	17899B..ZF...
	1970Q1-1970Q4	Annual	OECD	IRGDPCR.
ITA	1960Q1-1987Q4	Quarter	IFS	13699B.CZF...
	1988Q1-1992Q4	Quarter	OECD	IT301000B
JAP	1960Q1-1992Q4	Quarter	IFS	15899B.CZF...
HOL	1960Q1-1976Q4	Annual	IFS	13899B.CZF...
	1977Q1-1992Q4	Quarter	OECD	NL201000B
NZL	1960Q1-1969Q4	Annual	IFS	19699B..ZF...
	1970Q1-1992Q4	Annual	OECD	NZGDPCR.
NOR	1960Q1-1960Q4	Annual	IFS	14299B..ZF...
	1961Q1-1970Q4	Quarter	IFS	14299B..ZF...
	1971Q1-1977Q4	Annual	IFS	14299B..ZF...
	1978Q1-1986Q3	Quarter	IFS	14299B..ZF...
	1986Q4	Annual	IFS	14299B..ZF...
	1987Q1-1993Q1	Quarter	IFS	14299B..ZF...
SNG	1960Q1-1992Q4	Annual	IFS	57699B..ZF...
SPA	1960Q1-1969Q4	Annual	IFS	18499B..ZF...
	1970Q1-1992Q4	Annual	OECD	ESGDPCR.
SWE	1960Q1-1979Q4	Annual	IFS	14499B..ZF...
	1980Q1-1992Q4	Quarter	IFS	14499B..ZF...
SWI	1960Q1-1966Q4	Annual	IFS	14699B.CZF...
	1967Q1-1969Q4	Quarter	IMF	SWI99B..A
	1970Q1-1993Q1	Quarter	IFS	14699B.CZF...
GBR	1960Q1-1992Q4	Quarter	IFS	11299B.CZF...
USA	1960Q1-1993Q1	Quarter	IFS	11199B.CZF...
WRD	1960Q1-1992Q4	Quarter	OECD	OC001000B

To obtain the measures of GDP per capita, the country GDP measures are dividend by the following population series:

Country	Period	Frequency	Source	Code
AUS	1960Q1-1992Q4	Annual	IFS	19399Z..ZF...
AUT	1960Q1-1992Q4	Annual	IFS	12299Z..ZF...
BEL	1960Q1-1992Q4	Annual	IFS	12499Z..ZF...
CAN	1960Q1-1992Q4	Annual	IFS	15699Z..ZF...
DEN	1960Q1-1992Q4	Annual	IFS	12899Z..ZF...
FIN	1960Q1-1992Q4	Annual	IFS	17299Z..ZF...
FRA	1960Q1-1992Q4	Annual	IFS	13299Z..ZF...
GER	1960Q1-1992Q4	Annual	IFS	13499Z..ZF...
HKG	1973Q4-1992Q4	Annual	DataSt	HKTOTPOP
IRE	1960Q1-1992Q4	Annual	IFS	17899Z..ZF...
ITA	1960Q1-1992Q4	Annual	IFS	13699Z..ZF...
JAP	1960Q1-1992Q4	Annual	IFS	15899Z..ZF...
HOL	1960Q1-1992Q4	Annual	IFS	13899Z..ZF...
NZL	1960Q1-1992Q4	Annual	IFS	19699Z..ZF...
NOR	1960Q1-1992Q4	Annual	IFS	14299Z..ZF...
SNG	1960Q1-1992Q4	Annual	IFS	57699Z..ZF...
SPA	1960Q1-1992Q4	Annual	IFS	18499Z..ZF...

SWE	1960Q1-1992Q4	Annual	IFS	14499Z..ZF...
SWI	1960Q1-1992Q4	Annual	IFS	14699Z..ZF...
GBR	1960Q1-1992Q4	Annual	IFS	11299Z..ZF...
USA	1960Q1-1992Q4	Annual	IFS	11199Z..ZF...
WRD	1969Q4-1992Q4	Annual	OECD	OCDTOTPP
	1973Q4-1992Q4	Annual	DataSt	WDTOTPOP

The following currency exchange rate data used are used to convert GDP in local currency to U.S. dollar terms. These series are national currency units per U.S. dollar, quarterly and annual averages, depending on the frequency of the GDP data. Period averages are used to better match the fact that GDP figures also represent an average over the period as opposed to a spot figure.

Country		Code
AUS	MARKET RATE	193..RF.ZF...
AUT	OFFICIAL RATE	122..RF.ZF...
BEL	MARKET RATE	124..RF.ZF...
CAN	MARKET RATE	156..RF.ZF...
DEN	MARKET RATE	128..RF.ZF...
FIN	OFFICIAL RATE	172..RF.ZF...
FRA	OFFICIAL RATE	132..RF.ZF...
GER	MARKET RATE	134..RF.ZF...
HKG	MARKET RATE	532..RF.ZF...
IRE	MARKET RATE	178..RF.ZF...
ITA	MARKET RATE	136..RF.ZF...
JAP	MARKET RATE	158..RF.ZF...
HOL	MARKET RATE	138..RF.ZF...
NZL	MARKET RATE	196..RF.ZF...
NOR	OFFICIAL RATE	142..RF.ZF...
SNG	MARKET RATE	576..RF.ZF...
SPA	MARKET RATE	184..RF.ZF...
SWE	OFFICIAL RATE	144..RF.ZF...
SWI	OFFICIAL RATE	146..RF.ZF...
GBR	MARKET RATE	112..RF.ZF...

The relative inflation measure is the ratio of annual percentage changes in the local Consumer price index to annual percentage changes in the OECD CPI inflation series, available monthly for most of the countries. In predictive regressions, the variable is lagged five quarters to account for publication lag. The inflation series and their acess codes are as follows:

Country	Period	Frequency	Source	Code
AUS	1957Q1-1993Q1	Quarter	IFS	19364...ZF...
AUT	1957Jan-1993Apr	Month	IFS	12264...ZF...
BEL	1957Jan-1993May	Month	IFS	12464...ZF...
CAN	1957Jan-1993Apr	Month	IFS	15664...ZF...
DEN	1957Q1-1966Q4	Quarter	IFS	12864...ZF...
	1967Jan-1993Mar	Month	IFS	12864...ZF...
FIN	1957Jan-1993Apr	Month	IFS	17264...ZF...
FRA	1957Jan-1993May	Month	IFS	13264...ZF...
GER	1957Jan-1993Apr	Month	IFS	13464...ZF...
HKG	1969Mar-1993Feb	Month	IFS	53264...ZF...
IRE	1957Q1-1993Q1	Quarter	IFS	17864...ZF...
	1969Q4-1993Q2	Quarter	OECD	IROCPCONF
ITA	1957Jan-1992Oct	Month	IFS	13664...ZF...
JAP	1957Jan-1993Apr	Month	IFS	15864...ZF...
HOL	1957Jan-1993Mar	Month	IFS	13864...ZF...
NZL	1957Q1-1993Q1	Quarter	IFS	19664...ZF...

NOR	1957Jan-1993Apr	Month	IFS	14264...ZF...
SNG	1968Jan-1993Apr	Month	IFS	57664...ZF...
SPA	1957Jan-1993Apr	Month	IFS	18464...ZF...
SWE	1957Jan-1993Mar	Month	IFS	14464...ZF...
SWI	1957Jan-1993May	Month	IFS	14664...ZF...
GBR	1957Jan-1993Feb	Month	IFS	11264...ZF...
USA	1957Jan-1993May	Month	IFS	11164...ZF...
WRD	1957Jan-1992Dec	Month	IFS	00164...ZF...

A long term interest rate is measured for each country as an annualized percentage rate. In the predictive regressions, the long term rate is lagged one month. For two Hong Kong and Singapore, data are not available, so a U.S. rate was used. The sources and series codes are as follows:

Country	Period	Frequency	Source	Code	Description
AUS	1960Jan-1993May	Month	IFS	19361...ZF...	TREASURY BONDS: 15 YEARS
AUT	1971Jan-1993Apr	Month	IFS	12261...ZF...	GOVERNMENT BOND YIELD
BEL	1960Jan-1993May	Month	IFS	12461...ZF...	GOVERNMENT BOND YIELD
CAN	1960Jan-1993May	Month	IFS	15661...ZF...	GOVERNMENT BOND YIELD>10YRS.
DEN	1960Jan-1993Apr	Month	IFS	12861...ZF...	GOVERNMENT BOND YIELD
FIN	1972Jan-1993Apr	Month	OECD	FNOCLNG%	FN LONG-TERM RATE-YIELD ON TAXABLE PUBLIC BONDS(3-6 YEARS)M.AVG. (P)
FRA	1960Jan-1993May	Month	IFS	13261...ZF...	GOV.BOND YIELD(MOYMENS)
GER	1960Jan-1993Feb	Month	IFS	13461...ZF...	PUBLIC AUTHORITIES BOND YIELD
HKG	1960Jan-1993May	Month	IFS	11161...ZF...	GOVT BOND YIELD: 10 YEAR
IRE	1964Jan-1993May	Month	IFS	17861...ZF...	GOVERNMENT BOND YIELD
ITA	1960Jan-1992Jun	Month	IFS	13661...ZF...	GOVERNMENT BOND YIELD
JAP	1966Oct-1993Apr	Month	IFS	15861...ZF...	GOVENMENT BOND YIELD
HOL	1964Nov-1993May	Month	IFS	13861...ZF...	GOVERNMENT BOND YIELD
NZL	1964Jan-1993May	Month	IFS	19661...ZF...	GOVERNMENT BOND YIELD
NOR	1961Sep-1993May	Month	IFS	14261...ZF...	GOVERNMENT BOND YIELD
SNG	1960Jan-1993May	Month	IFS	11161...ZF...	GOVT BOND YIELD: 10 YEAR
SPA	1978Mar-1993May	Month	IFS	18461...ZF...	GOVERNMENT BOND YIELD
SWE	1960Jan-1993Apr	Month	IFS	14461...ZF...	SECON.MKT:CENT.GOV.BONDS,5YR
SWI	1964Jan-1993May	Month	IFS	14661...ZF...	GOVERNMENT BOND YIELD
GBR	1960Jan-1993Apr	Month	IFS	11261...ZF...	GOVT BOND YIELD: LONG-TERM
USA	1960Jan-1993May	Month	IFS	11161...ZF...	GOVT BOND YIELD: 10 YEAR

Short term interest rates for the various countries are used to construct a measure of the slope of the term structure. The Term Spread is the difference between the long-term interest rate and a short term interest rate in each country. The Term spread is lagged one month in the predictive regressions. The short term interest rates are listed here together with their series codes:

Country	Period	Frequency	Source	Code	Description
AUS	1969Jul-1993May	Month	IFS	19360C..ZF...	13 WEEKS' TREASURY BILLS
AUT	1960Jan-1993May	Month	OECD	OEOCSTIR	OE SHORT-TERM INT. RATE - 3-MONTH VIBOR (MONTHLY AVERAGE) (P)
BEL	1960Jan-1993Jun	Month	IFS	12460C..ZF...	TREASURY PAPER
CAN	1960Jan-1993Jun	Month	IFS	15660C..ZF...	TREASURY BILL RATE
DEN	1960Jan-1993May	Month	OECD	DKOCSTIR	DK SHORT-TERM INTEREST RATE - 3-MONTH INTERBANK RATE (P)
FIN	1977Dec-1993May	Month	IFS	17260B..ZF...	AVERAGE COST OF CB DEBT

FRA	1970Jan-1986Jun	Month	IFS	13260BS.ZF...	INTERBANK MONEY RATE
	1986Jul-1993May	Month	IFS	13260C..ZF...	TREASURY BILLS:13 WEEKS
GER	1975Jul-1993Mar	Month	IFS	13460C..ZF...	TREASURY BILL RATE
HKG	1974Sep-1993May	Month	IFS	11160CS.ZF...	TREASURY BILL RATE (BOND EQUIVALENT BASIS)
IRE	1972Mar-1993Apr	Month	IFS	17860C..ZF...	EXCHEQUER BILLS
ITA	1977Mar-1993Mar	Month	IFS	13660C..ZF...	T BILLS (WGHTD AV BEFORE TAX)
JAP	1960Jan-1977Jan	Month	IFS	15860B..ZF...	CALL MONEY RATE
	1977Feb-1993May	Month	OECD	JPOCGEN%	JP SHORT-TERM INT.RATE-3-MONTH GENSAKI RATE-MONTHLY AVERAGE (P)
HOL	1968Dec-1990Aug	Month	IFS	13860C..ZF...	TREASURY BILL RATE
NZL	1978Feb-1993May	Month	IFS	19660C..ZF...	NEW ISSUE RATE: 3-MO T BILLS
NOR	1971Aug-1993May	Month	IFS	14260B..ZF...	CALL MONEY RATE
SNG	1972Apr-1993Apr	Month	IFS	57660B..ZF...	3 MONTH INTERBANK RATE
SPA	1974Jan-1978Dec	Month	IFS	18460B..ZF...	CALL MONEY RATE
	1979Jan-1993May	Month	IFS	18460C..ZF...	TREASURY BILL RATE
SWE	1960Mar-1993Apr	Month	IFS	14460C..ZF...	3 MONTHS TREASURY DISC.NOTES
SWI	1975Sep-1979Dec	Month	IFS	14660B..ZF...	CALL MONEY RATE
	1980Jan-1993May	Month	IFS	14660C..ZF...	TREASURY BILL RATE
GBR	1974Jun1993May	Month	IFS	11260CS.ZF...	TREASURY BILL RATE BOND EQU
USA	1974Sep-1993May	Month	IFS	11160CS.ZF...	TREASURY BILL RATE (BOND EQUIVALENT BASIS)

Industry Structure Measures:

These are the regression coefficients from regressing the country returns on the four groupings of the MSCI industry indexes, presented in Figure 1. We use the MSCI world industry portfolios to construct the industry indexes. Each aggregate index is an equally-weighted average of the returns of the MSCI industries in the group. MSCI tracks 38 industry groups. These are: Aerospace and Military Technology, Appliances and Household Durables, Automobiles, Banking, Beverages and Tobacco, Broadcasting and Publishing, Building Materials and Components, Business and Public Services, Chemicals, Construction and Housing, Data Processing and Reproduction, Electrical and Electronics, Electronic Components and Instruments, Energy Equipment and Services, Energy Sources, Financial Services, Food and Household Products, Forest Products and Paper, Gold Mines, Health and Personal Care, Industrial Components, Insurance, Leisure and Tourism, Machinery and Engineering, Merchandising, Metals (Non-Ferrous), Metals (Steel), Miscellaneous Materials and Commodities, Multi-Industry, Recreation, Other Consumer Goods, Real Estate, Telecommunication, Textiles and Apparel, Transportation-Airlines, Transportation-Road and Rail, Transportation-Shipping, Utilities-Electrical and Gas, and Wholesale and International Trade. All of the world industry indices have a base value of 100 in December 1969. The indices are calculated in U.S. dollars but do not include dividends. We group 37 of the industry returns into the four groups shown in Figure 1. The correlations of the four industry grouped portfolio returns are:

	IND1	IND2	IND3	IND4
IND1	1	0.69	0.71	0.64
IND2		1	0.81	0.90
IND3			1	0.78

World Information Variables:
A short term slope of the term structure is the difference between the 90 day Eurodollar rate (Citibase FYUR3M) and the 30-day Eurodollar deposit rate. The short term interest rate is the 30-day Eurodollar deposit yield. Both are monthly averages of daily quotes. The lagged values of the MSCI world stock market return, the dividend yield of the world stock market index, and the G10 FX return are also used.

Global Risk Factors:
Data are available as early as January of 1970 for some of the series; all are available by February of 1971. The MSCI world return is the U.S. dollar world market return less the 30-day Eurodollar rate. This series is

from DATASTREAM. The Oil return is the percentage change in the U.S. dollar price of Saudi light crude, less the 30-day Eurodollar deposit rate, which is available from OECD from 1973. Prior to that date, the OECD series is constant, so we use the same oil price series as in Ferson and Harvey (1993a,b) prior to 1973. This is the posted West Texas Intermediate price from 1969-1973. Since the West Texas price reflects a different grade of oil than the Saudi light crude, the 1969-1973 data is grossed down by a scale factor, based on the average price levels over the 1974-1976 period. The G10 FX return is the return on holding a portfolio of currencies of the G10 countries (plus Switzerland) in excess of the 30-day Eurodollar rate. The currency return is the percentage change in the spot exchange rate plus the local currency, 30-day Eurodeposit rate. The portfolio weights are based on a one-year lag of a five-year moving average of trade sector weights. The numerator of the weight is the sum of the imports plus exports and the denominator is the sum over the countries, of the imports plus exports of each country, measured in a common currency (U.S. dollars). We use a five-year moving average of these weights, lagged by one year to insure they are predetermined, public information. Further details of the index construction are presented in Harvey (1993b), who compares this measure with the Federal Reserve series of G10 Exchange rate changes that was used by Ferson and Harvey (1993a,b). He finds that the correlation of the two series is in excess of 0.9.

The sample correlations of the global risk factors are:

	EXG10FX	EXOIL	dOECDIP	dOECDCPI
EXWRD	.36	-.09	-.14	-.11
EXG10FX		.03	.01	-.13
EXOIL			-.04	.09
dOECDIP				-.02

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FOOTNOTES:

1. To the extent that such effects are concentrated in smaller shares, we may understate their importance by using the MSCI indexes, which are heavily weighted towards the larger and more liquid issues.

2. We use the long rate and the spread because their correlation is much lower than the correlation of the short rate and the spread or the short rate and the long rate. While the long rates are highly persistent, Appendix Table 1 shows that the sample autocorrelations damp out at longer lags.

3. These are based on the 1976.1-93.1 period shown in Table 1. When we begin the samples in 1970.1 when available, the R^2 of the relation between average returns and the standard deviation of the price-to-book ratio increases to 25.7%.

4. Starting the sample in 1970.1 when available, the slope is 0.35 (standard error=0.23) and the R^2 is .107.

5. The GDP and inflation variables are lagged 15 months in these regressions to account for publication lag, and the interest rates are lagged one month. The industry structure variables are not predetermined, since they are estimated using regressions over the full sample period. However, they are constrained to be constant over time, which limits their predictive ability. We should not expect significant bias from including these measures, but we believe that future research should use alternative measures of industry structure which are predetermined.

6. The maximum correlation and zero correlation condition with the other attributes is imposed only in a cross-sectional sense, and need not hold over time [See Shanken and Weinstein (1990) or Ferson and Harvey (1991)].

7. The slope of the average relation, equal to 3.9, is not identical to .005*1200=6.0 in Table 1, because the cross-sectional regressions for different months use different numbers of countries in Table 1.

8. Joint tests across the countries are complicated by the fact that the regressions for different countries use different sample periods. This also reduces the dependence across the separate regressions.

9. Ferson and Harvey motivated their assumption that the global risk premia depend only on world information variables by appealing to market integration. But they pointed out that their distinction between world and local market information variables was somewhat arbitrary. Expected risk

premia may depend on the collection of the country attributes, as well as other public information variables, even in integrated equity markets.

10. Mimicking portfolios are defined as portfolios that may be substituted for the factors in a factor model regression, to measure the betas, and whose expected excess returns are the risk premiums. See Huberman, Kandel and Stambaugh (1987), or Lehmann and Modest (1988).

11. Some informal intuition for the impact of this restriction is suggested by Ferson and Harvey (1993a). Assume that $E(r_{it+1}|\Omega_t)$ is a function $f(A^i_t, Y_t)$, where Y_t is the remaining public information, given A_t. Dropping the subscripts, consider an example where there is a single factor (K=1), where β, λ, A^i, and Y are scalars, and where A^i is uncorrelated with Y. Writing $f(A^i,Y)=\beta(A^i,Y)\lambda(A^i,Y)$ and taking a first order Taylor series about the means, we have:

$$\mathrm{Var}(f) \approx [\lambda(.)\partial\beta/\partial A^i + \beta(.)\partial\lambda/\partial A^i]^2 \ \mathrm{Var}(A^i) + [\lambda(.)\partial\beta/\partial Y + \beta(.)\partial\lambda/\partial Y]^2 \ \mathrm{Var}(Y),$$

where $\lambda(.)$ and $\beta(.)$ are evaluated at the means. The first term captures the contribution of the fundamental attributes to the variance of country *i*'s expected return, and the second term captures the contribution of the remaining public information. The assumption that the betas depend only on the local market information implies that $\partial\beta/\partial = 0$ in the second term. By setting $\partial\beta/\partial Y=0$, we are ignoring what should be the smaller of the coefficients on the variance in the second term. This is because the square of an average risk premium is a small number, compared with the square of an average beta.

12. We also combined the alternative hypotheses, modelling $\alpha_{it}=\alpha_{i0}+C_i'Z_t+D_i'A^i_t$. The impressions from these tests are similar to the results reported below.

13. We repeated the tests in table 4, where the dividend-to-price ratio is replaced by the price-to-cash flow ratio. The results are generally similar, which shows some robustness of the results to the precise specification of the fundamental attributes.

14. Harvey (1991) also conducted joint tests across the countries and did not reject that the average pricing errors are zero. Such joint tests would be complicated here because the sample periods for the countries are different.

Figure 1

International industry portfolios

Number	Portfolio[†]	MSCI Composition
1	Natural Resoures	Forest Products & Paper (18) Gold Mines (19) Metals (Non-Ferrous) (26) Metals (Steel) (27) Misc. Materials & Commodities (28) Beverages & Tobacco (5) Food & Household Products (17)
2	Contruction and Manufacturing	Building Materials & Components (7) Construction & Housing (10) Appliances & Household Durables (2) Automobiles (3) Electrical & Electronics (12) Electronic Components & Instruments (13) Industrial Components (21) Machinery & Engineering (24) Aerospace & Military Technology (1) Chemicals (9) Mechandising (25) Textiles & Apparel (33) Wholesale & International Trade (38) Recreation, Other Consumer Goods (31)
3	Transportation/Communication/ Utilities/Energy	Transportation–Airlines (34) Transportation–Road & Rail (35) Transportation–Shipping (36) Broadcasting (6) Telecommunications (32) Utilities–Electrical & Gas (37) Energy Equipment & Services (14) Energy Sources (15)
4	Services and Financial Services	Banking (4) Financial Services (16) Insurance (22) Real Estate (30) Business & Public Services (8) Data Processing & Reproduction (11) Health & Personal Care (20) Leisure & Tourism (23)

[†] An aggregation of 37 Morgan Stanley Capital International industry porfolios. Each of the 37 MSCI portfolios (numbers in parentheses) are value weighted. The aggregated portfolios represent returns to a portfolio that starts with an equally-weighted investment in the MSCI categories in December 1969. Data is available through September 1991.

Figure 2

Mean equity returns and the mean and volatility of attributes January 1975 to May 1993 (221 observations)

A. Mean equity return vs. standard deviation of equity return

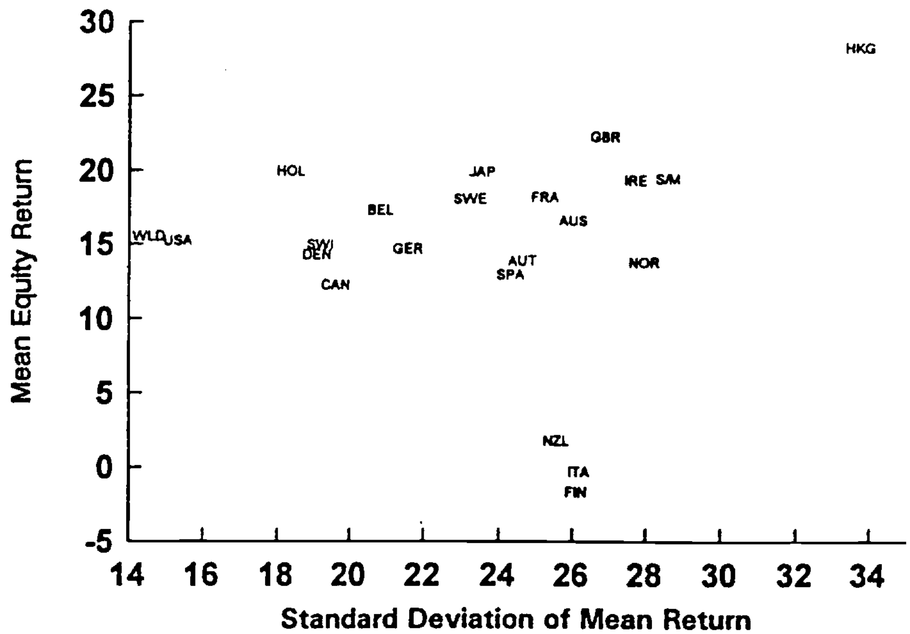
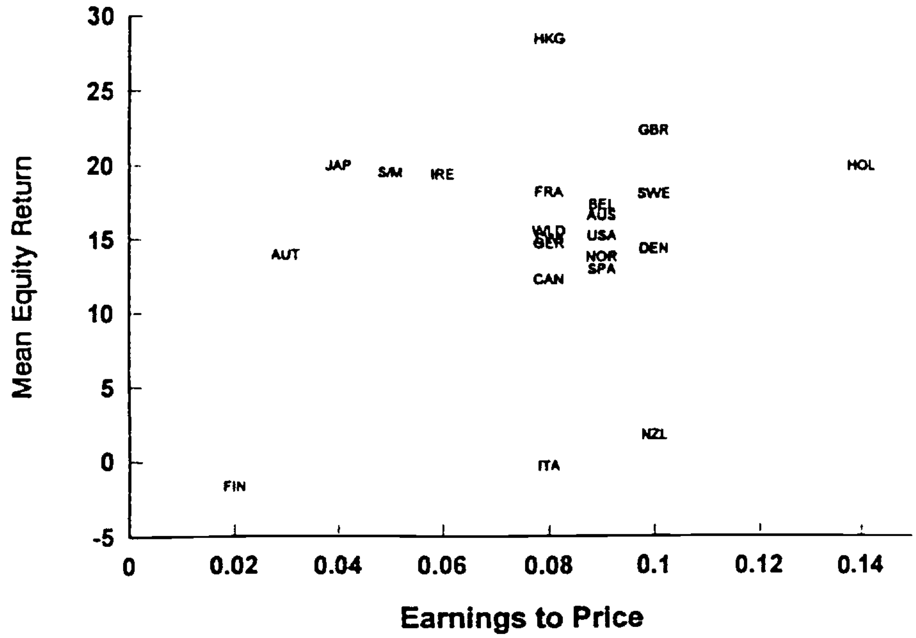


Figure 2 (continued)

B. Mean equity return vs. mean earnings to price



C. Mean equity return vs. standard deviation of earnings to price

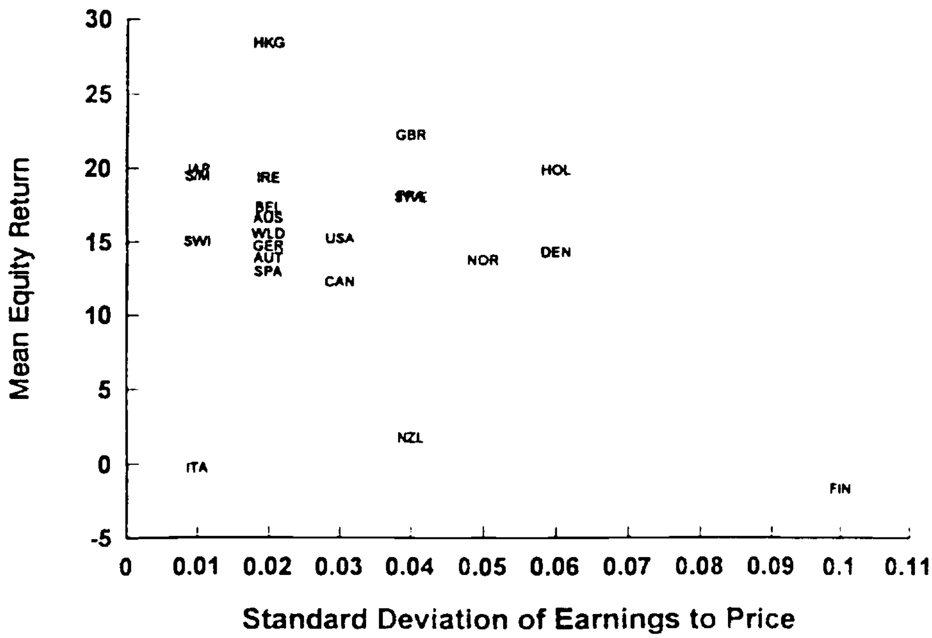
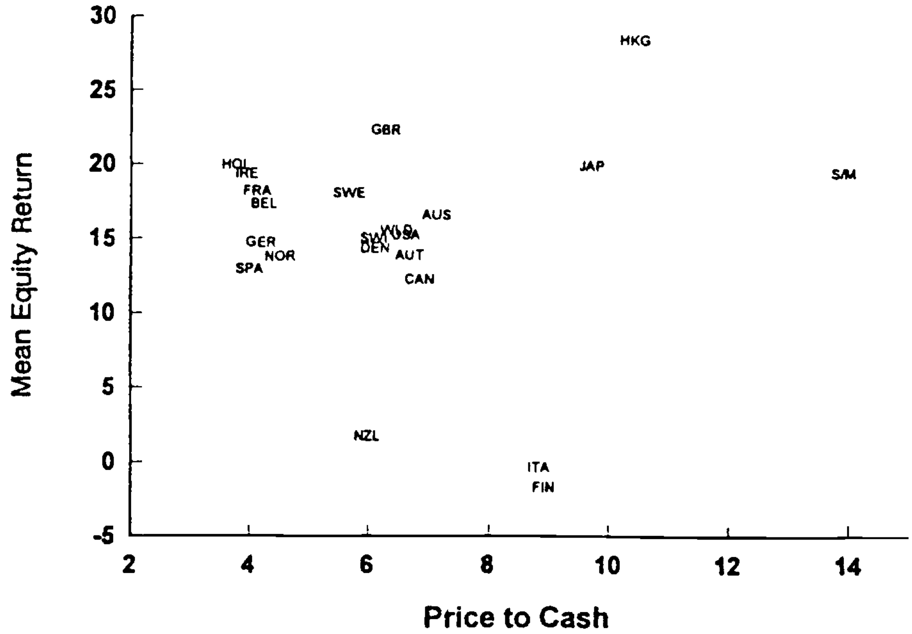


Figure 2 (continued)

D. Mean equity return vs. mean price to cash



E. Mean equity return vs. standard deviation of price to cash

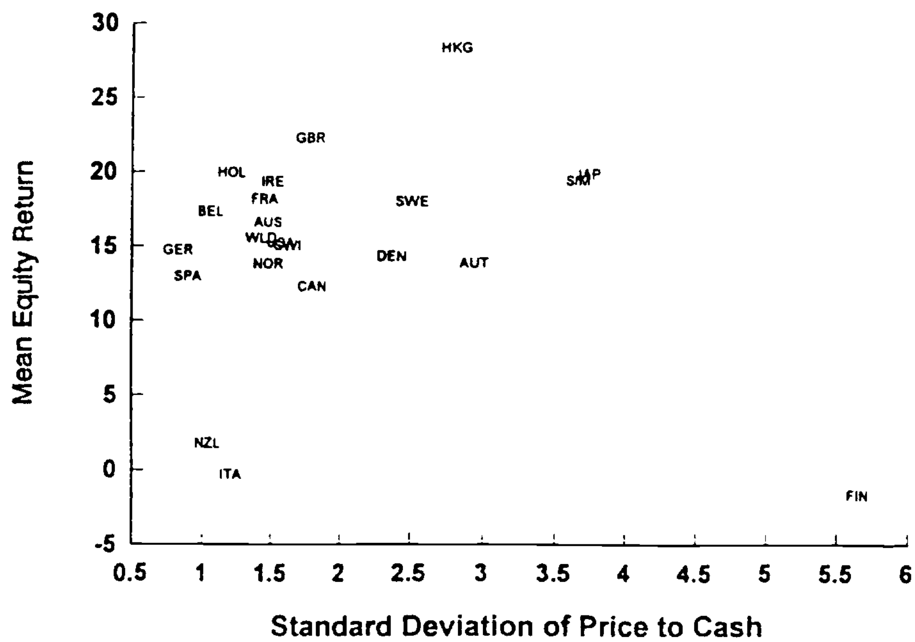
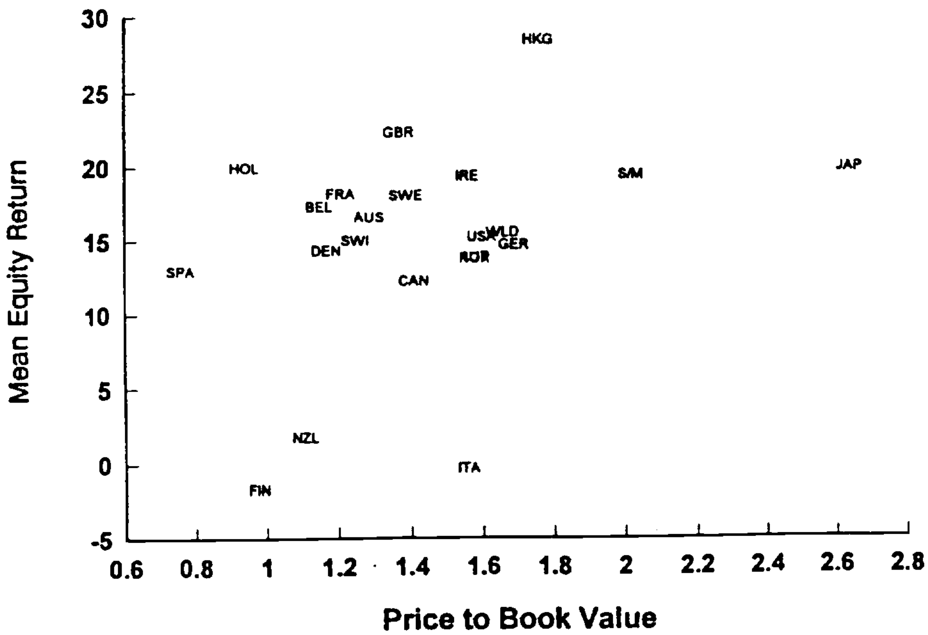


Figure 2 (continued)

F. Mean equity return vs. mean price to book



G. Mean equity return vs. standard deviation of price to book

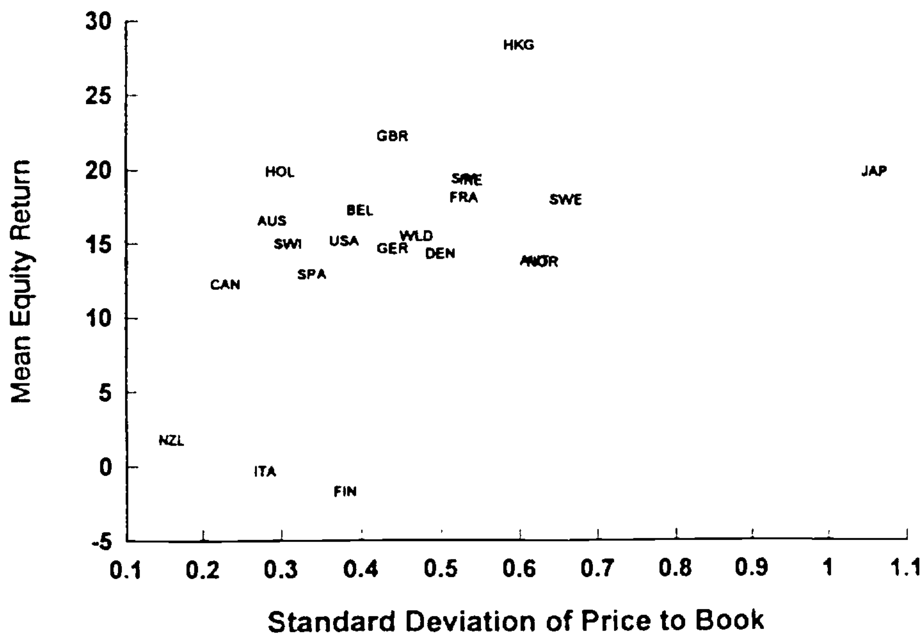
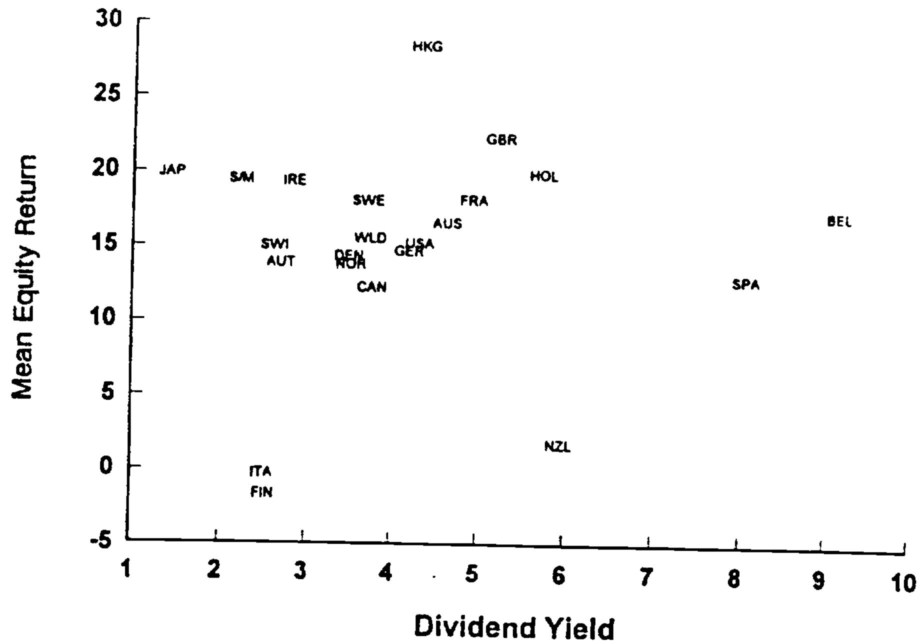


Figure 2 (continued)

H. Mean equity return vs. mean dividend yield



I. Mean equity return vs. standard deviation of dividend yield

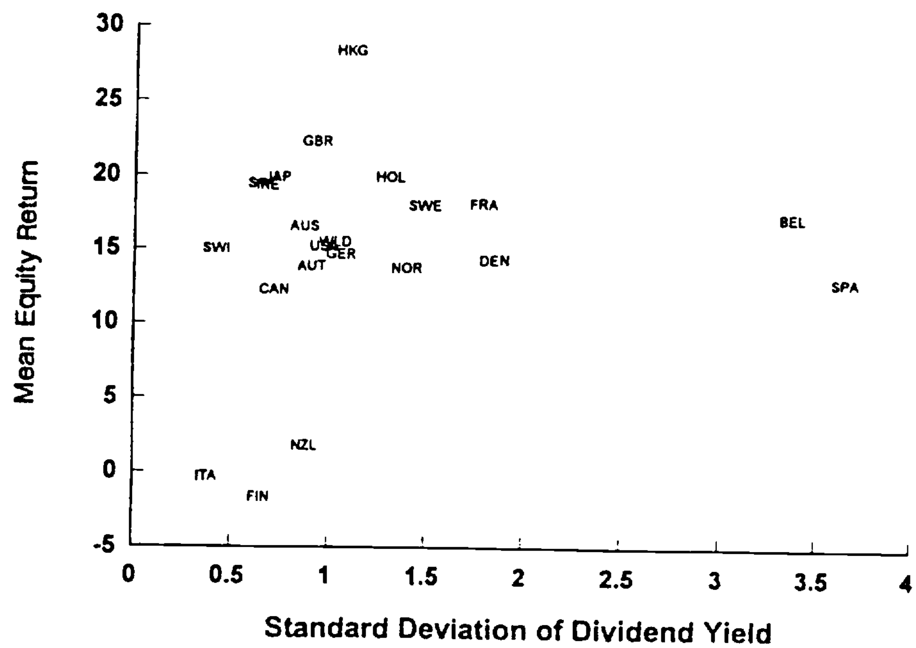
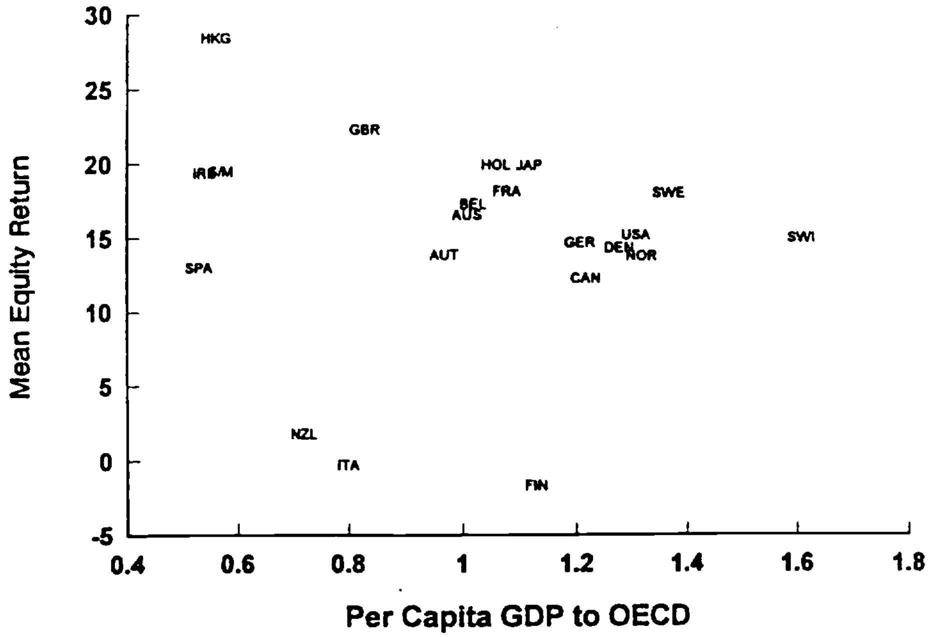


Figure 2 (continued)

J. Mean equity return vs. mean GDP to OECD GDP



K. Mean equity return vs. standard deviation of GDP to OECD GDP

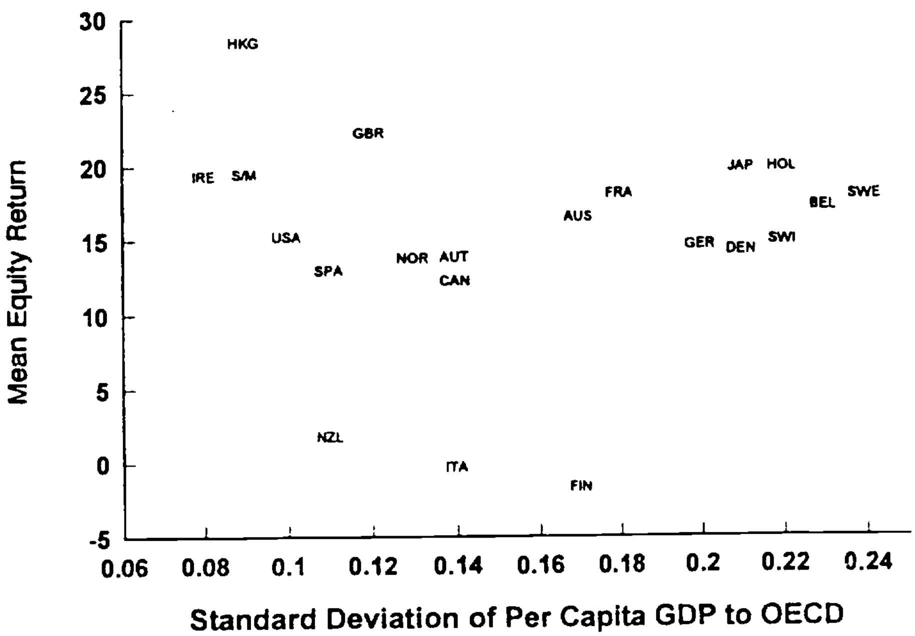
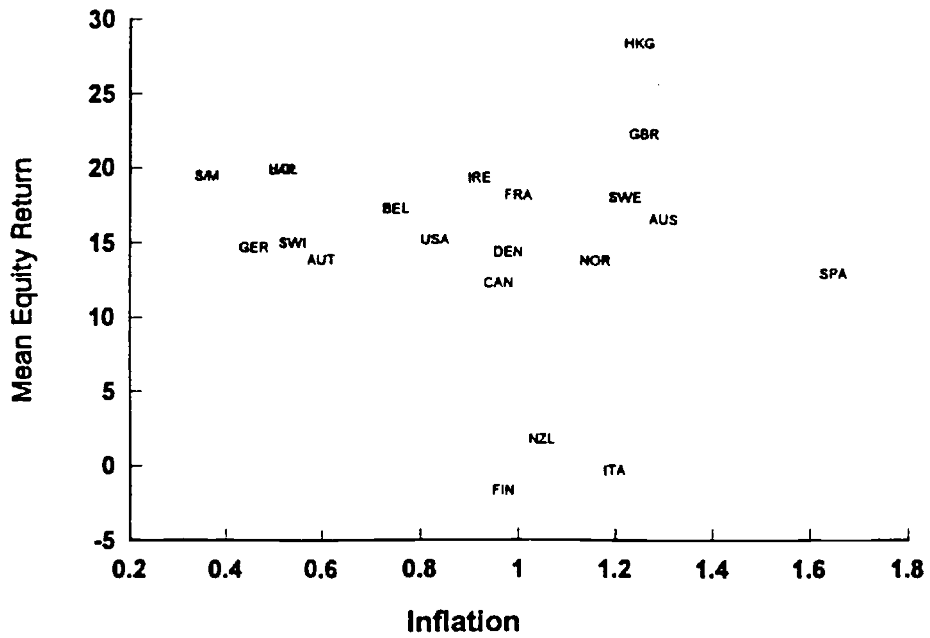


Figure 2 (continued)

L. Mean equity return vs. mean CPI to OECD CPI



M. Mean equity return vs. standard deviation of CPI to OECD CPI

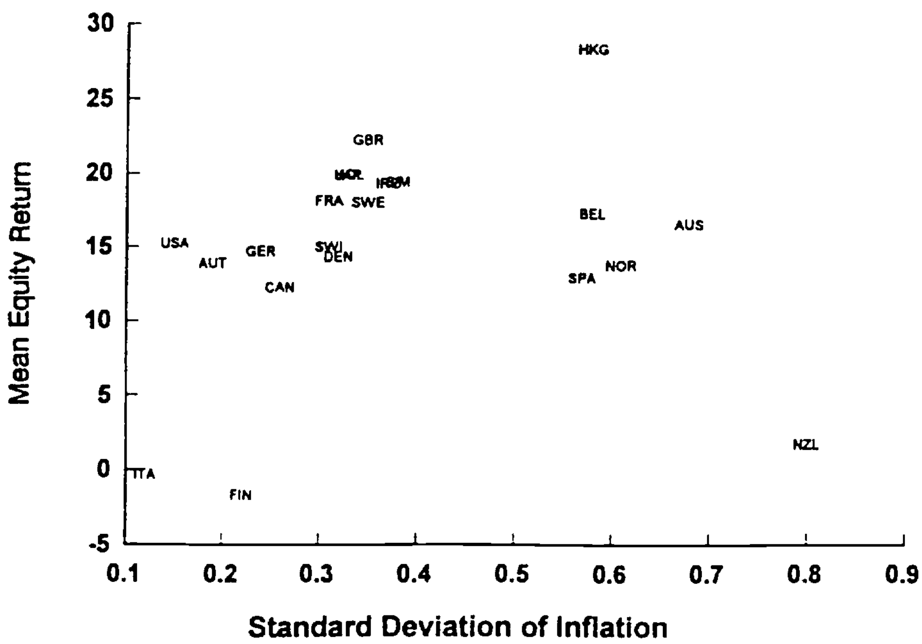
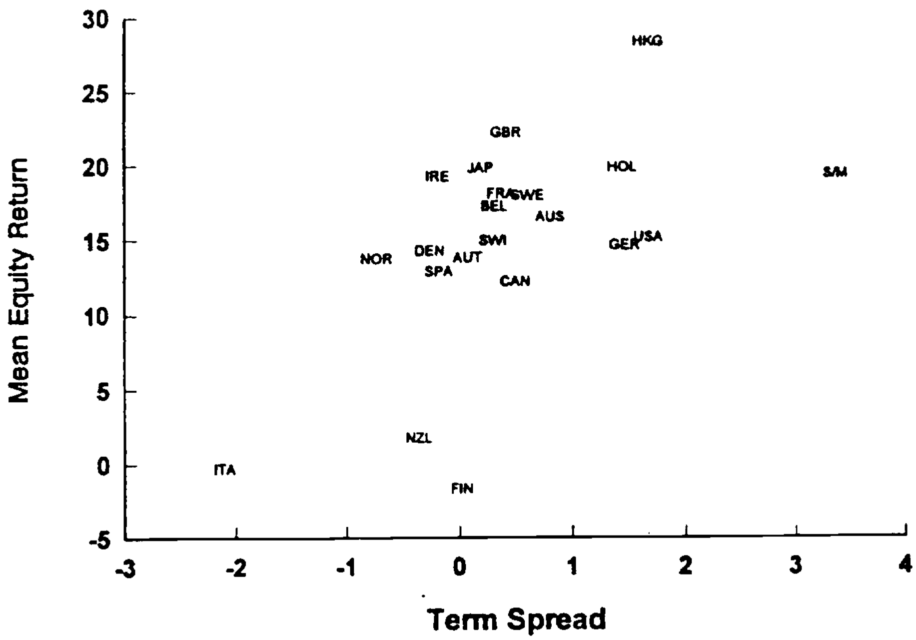


Figure 2 (continued)

N. Mean equity return vs. mean term spread



O. Mean equity return vs. standard deviation of term spread

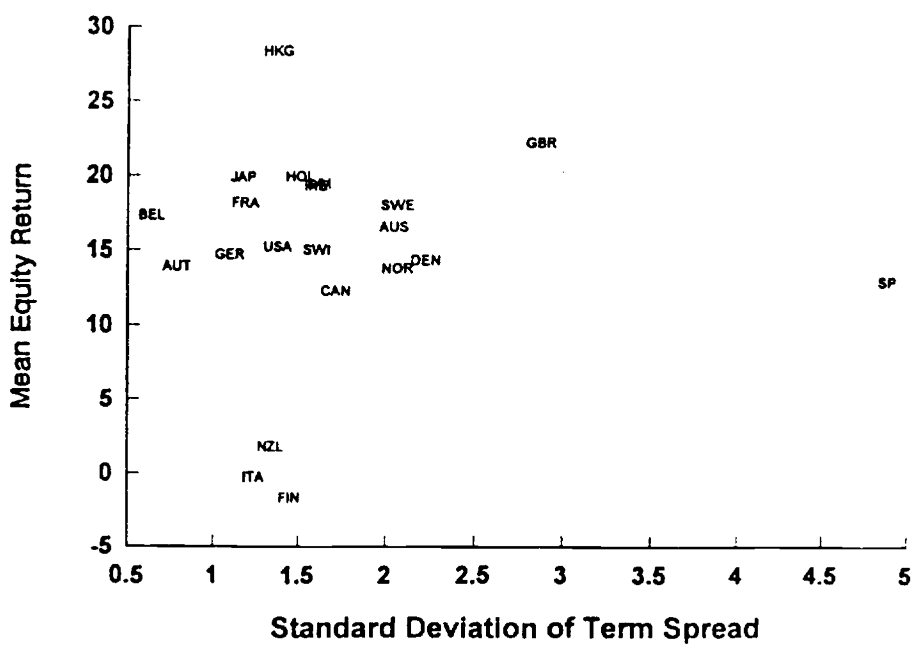
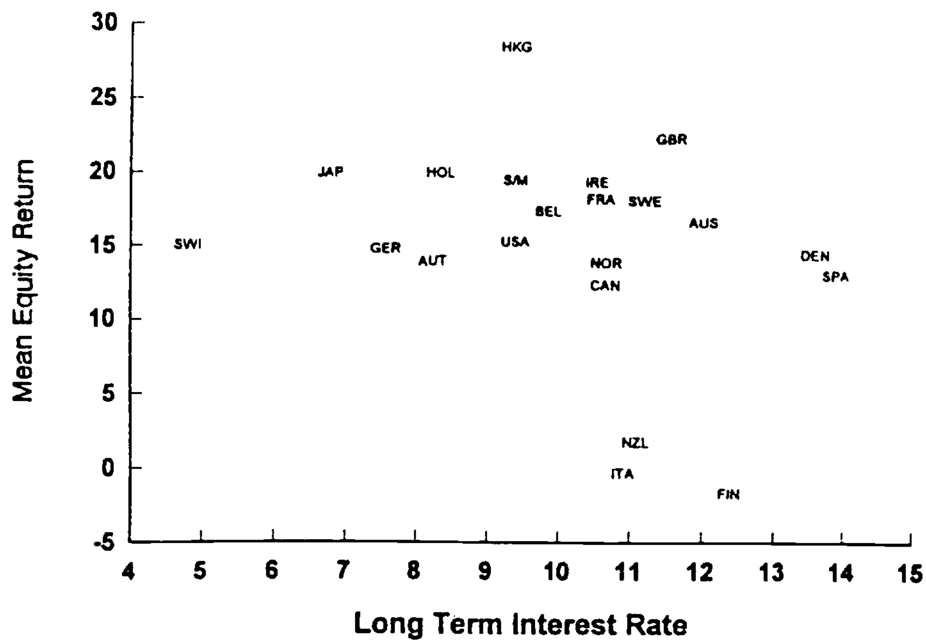


Figure 2 (continued)

P. Mean equity return vs. mean long-term rate



Q. Mean equity return vs. standard deviation of long-term rate

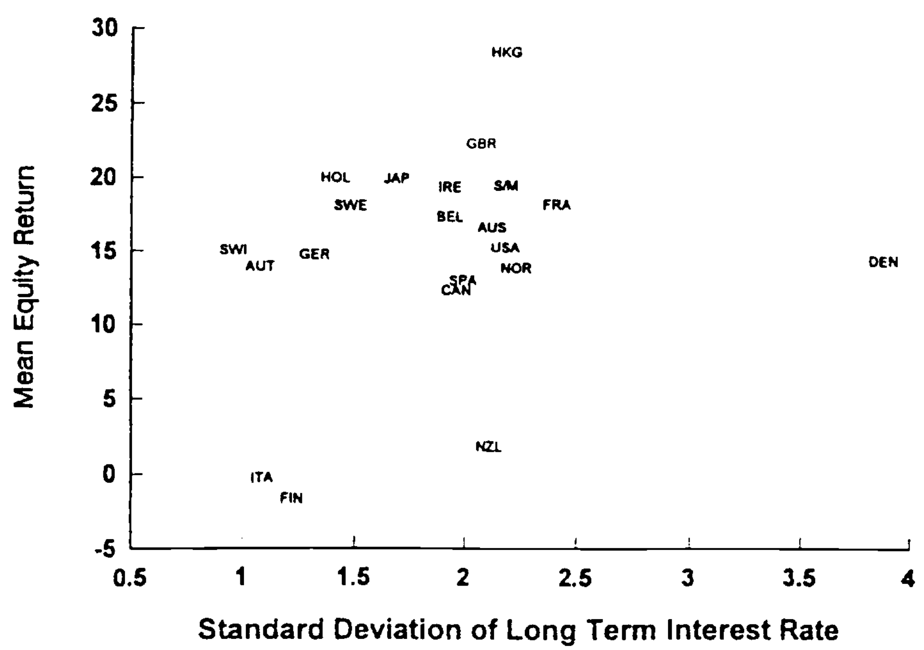


Table 1

Cross-sectional regressions of country returns on attributes: 1976:01–1993:01 (205 regressions)

Fundamental	Mean	Std. dev.	t-ratio	Minimum	Maximum	1st-order auto-correlation	Average cross-sectional R^2
A. Univariate models[a]							
Earnings to price	0.0360	0.4616	1.15	-1.578	1.723	0.105	0.078
Price to cash	0.0002	0.0058	0.55	-0.014	0.020	0.062	0.099
Price to book	-0.0010	0.0320	-0.47	-0.194	0.103	-0.111	0.083
Dividend to Price	0.0009	0.0074	1.78	-0.021	0.032	0.148	0.066
Per capita GDP to OECD	-0.0084	0.0525	-2.29	-0.179	0.154	0.051	0.089
Inflation to OECD	0.0046	0.0391	1.73	-0.102	0.144	0.096	0.088
Term spread	0.0005	0.0081	1.45	-0.023	0.030	0.097	0.064
Long-term interest rate	-0.0002	0.0061	-0.48	-0.017	0.018	0.107	0.077
Industry 1 loading	-0.0072	0.0900	-1.18	-0.247	0.260	-0.006	0.087
Industry 2 loading	0.0006	0.0624	0.14	-0.147	0.211	0.003	0.088
Industry 3 loading	-0.0053	0.0495	-1.58	-0.164	0.117	0.043	0.079
Industry 4 loading	0.0089	0.0527	2.49	-0.141	0.256	0.088	0.092
B. Multivariate models[b]							
Earnings to price	-0.0111	0.7040	-0.23	-3.49	2.03	0.102	0.294
Price to cash	0.0012	0.0109	2.83	-0.029	0.079	0.114	0.294
Price to book	-0.0017	0.0440	-0.57	-0.111	0.154	0.062	0.294
Dividend to Price	0.0010	0.0094	1.57	-0.028	0.034	0.083	0.294
Per capita GDP to OECD	-0.0064	0.0582	-1.57	-0.203	0.186	0.029	0.303
Inflation to OECD	0.0044	0.0555	1.14	-0.175	0.182	0.154	0.303
Term spread	-0.00002	0.0100	-0.03	-0.050	0.025	0.088	0.303
Long-term interest rate	-0.0010	0.0084	-1.75	-0.025	0.033	0.058	0.303
Industry 1 loading	0.0010	0.1307	0.11	-0.405	0.572	0.077	0.317
Industry 2 loading	0.0074	0.1260	0.87	-0.446	0.474	0.102	0.317
Industry 3 loading	0.0063	0.1259	0.74	-0.346	0.461	0.101	0.317
Industry 4 loading	0.0125	0.1111	1.66	-0.301	0.634	0.174	0.317
Price to cash	-0.0003	0.0080	-0.45	-0.026	0.024	0.049	0.305
Dividend to Price	0.0005	0.0107	0.67	-0.044	0.028	0.213	0.305
Per capita GDP to OECD	-0.0063	0.0679	-1.36	-0.247	0.239	0.168	0.305
Long-term interest rate	-0.0007	0.0062	-1.67	-0.018	0.018	0.135	0.305
Price to cash	-0.0004	0.0066	-0.79	-0.032	0.017	0.067	0.241
Per capita GDP to OECD	-0.0079	0.0568	-1.99	-0.218	0.154	0.184	0.241
Long-term interest rate	-0.0008	0.0062	-1.73	-0.019	0.017	0.110	0.241
Dividend to Price	0.0007	0.0080	1.25	-0.033	0.021	0.065	0.221
Per capita GDP to OECD	-0.0063	0.0560	-1.61	-0.211	0.165	-0.002	0.221
Long-term interest rate	-0.0008	0.0057	-1.88	-0.017	0.014	0.181	0.221
Dividend to Price	0.0007	0.0081	1.18	-0.033	0.026	0.067	0.286
Per capita GDP to OECD	-0.0040	0.0627	-0.92	-0.207	0.178	-0.004	0.286
Long-term interest rate	-0.0007	0.0059	-1.77	-0.017	0.017	0.176	0.286
Industry 4 loading	0.0034	0.0535	0.91	-0.180	0.140	-0.056	0.286

In the regressions from January 1975–January 1977, there are 14 countries (Austria, Finland, Italy, Ireland, New Zealand, Spain and Switzerland are excluded). From February 1977–February 1978, there are 16 countries in the regessions (Finland, Italy, Ireland and New Zealand Spain are excluded). From March 1978–April 1984, there are 17 countries in the regessions (Finland, Italy, Ireland and New Zealand are excluded). From May 1984–January 1988, there are 18 countries (Finland, Ireland and New Zealand are excluded). From February 1988–May 1990, there are 20 countries (Ireland is excluded). All 21 countries are used from June 1990. Per capita GDP to OECD is the ratio of per capita annual GDP calculated in U.S. dollars for country to per capita annual OECD calculated in U.S. dollars. Inflation to OECD is the annual change in inflation for country i divided by the annual change in inflation for the OECD. The term spread is the long-term rate minus the short-term rate. The industry loadings are slope coefficients in the regressions of country returns on four industry returns: Natural resources (loading 1), construction and manufacturing (loading 2), transportation/communication/energy and utilities (loading 3), and services and financial services (loading 4). Detailed descriptions and sources for all the variables are found in the appendix.

[a] The univariate model is the cross-sectional regression of the returns in month t on the lagged attribute. Earnings to price, price to cash, price to book, dividend to price, term spread, long-term interest rate, and the industry loadings are lagged by one month. The per capita GDP to OECD GDP and the inflation to OECD inflation are lagged by 15 months to allow for publication delays. Mean represents the average time-series cross-sectional coefficient on the attribute.

[b] The multivariate model is the cross-sectional regression of returns in month t on a group of lagged attributes.

Table 2

Correlations of mimicking portfolios returns and prespecified factors 1976:01–1993:01 (205 observations)

Factor	γ YD	γ RGDP	γ LONG	Multiple
MSCI world excess return	-0.14	-0.07	-0.01	0.14
G10 excess FX return	0.07	-0.02	-0.32	0.32
Oil excess return	0.15	0.20	0.02	0.21
Growth OECD production	0.02	0.00	0.03	0.04
OECD inflation	-0.10	-0.03	0.09	0.13
2 factors	0.18	0.07	0.34	
5 factors	0.26	0.21	0.35	

The mimicking portfolio returns, γ, are based on cross-sectional regressions of country returns on three lagged attributes: dividend yield, country per capita GDP to OECD GDP, and the long-term interest rate. GDP to OECD is the ratio of per capita annual GDP calculated in U.S. dollars for country to per capita annual OECD calculated in U.S. dollars. In the cross-sectional regressions from January 1975–January 1977, there are 14 countries (Austria, Finland, Italy, Ireland, New Zealand, Spain and Switzerland are excluded). From February 1977–February 1978, there are 16 countries in the regessions (Finland, Italy, Ireland and New Zealand Spain are excluded). From March 1978–April 1984, there are 17 countries in the regessions (Finland, Italy, Ireland and New Zealand are excluded). From May 1984–January 1988, there are 18 countries (Finland, Ireland and New Zealand are excluded). From February 1988–May 1990, there are 20 countries (Ireland is excluded). All 21 countries are used from June 1990. The cross-sectional slope coefficients are the mimicking portfolio returns. Time-series correlations are reported with five world risk factors: the excess return on the MSCI world market return, the excess return on a portfolio of currency investments in 10 countries [see Harvey (1993) for details of the construction of this variable], the excess return to holding crude oil, growth in OECD industrial production and the rate of change in OECD inflation.

Table 3

World information and country attributes for predicting national excess equity returns 1976:01–1993:01 (205 observations)

Country i	Intercept	wr_{t-1}	$rg10fx_{t-1}$	$wdiv_{t-1}$	$e\$90\text{-}30_{t-1}$	$e\$30_t$	$div_{i,t-1}$	$rgdp_{i,t-1}$	$long_{i,t-1}$	$\bar{R}^2$	F-test exclude world Z	F-test exclude local A
Australia	0.033	0.463	-0.072	0.013	0.030	-2.018	0.017	-0.144	-0.000	0.066	3.230	2.565
	(0.064)	(0.144)	(0.180)	(0.009)	(0.015)	(2.601)	(0.009)	(0.052)	(0.003)		[0.008]	[0.056]
Austria	0.150	0.245	-0.139	-0.004	0.033	1.327	-0.009	-0.076	-0.007	0.054	1.079	2.157
	(0.046)	(0.156)	(0.221)	(0.009)	(0.015)	(1.910)	(0.012)	(0.037)	(0.006)		[0.374]	[0.095]
Belgium	0.152	-0.107	-0.034	0.005	0.006	-2.277	0.005	-0.100	-0.009	0.095	0.670	6.230
	(0.038)	(0.110)	(0.167)	(0.012)	(0.013)	(2.610)	(0.004)	(0.028)	(0.004)		[0.647]	[0.000]
Canada	0.185	0.201	-0.072	0.003	0.026	2.224	0.028	-0.177	-0.010	0.058	1.592	3.988
	(0.058)	(0.070)	(0.106)	(0.007)	(0.014)	(2.619)	(0.015)	(0.055)	(0.004)		[0.164]	[0.009]
Denmark	0.072	-0.216	-0.064	-0.025	0.014	-2.036	0.006	-0.037	0.005	0.014	2.052	1.562
	(0.045)	(0.107)	(0.141)	(0.010)	(0.014)	(1.940)	(0.005)	(0.033)	(0.003)		[0.073]	[0.200]
Finland	0.526	0.393	-0.551	-0.069	0.017	-5.380	0.079	-0.308	-0.010	0.137	1.630	2.880
	(0.174)	(0.194)	(0.241)	(0.049)	(0.049)	(6.704)	(0.023)	(0.111)	(0.008)		[0.167]	[0.044]
France	0.205	-0.030	-0.149	-0.000	-0.005	2.678	0.014	-0.161	-0.010	0.057	0.437	5.051
	(0.051)	(0.119)	(0.183)	(0.013)	(0.019)	(3.133)	(0.008)	(0.039)	(0.004)		[0.822]	[0.002]
Germany	0.098	0.006	-0.269	0.000	0.011	-3.266	0.008	-0.078	-0.002	0.032	0.999	2.730
	(0.036)	(0.147)	(0.181)	(0.006)	(0.015)	(2.445)	(0.010)	(0.028)	(0.004)		[0.419]	[0.045]
Hong Kong	0.052	0.226	0.034	0.001	-0.009	2.992	0.016	-0.078	-0.009	0.015	0.554	2.055
	(0.073)	(0.154)	(0.268)	(0.009)	(0.028)	(5.028)	(0.008)	(0.081)	(0.007)		[0.735]	[0.107]
Ireland	0.611	-0.174	-0.024	-0.033	-0.033	-3.066	0.052	-0.902	-0.013	0.104	0.449	4.560
	(0.220)	(0.150)	(0.254)	(0.032)	(0.026)	(5.063)	(0.027)	(0.272)	(0.007)		[0.813]	[0.005]
Italy	-0.360	-0.454	0.308	-0.119	0.014	36.013	0.184	0.308	-0.022	0.068	1.240	2.070
	(0.671)	(0.271)	(0.326)	(0.099)	(0.057)	(14.506)	(0.069)	(0.430)	(0.016)		[0.317]	[0.129]
Japan	0.172	-0.043	0.112	-0.004	-0.001	0.225	0.004	-0.095	-0.007	0.033	0.127	3.746
	(0.053)	(0.154)	(0.180)	(0.012)	(0.014)	(2.906)	(0.017)	(0.029)	(0.006)		[0.986]	[0.012]
Netherlands	0.058	-0.043	-0.095	-0.003	0.010	-3.290	0.020	-0.078	-0.006	0.082	1.178	5.495
	(0.024)	(0.103)	(0.127)	(0.008)	(0.013)	(1.648)	(0.007)	(0.024)	(0.003)		[0.321]	[0.001]
New Zealand	0.406	0.227	-0.192	-0.131	-0.100	3.874	0.031	-0.251	-0.008	0.072	1.743	1.291
	(0.499)	(0.280)	(0.314)	(0.085)	(0.051)	(22.803)	(0.018)	(0.753)	(0.018)		[0.140]	[0.287]
Norway	0.141	0.108	-0.073	-0.011	0.012	2.713	0.007	-0.089	-0.002	-0.022	0.257	0.908
	(0.091)	(0.176)	(0.201)	(0.013)	(0.020)	(3.772)	(0.007)	(0.060)	(0.004)		[0.936]	[0.438]
Singapore/Malaysia	0.031	0.112	-0.002	0.002	-0.004	4.722	0.013	0.015	-0.011	0.012	0.506	2.186
	(0.088)	(0.132)	(0.192)	(0.010)	(0.026)	(4.661)	(0.019)	(0.115)	(0.006)		[0.771]	[0.091]
Spain	0.177	0.059	-0.089	-0.020	-0.013	0.313	0.007	-0.115	-0.007	0.039	0.743	3.289
	(0.065)	(0.148)	(0.171)	(0.014)	(0.015)	(2.553)	(0.004)	(0.050)	(0.004)		[0.592]	[0.022]
Sweden	-0.024	0.250	-0.223	-0.011	0.002	-1.436	0.015	-0.052	0.009	0.027	1.400	2.396
	(0.073)	(0.140)	(0.176)	(0.009)	(0.020)	(2.890)	(0.007)	(0.032)	(0.005)		[0.226]	[0.069]
Switzerland	0.070	-0.005	-0.097	-0.001	0.030	-3.682	0.009	-0.047	0.003	0.055	1.944	2.180
	(0.041)	(0.115)	(0.154)	(0.006)	(0.016)	(1.936)	(0.019)	(0.018)	(0.004)		[0.089]	[0.092]
United Kingdom	0.036	0.144	-0.121	-0.021	0.017	1.443	0.043	-0.202	-0.002	0.059	1.240	4.923
	(0.043)	(0.113)	(0.149)	(0.010)	(0.014)	(2.267)	(0.015)	(0.064)	(0.005)		[0.292]	[0.003]
United States	0.044	-0.008	-0.017	-0.016	-0.003	-5.090	0.033	-0.060	-0.001	0.018	1.331	2.682
	(0.056)	(0.091)	(0.106)	(0.008)	(0.012)	(2.219)	(0.011)	(0.053)	(0.003)		[0.252]	[0.048]

Time-series regressions begin in January 1976 or later depending on data availability. Returns are available from January 1970 except for Finland, Ireland and New Zealand (who begin in February 1988). The instruments consist of two sets: the world Z and the attributes A. The world instruments are : the lagged MSCI world return, the lagged change in a portfolio of 10 currency returns, the lagged MSCI world dividend yield, the lagged spread between the 90-day and 30-day Eurodollar rates (based average daily rates) and the 30-day Eurodollar rate (quote

Table 3 (continued)

last day of previous month). The attributes are: the first lag of the local dividend yield, the 15th lag of the ratio of per capita GDP to OECD GDP and first lag the long-term interest rate. Per capita GDP to OECD is the ratio of per capita annual GDP calculated in U.S. dollars for country to per capita annual OECD calculated in U.S. dollars. The long-term interest rate in Spain is only available from March 1978.

Table 4

National attributes and asset pricing using dividend yields, economic performance and long-term interest rates, 1976:01–1993:01 (205 observations)

Country i	wr_t	$wr_t \times div_{i,t-1}$	$wr_t \times rgdp_{i,t-1}$	$wr_t \times long_{i,t-1}$	$\overline{R}^2$	F-test exclude $wr_t \otimes A_{t-1}$
Australia	1.068 (1.452)	-0.434 (0.182)	1.670 (0.818)	0.012 (0.052)	0.282	4.568 [0.004]
Austria	0.129 (1.101)	-0.142 (0.185)	-0.001 (0.947)	0.089 (0.110)	0.077	0.407 [0.748]
Belgium	1.991 (0.876)	0.041 (0.046)	-0.604 (0.651)	-0.084 (0.073)	0.374	0.947 [0.419]
Canada	-2.531 (1.326)	-0.116 (0.253)	2.045 (1.468)	0.127 (0.044)	0.499	5.717 [0.001]
Denmark	0.850 (0.931)	-0.001 (0.089)	0.031 (0.685)	-0.015 (0.034)	0.251	0.163 [0.921]
Finland	-5.180 (3.749)	-0.434 (0.353)	6.381 (3.526)	-0.138 (0.262)	0.126	1.405 [0.250]
France	2.652 (0.919)	0.176 (0.110)	-0.626 (0.675)	-0.154 (0.079)	0.400	1.919 [0.128]
Germany	0.984 (0.822)	0.035 (0.123)	-0.232 (0.582)	-0.003 (0.095)	0.289	0.058 [0.981]
Hong Kong	1.027 (1.413)	-0.296 (0.187)	-0.145 (1.795)	0.135 (0.068)	0.196	3.791 [0.011]
Ireland	9.731 (2.832)	0.449 (0.214)	-11.697 (3.589)	-0.332 (0.113)	0.367	4.165 [0.008]
Italy	-2.569 (9.243)	0.208 (0.892)	1.322 (6.376)	0.192 (0.415)	0.619	0.413 [0.745]
Japan	2.066 (0.798)	-0.376 (0.242)	-0.402 (0.535)	0.003 (0.084)	0.529	2.202 [0.089]
Netherlands	0.365 (0.346)	0.080 (0.088)	0.166 (0.420)	-0.009 (0.061)	0.524	1.461 [0.226]
New Zealand	2.082 (4.591)	0.033 (0.218)	-1.450 1(0.796)	-0.061 (0.352)	0.029	0.186 [0.905]
Norway	-2.185 (1.662)	-0.062 (0.090)	2.072 (1.094)	0.061 (0.072)	0.282	1.483 [0.220]
Singapore/Malaysia	4.909 (1.403)	-0.631 (0.299)	-5.458 (1.720)	0.043 (0.059)	0.320	5.721 [0.001]
Spain	2.913 (1.140)	-0.056 (0.027)	-0.641 (1.056)	-0.092 (0.064)	0.337	4.161 [0.007]
Sweden	-1.383 (1.178)	-0.066 (0.072)	0.302 (0.594)	0.178 (0.072)	0.299	2.106 [0.101]
Switzerland	0.492 (0.746)	0.043 (0.154)	0.038 (0.351)	0.047 (0.076)	0.442	0.222 [0.881]
United Kingdom	0.285 (0.634)	-0.039 (0.129)	0.346 (0.982)	0.065 (0.059)	0.490	0.958 [0.413]
United States	-2.511 (1.370)	-0.104 (0.122)	2.693 (1.202)	0.026 (0.036)	0.612	3.767 [0.012]

Table 4 (continued)

Country i	wr_t	$wr_t \times div_{i,t-1}$	$wr_t \times rgdp_{i,t-1}$	$wr_t \times long_{i,t-1}$	$rg10_t$	$rg10_t \times div_{i,t-1}$	$rg10_t \times rgdp_{i,t-1}$	$rg10_t \times long_{i,t-1}$	$\overline{R}^2$	F-test exclude $F_t \odot A_{t-1}$
Australia	1.910 (1.111)	-0.414 (0.143)	1.044 (0.809)	-0.014 (0.051)	-4.666 (1.662)	0.378 (0.227)	2.274 (1.373)	0.053 (0.070)	0.306	3.894 [0.001]
Austria	-0.095 (0.987)	-0.252 (0.203)	0.562 (0.824)	0.053 (0.125)	1.252 (1.367)	0.314 (0.226)	-1.745 (1.234)	0.070 (0.161)	0.213	1.112 [0.357]
Belgium	2.251 (0.858)	0.012 (0.047)	-0.803 (0.559)	-0.083 (0.081)	-0.258 (0.881)	0.085 (0.044)	0.239 (0.574)	-0.007 (0.079)	0.470	1.971 [0.071]
Canada	-1.971 (1.379)	-0.065 (0.264)	1.650 (1.586)	0.109 (0.042)	-1.340 (1.576)	-0.001 (0.391)	0.519 (2.157)	0.042 (0.062)	0.509	3.044 [0.007]
Denmark	-0.161 (0.800)	-0.122 (0.091)	0.735 (0.612)	0.012 (0.032)	2.457 (0.984)	0.208 (0.148)	-1.367 (0.731)	-0.062 (0.057)	0.329	0.867 [0.520]
Finland	-5.212 (3.560)	-0.404 (0.255)	3.859 (2.866)	0.140 (0.172)	6.897 (7.008)	-0.579 (0.719)	1.319 (4.568)	-0.617 (0.246)	0.329	2.699 [0.022]
France	2.915 (0.731)	0.140 (0.115)	-0.868 (0.560)	-0.156 (0.072)	-0.396 (1.136)	0.104 (0.136)	0.330 (0.868)	0.025 (0.076)	0.466	1.467 [0.191]
Germany	0.786 (0.841)	-0.136 (0.131)	0.062 (0.578)	0.039 (0.100)	1.069 (0.902)	0.321 (0.170)	-0.723 (0.737)	-0.095 (0.096)	0.414	0.807 [0.566]
Hong Kong	0.542 (1.521)	-0.356 (0.169)	0.605 (1.852)	0.167 (0.078)	1.289 (2.971)	0.394 (0.307)	-3.629 (2.954)	-0.096 (0.124)	0.199	2.569 [0.020]
Ireland	8.494 (2.546)	0.465 (0.229)	-9.921 (3.333)	-0.316 (0.112)	2.012 (4.183)	-0.202 (0.619)	-2.676 (5.726)	0.017 (0.205)	0.364	2.362 [0.035]
Italy	-2.814 (8.375)	0.057 (0.854)	1.600 (5.887)	0.219 (0.367)	4.152 (8.552)	0.726 (0.712)	-3.668 (7.088)	-0.195 (0.292)	0.566	0.292 [0.936]
Japan	1.934 (1.138)	-0.541 (0.247)	-0.569 (0.739)	0.063 (0.081)	0.940 (1.272)	0.472 (0.243)	0.229 (0.772)	-0.200 (0.094)	0.571	2.321 [0.034]
Netherlands	0.517 (0.422)	0.028 (0.091)	0.214 (0.442)	-0.010 (0.066)	-0.257 (0.486)	0.127 (0.110)	-0.485 (0.620)	0.049 (0.070)	0.553	1.196 [0.310]
New Zealand	-2.355 (5.068)	-0.081 (0.245)	12.347 (10.864)	-0.460 (0.367)	8.117 (6.480)	0.553 (0.308)	-36.321 (19.142)	1.265 (0.665)	0.138	1.596 [0.165]
Norway	-2.118 (1.718)	-0.087 (0.099)	2.096 (1.206)	0.057 (0.075)	-0.272 (2.361)	0.079 (0.124)	-0.037 (1.457)	0.015 (0.102)	0.271	0.824 [0.552]
Singapore/Malaysia	4.999 (1.070)	-0.675 (0.259)	-5.053 (1.480)	0.023 (0.065)	-3.190 (2.187)	0.827 (0.311)	1.116 (2.652)	0.057 (0.094)	0.346	4.021 [0.001]
Spain	2.261 (1.272)	-0.084 (0.028)	-0.035 (1.179)	-0.061 (0.066)	1.546 (1.421)	0.078 (0.040)	-2.380 (1.232)	-0.037 (0.097)	0.374	3.421 [0.003]
Sweden	-1.817 (1.218)	-0.150 (0.088)	0.944 (0.673)	0.162 (0.071)	1.427 (1.654)	0.259 (0.127)	-2.038 (0.711)	0.042 (0.110)	0.308	2.137 [0.051]
Switzerland	0.571 (0.673)	-0.177 (0.137)	0.088 (0.321)	0.093 (0.080)	-0.435 (0.804)	0.801 (0.220)	-0.561 (0.419)	-0.017 (0.099)	0.571	2.429 [0.028]
United Kingdom	-0.232 (0.652)	-0.108 (0.120)	1.088 (1.012)	0.080 (0.062)	1.623 (0.922)	0.342 (0.239)	-2.613 (1.156)	-0.083 (0.095)	0.506	1.249 [0.283]
United States	-2.630 (1.219)	-0.009 (0.079)	2.886 (1.041)	-0.017 (0.028)	2.613 (1.366)	0.072 (0.097)	-3.150 (1.261)	0.075 (0.029)	0.742	4.333 [0.000]

Time-series regressions begin in January 1976 or later depending on data availability. Returns are available from January 1976 except for Finland, Ireland and New Zealand (who begin in February 1988). The returns are regressed on one factor (first panel) or two factors (second panel). The first factor is the excess MSCI world return. The second factor is the excess return on a portfolio of 10 currency investments. The models regress the country return on the factor and the factor times each attribute. The three attributes are: the first lag of the local dividend yield, the 15th lag of the ratio of per capita GDP to OECD GDP and first lag the long-term interest rate. Per capita GDP to OECD is the ratio of per capita annual GDP calculated in U.S. dollars for country to per capita annual OECD calculated in U.S. dollars. The long-term interest rate in Spain is only available from March 1978. No intercept is included in the regression. Tests are presented that exclude the the factor times each attribute.

Table 5

Tests of asset pricing models using national attributes 1976:01–1993:01 (205 observations)

Country	F-test exclude intercept	F-test exclude Z	F-test exclude A
One factor model			
Australia	0.294 [0.588]	2.569 [0.028]	0.895 [0.445]
Austria	0.228 [0.633]	2.273 [0.049]	3.171 [0.026]
Belgium	0.363 [0.548]	1.311 [0.261]	4.066 [0.008]
Canada	0.005 [0.941]	1.126 [0.348]	1.185 [0.316]
Denmark	0.116 [0.734]	1.965 [0.085]	1.123 [0.341]
Finland	2.880 [0.095]	2.410 [0.048]	1.917 [0.138]
France	0.000 [0.985]	0.427 [0.829]	3.220 [0.024]
Germany	0.005 [0.945]	1.131 [0.345]	1.496 [0.217]
Hong Kong	4.067 [0.045]	0.629 [0.678]	0.698 [0.555]
Ireland	0.089 [0.766]	0.238 [0.945]	2.218 [0.091]
Italy	1.261 [0.271]	0.904 [0.493]	0.822 [0.493]
Japan	0.563 [0.454]	0.096 [0.993]	2.176 [0.092]
Netherlands	2.758 [0.098]	0.582 [0.714]	2.048 [0.108]
New Zealand	0.621 [0.434]	2.459 [0.044]	0.760 [0.521]
Norway	0.221 [0.639]	0.581 [0.715]	0.080 [0.971]
Singapore/Malaysia	1.539 [0.216]	0.400 [0.849]	1.164 [0.325]
Spain	0.008 [0.929]	0.836 [0.526]	1.222 [0.303]
Sweden	0.820 [0.366]	2.703 [0.022]	2.039 [0.110]
Switzerland	0.081 [0.777]	1.873 [0.101]	2.678 [0.048]
United Kingdom	1.269 [0.261]	0.089 [0.994]	2.140 [0.096]
United States	0.202 [0.653]	0.384 [0.859]	2.819 [0.040]

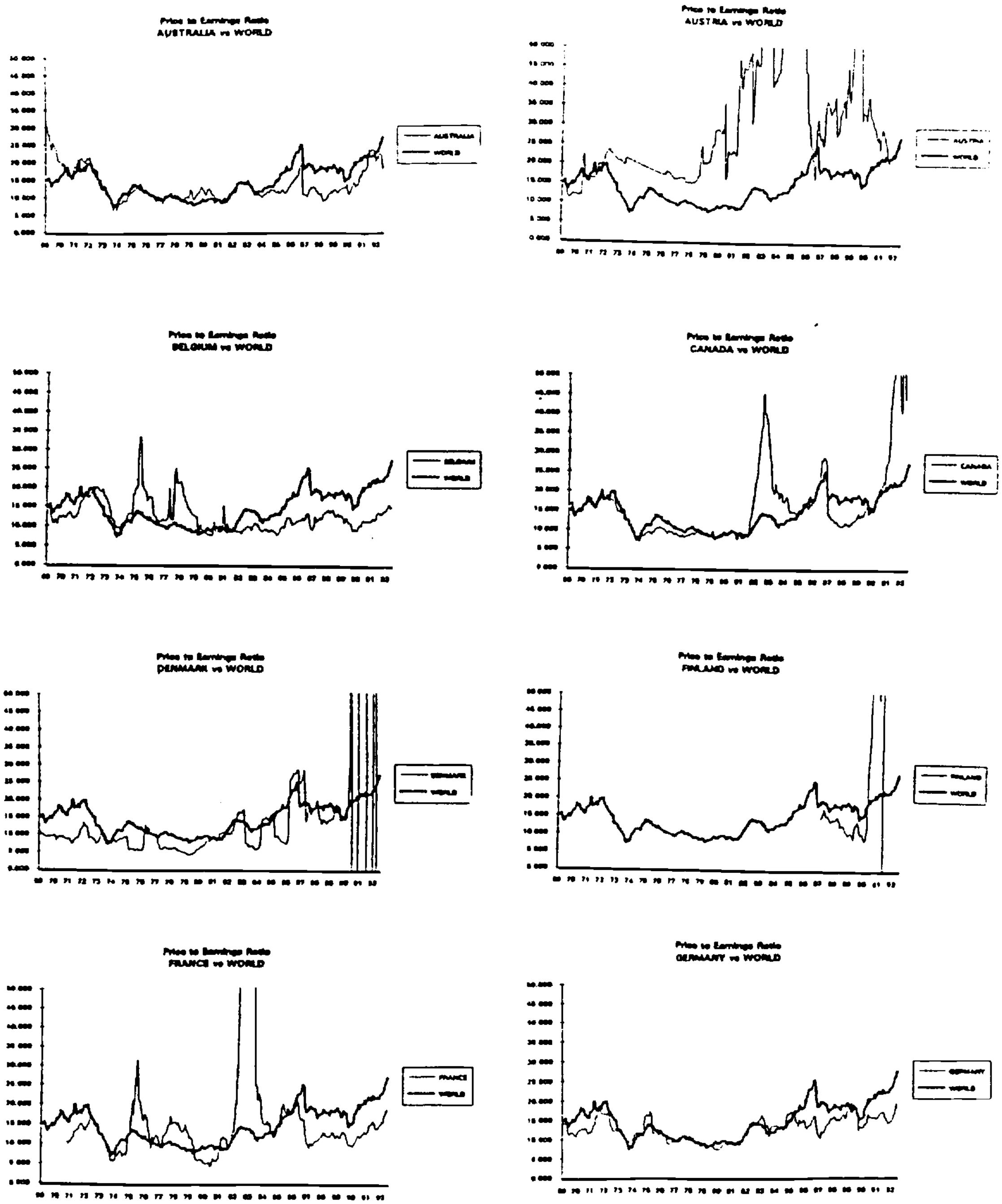
Table 5 (continued)

Country	F-test exclude intercept	F-test exclude Z	F-test exclude A
Two factor model			
Australia	0.670 [0.414]	2.952 [0.014]	0.707 [0.549]
Austria	0.558 [0.456]	2.683 [0.023]	2.165 [0.094]
Belgium	0.945 [0.332]	0.292 [0.917]	2.834 [0.039]
Canada	0.037 [0.847]	0.714 [0.613]	1.413 [0.240]
Denmark	0.030 [0.862]	1.443 [0.210]	2.706 [0.047]
Finland	3.045 [0.087]	1.643 [0.166]	2.616 [0.061]
France	0.053 [0.818]	0.625 [0.681]	2.046 [0.109]
Germany	0.296 [0.587]	1.104 [0.359]	1.413 [0.240]
Hong Kong	3.580 [0.060]	0.545 [0.742]	0.949 [0.418]
Ireland	0.285 [0.595]	0.369 [0.868]	2.320 [0.080]
Italy	1.266 [0.272]	0.902 [0.496]	0.856 [0.478
Japan	0.636 [0.426]	0.361 [0.875]	1.877 [0.135]
Netherlands	3.835 [0.052]	0.183 [0.969]	2.429 [0.067]
New Zealand	0.001 [0.970]	3.786 [0.005]	1.183 [0.325]
Norway	0.314 [0.576]	0.685 [0.636]	0.028 [0.994]
Singapore/Malaysia	1.248 [0.265]	0.376 [0.865]	1.522 [0.210]
Spain	0.189 [0.664]	0.671 [0.646]	1.224 [0.303]
Sweden	1.168 [0.281]	2.802 [0.018]	2.308 [0.078]
Switzerland	0.998 [0.319]	1.062 [0.383]	2.486 [0.062]
United Kingdom	0.726 [0.395]	0.191 [0.966]	1.800 [0.148]
United States	1.025 [0.313]	1.879 [0.100]	2.188 [0.091]

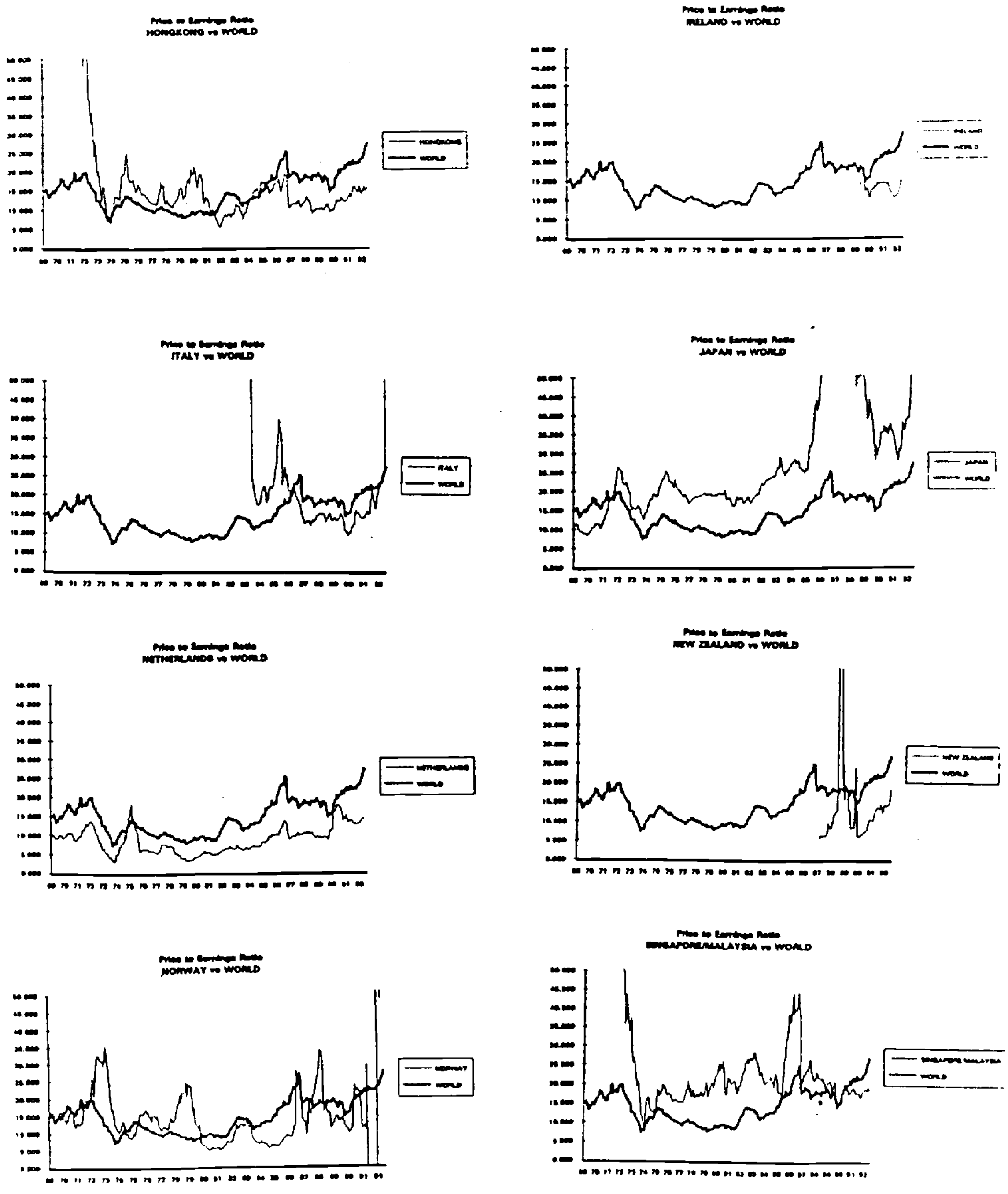
A model is estimated with the world risk factor(s) and the product of the world risk factor(s) and the lagged country attributes. The first risk factor is the excess return on the MSCI world market portfolio. The second risk factor is the excess return on holding a trade-weighted portfolio of 10 countries currencies invested in local eurodeposits. Three exclusion tests are presented: (1) exclude an intercept, (2) exclude the lagged world information [the lagged MSCI world return, the lagged change in a portfolio of 10 currency returns, the lagged MSCI world dividend yield, the lagged spread between the 90-day and 30-day Eurodollar rates (based average daily rates) and the 30-day Eurodollar rate (quote last day of previous month)], (3) exclude the lagged country attributes [dividend yield, ratio of GDP to OECD GDP and long-term interest rates].

Appendix Figure 1

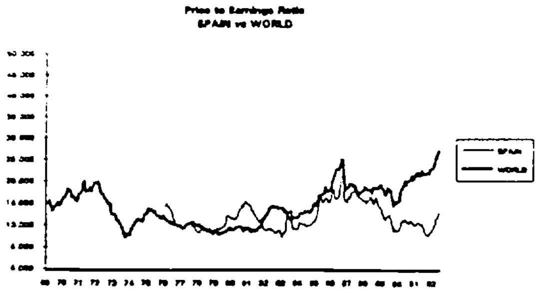
Price to earnings ratios

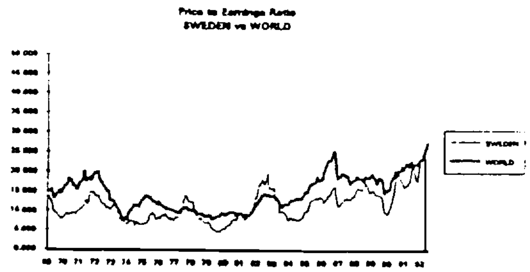


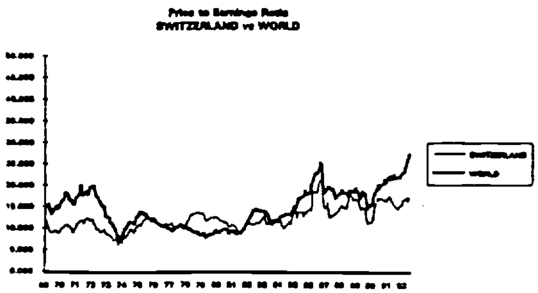
Appendix Figure 1 (continued)

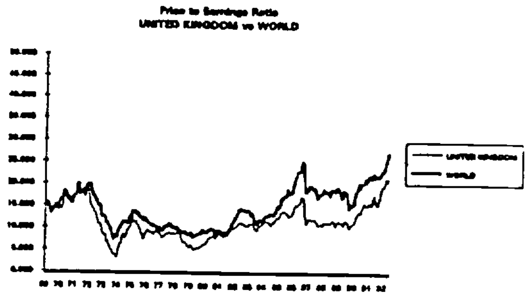


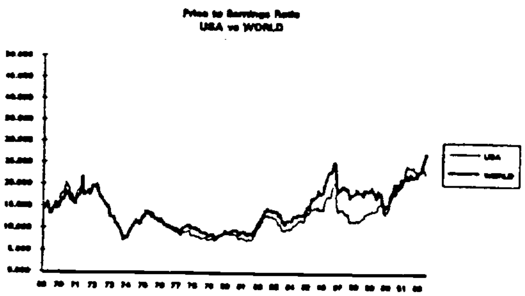
Appendix Figure 1 (continued)





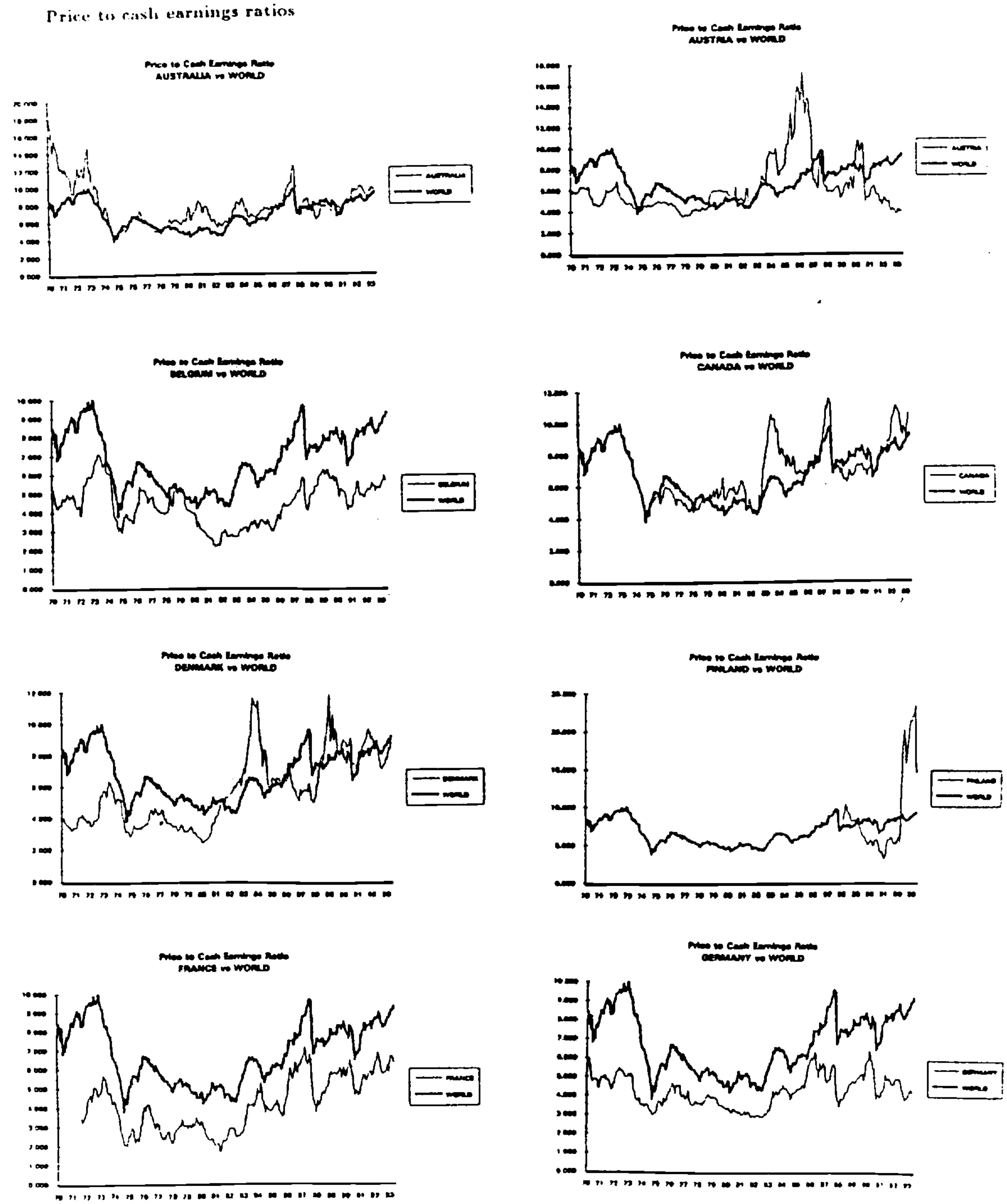




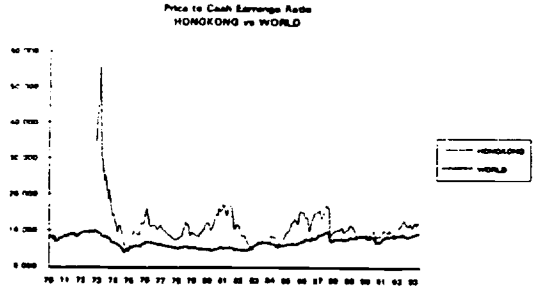


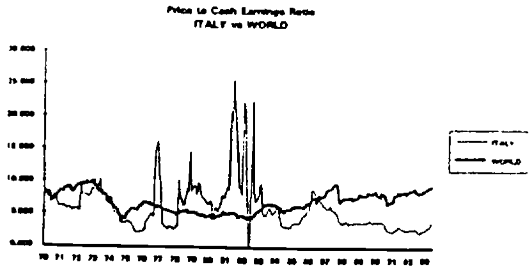
Appendix Figure 2

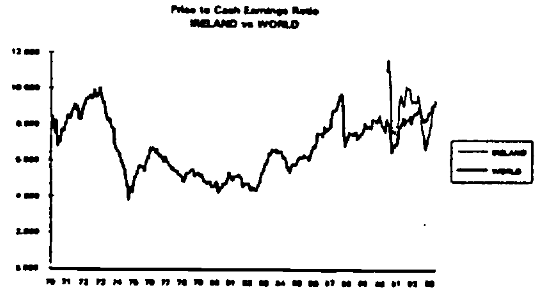
Price to cash earnings ratios

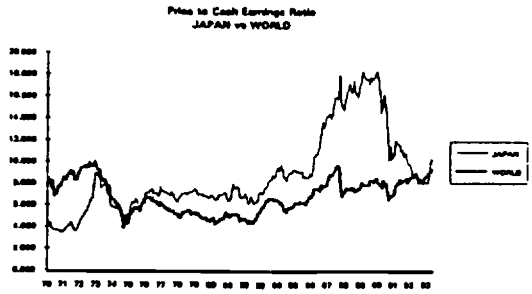


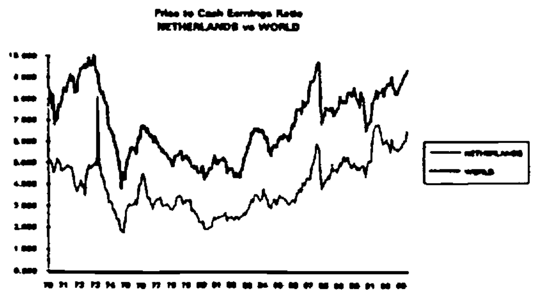
Appendix Figure 2 (continued)

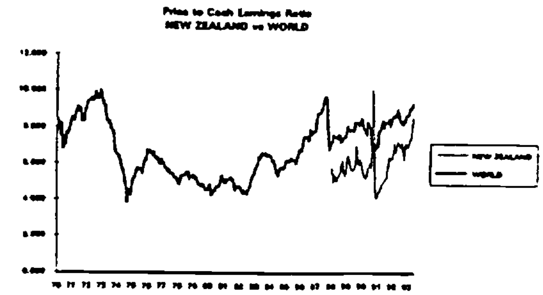


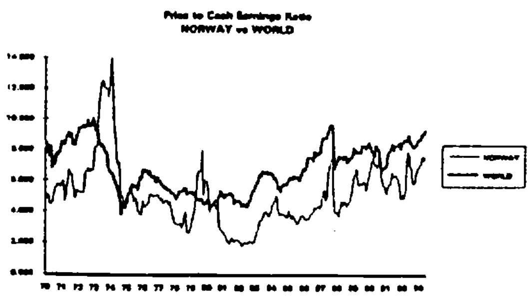


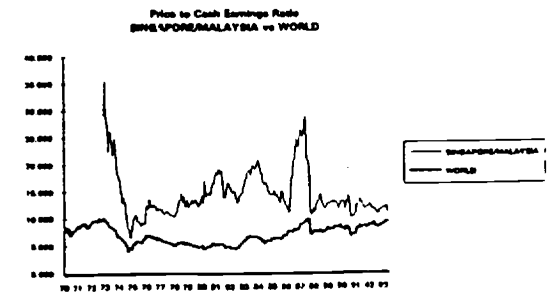




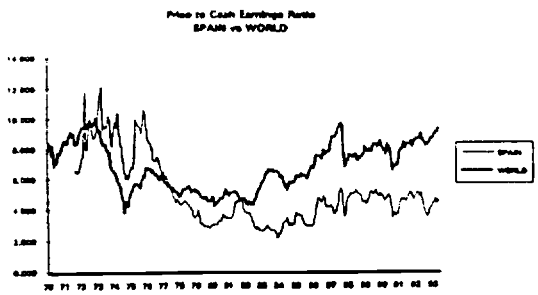


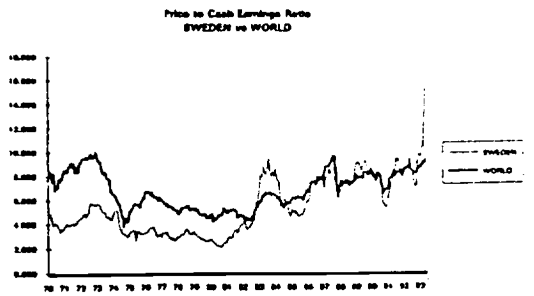


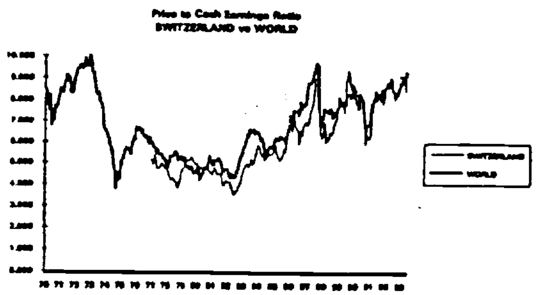


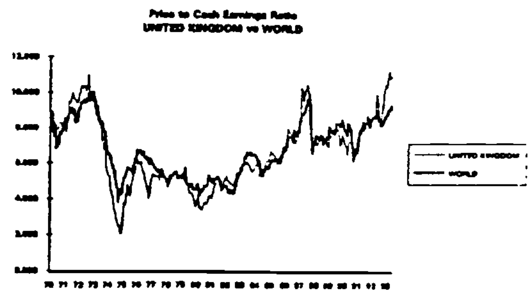


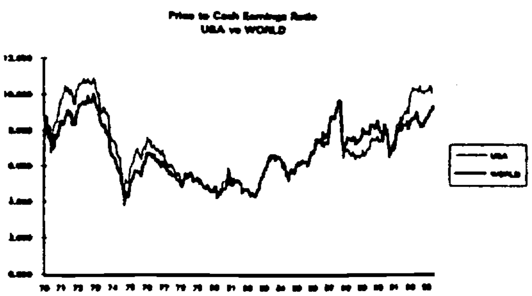
Appendix Figure 2 (continued)





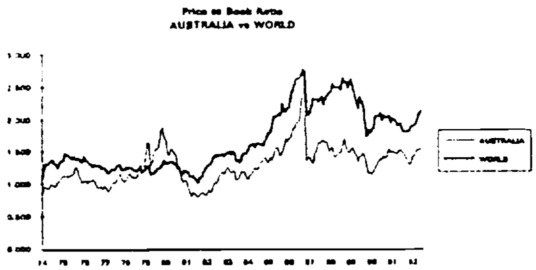


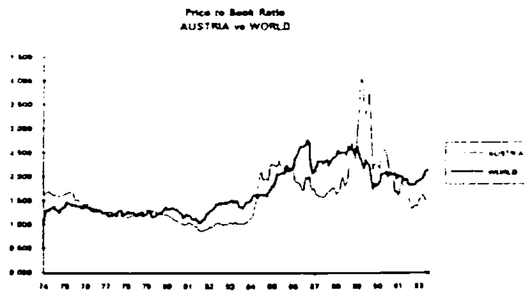


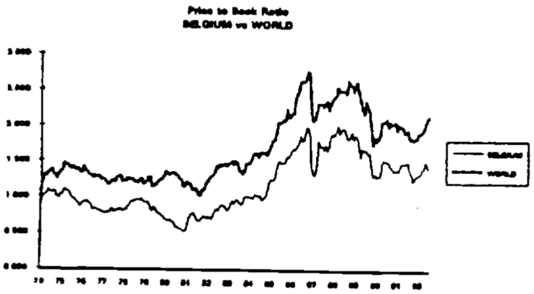


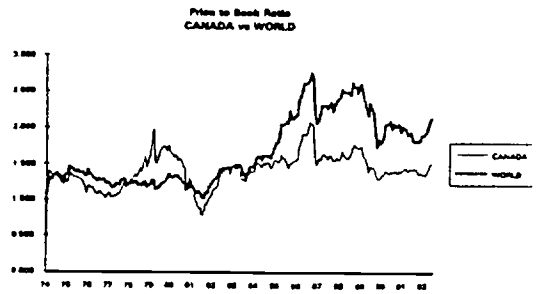
Appendix Figure 3

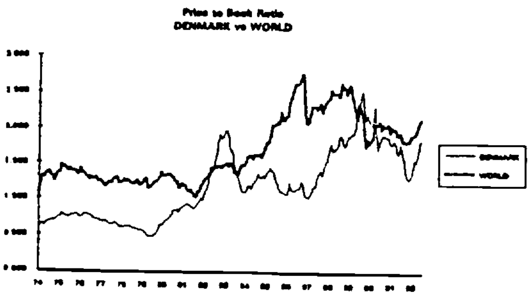
Price to book value ratios

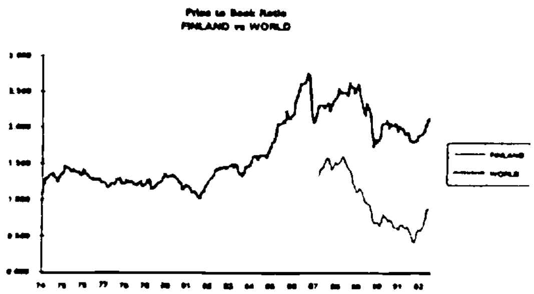


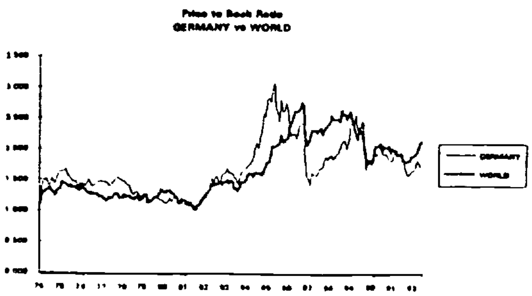


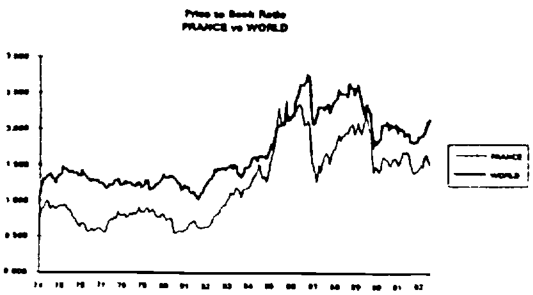




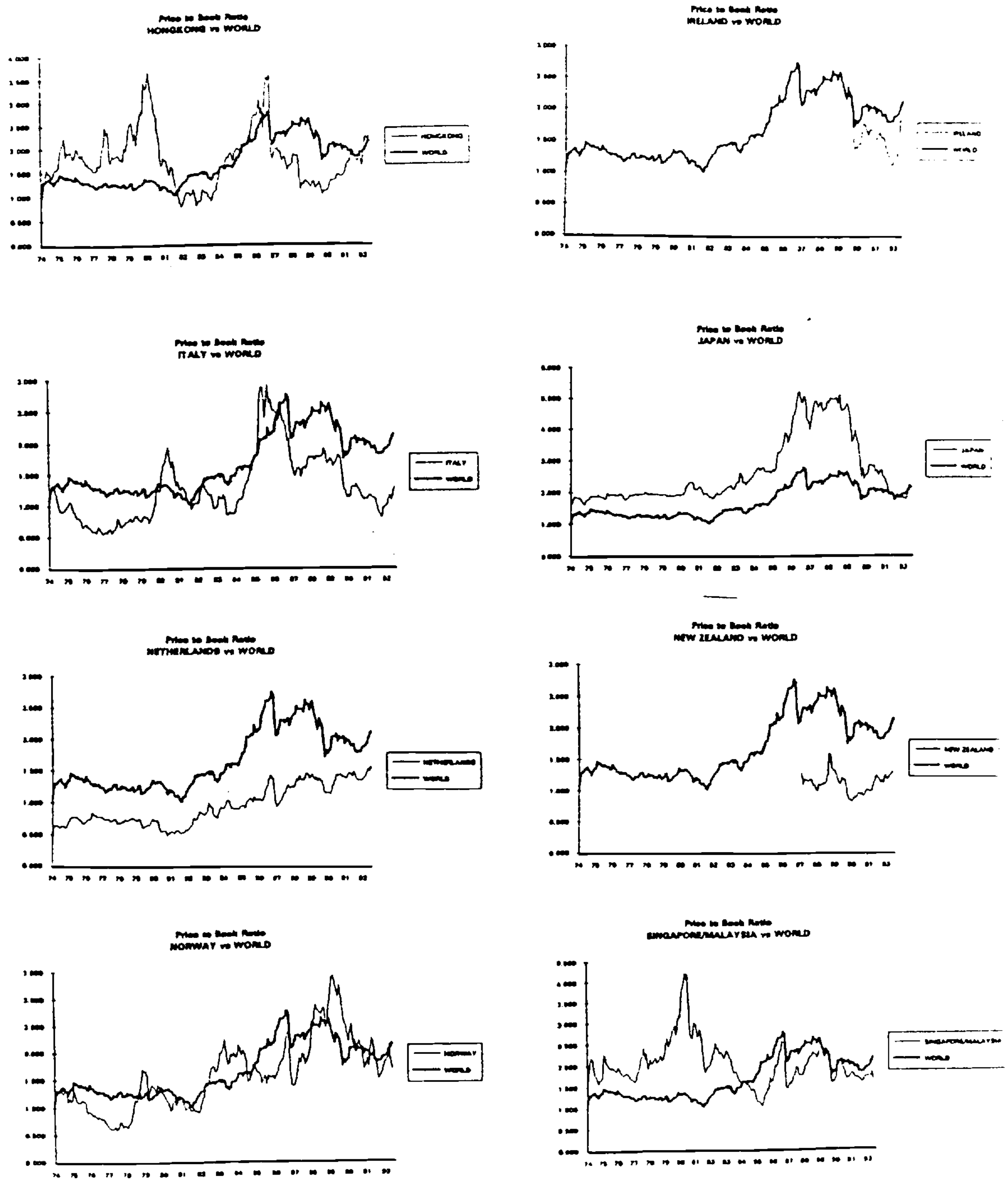




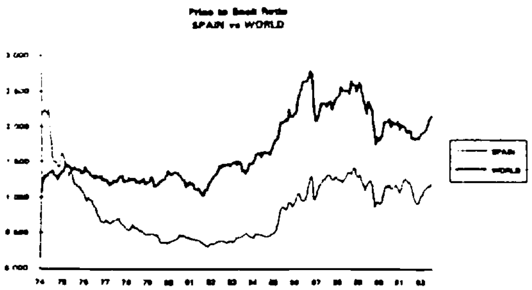


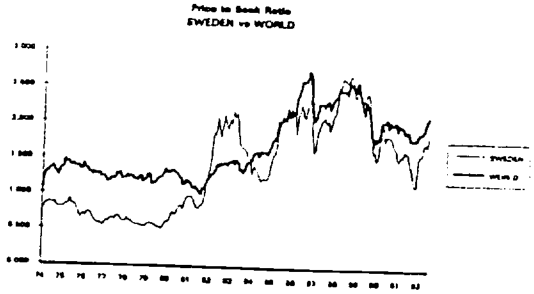


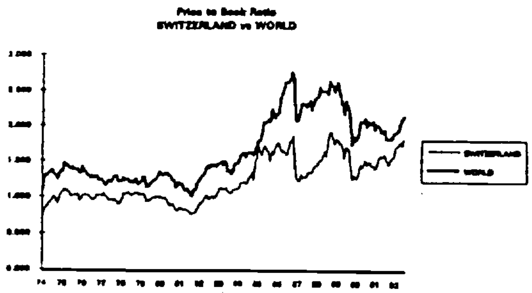
Appendix Figure 3 (continued)

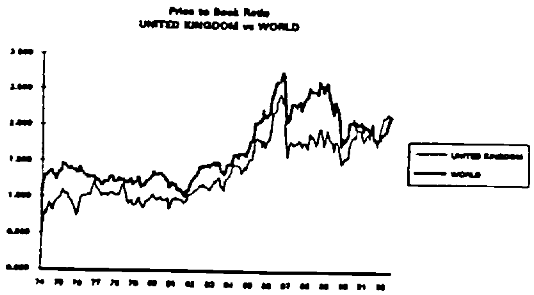


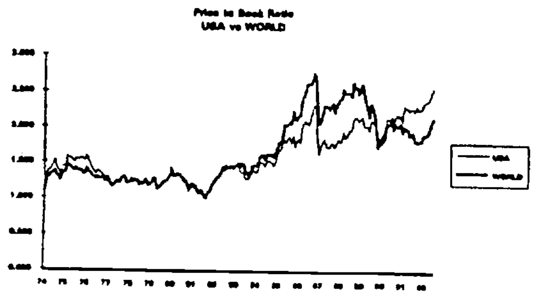
Appendix Figure 3 (continued)





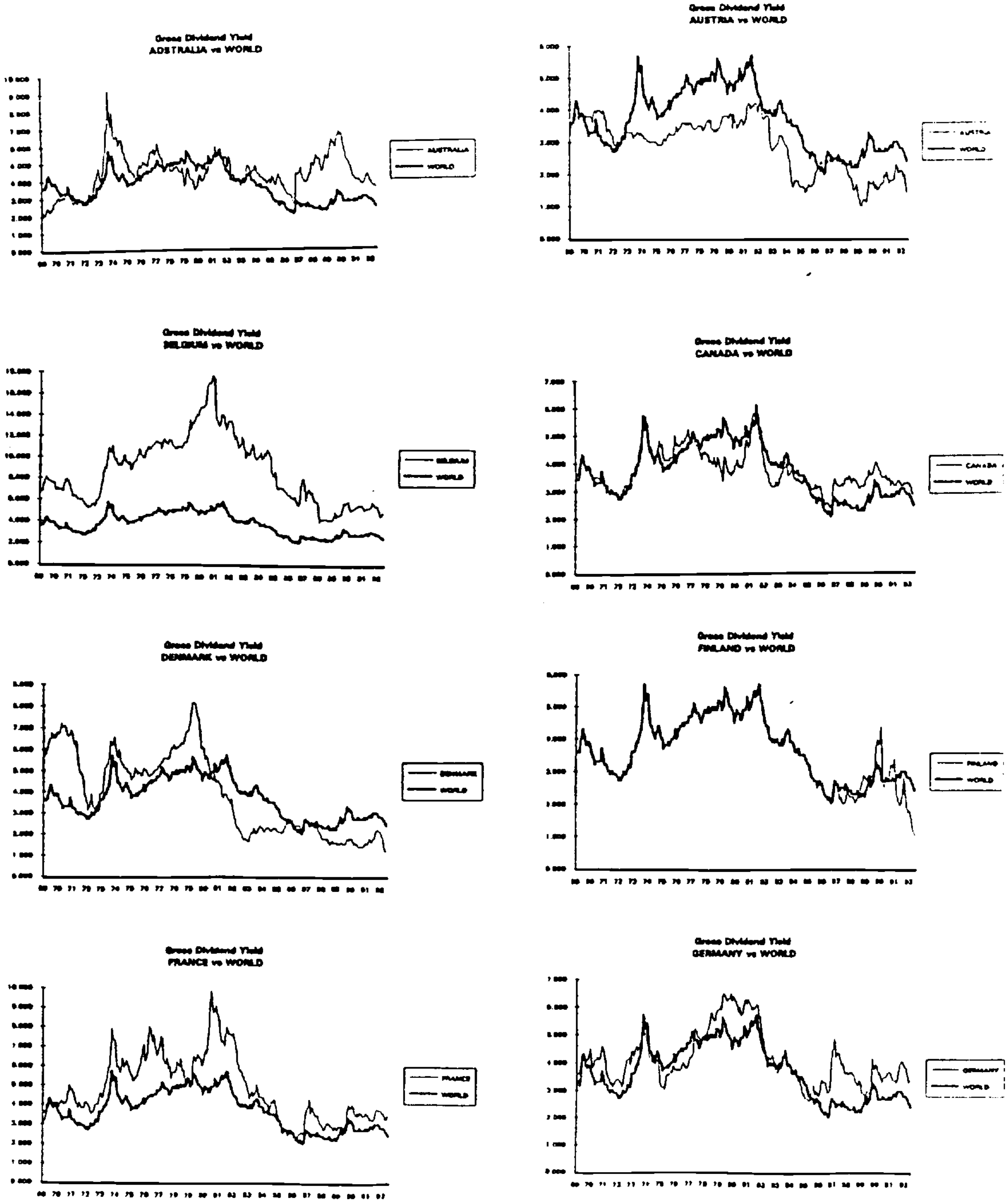




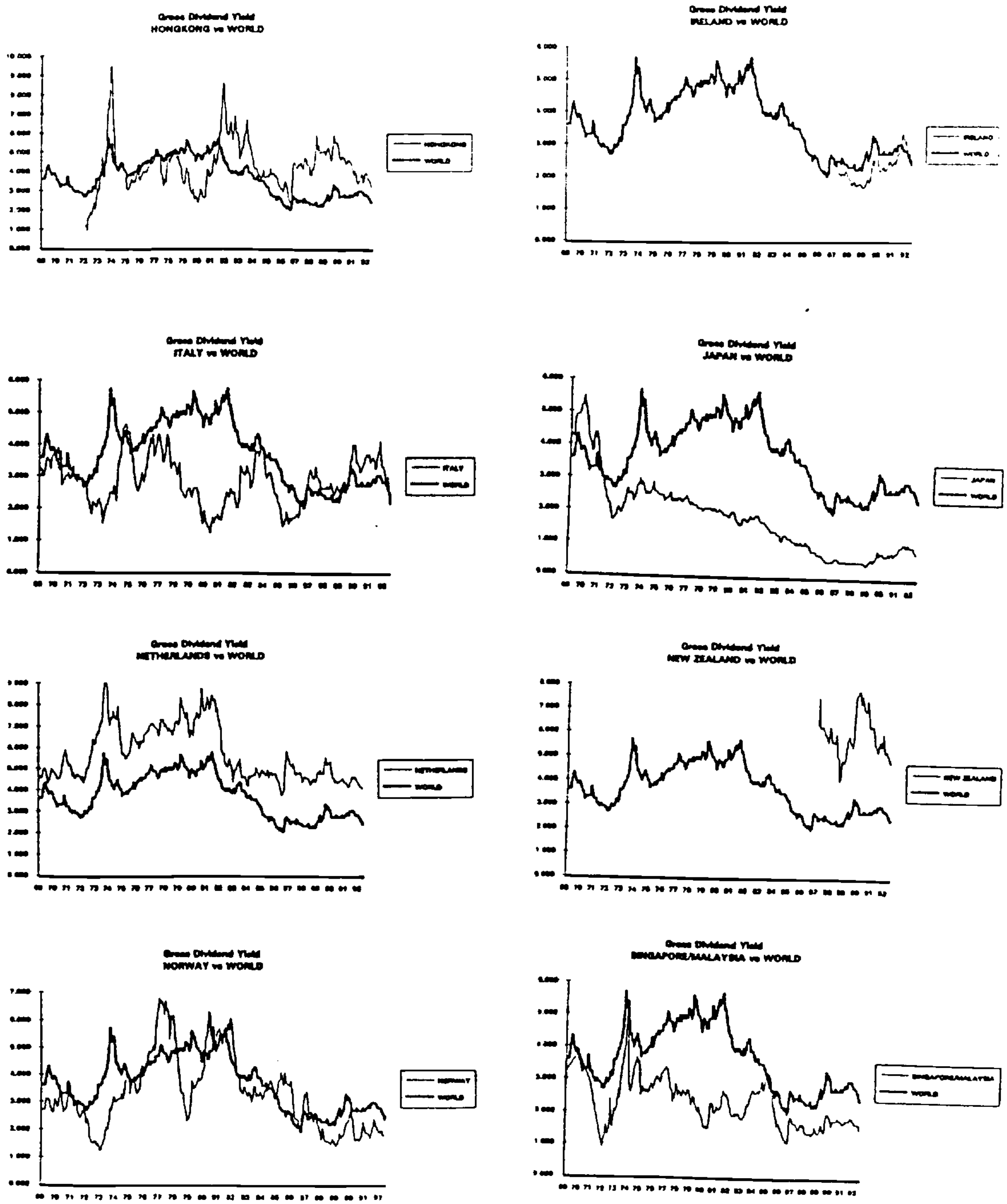


Appendix Figure 4

Dividend to price ratios



Appendix Figure 4 (continued)



Appendix Figure 4 (continued)