THE COST OF EQUITY CAPITAL IN AUSTRALIA: WHAT CAN WE LEARN FROM INTERNATIONAL EQUITY RETURNS?

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ABSTRACT

This paper reviews some evidence on the cost of equity capital in Australia and overseas. Two conventional approaches yield conflicting results. A third approach, based on the International Asset Pricing Model, starts from the premise that Australian equities are part of a world market, and hence must be priced in a manner that reflects their risk in an international context. There is evidence that Australian stockmarket returns show more risk than would be justified by the relatively low debt/equity ratios of Australian companies. Furthermore, real earnings in Australia appear to have been relatively risky when measured against the benchmark of world earnings. If there is more risk in the Australian economy, it is possible that the cost of equity is higher in Australia than overseas.

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1. INTRODUCTION

Recent policy discussions in Australia have focused on the cost of capital faced by Australian firms. The real cost of capital depends both on the real cost of debt to firms and the real cost of equity, as well as the mix by which corporate activities are financed.[1] This paper focuses on the cost of equity, and uses data for national stockmarkets to investigate the evidence on the cost of equity in Australia and overseas.[2]

Three approaches can be used to investigate the cost of equity. The first two, relying on realised rates of return over long periods, and earnings/price ratios, yield conflicting results, though there are reasons for preferring the results of the latter method which suggest that the cost of equity is higher in Australia. The third method considers the risk properties of equities which might influence the way that they are priced. It starts from the premise that Australian equities are part of a world market, and hence must be priced in a manner that reflects their risk in an international context. For its theoretical framework, this method draws on the Capital Asset Pricing Model (CAPM), the Arbitrage Pricing Theory (APT) model, and their extensions into an international framework. I find some tentative evidence that Australian stockmarket returns show more risk than would be

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[1] Note that references to the "cost of capital" in this paper correspond more closely to the standard corporate finance definition, which is sometimes also referred to as the "cost of funds". Other papers, especially in the tax policy literature (e.g. Ryan, 1990) adopt a "user cost of capital" approach which begins with the cost of funds and then also includes the effect of depreciation allowances and investment tax credits. In the corporate finance literature, these last two adjustments would typically be made at the cash flow level, before applying the cost of funds as the discount rate. McCauley and Zimmer (1989, p. 6) and Hodder (1991, p. 87) provide further discussion of these points.

[2] See the Australian Manufacturing Council (1990) and Irvine (1991) for conflicting recent views. Another recent study, by Pappas Carter Evans and Koop, is discussed in the *Australian Financial Review* (27/3/91, p. 52) but at the time of writing a paper was not available, so that approach will not be discussed in this study.

justified by the relatively low debt/equity ratios of Australian companies. Furthermore, I provide other evidence from national accounts data which suggest that real earnings in Australia may be relatively risky when measured against the benchmark of world earnings.

The paper is organized as follows. Section 2 presents the data used in this study. In Section 3, a number of methods of calculating the cost of equity are presented, including a brief survey of the relevant literature on international asset pricing. Section 4 contains estimates on the cost of equity based on realised rates of return and earnings/price ratios. In Section 5, a simple model of international asset pricing is estimated for a number of countries, and the implications for the cost of equity in Australia are discussed. Section 6 considers whether or not this financial market risk has its origin in earnings risk in the real economy. Section 7 provides further discussion of the asset pricing models that this paper has estimated, and a brief discussion on the effect of personal taxes. Finally, Section 8 suggests some implications from this research.

2. DATA - STOCKMARKET RETURNS

The stock price data used in this study are the national stockmarket indices produced by Morgan Stanley Capital International (MSCI).[3] The indices include the largest companies in each of the national markets, and should be a very good proxy for the total market. The MSCI index for Australia contains around sixty stocks, with the composition changing over time with takeovers, delistings, and as market capitalisations change. They account for the reinvestment of dividends on a monthly basis, and thus are indices for total returns, not just price movements.[4]

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[3] I am grateful to Morgan Stanley for providing the data.

[4] A description of the database reads as follows: "Indices with dividends reinvested constitute an estimate of the total return arrived at by reinvesting one twelfth of the trailing twelve month yield reported at every month end." The dividend adjustment may be slightly imperfect, but this will not be a major factor over the long run, and will still be a fairly good short run approximation. Indeed, some studies that estimate CAPM-type models across countries use only price data and ignore the effect of dividends.

The study uses end-month data from December 1969, when the MSCI database begins, until December 1990. Monthly returns data thus begin in January 1970. The countries included in the study are Australia, Canada, France, West Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States. The MSCI series for the World Index is also used. Selection of countries was based largely on the size of the national markets, and on the availability in the MSCI database. The most notable omissions are probably South Africa and New Zealand, which are similar to Australia in their dependence on commodities, but were unavailable on the MSCI database.

Table 1 provides some summary measures of returns in different countries for the period December 1969 to December 1990.[5] To enable comparison across countries, the accumulation indices were converted into a common currency, the Special Drawing Right (SDR) of the International Monetary Fund. Since the SDR is a weighted average of five major currencies, the indices in SDR terms will be a reasonable approximation of the returns available to a representative world investor.

The data indicate that there have been significant divergences in returns in different markets. The Japanese and Hong Kong markets have been star performers, while markets like Australia, Italy and the US have lagged. Australia's relative performance will be discussed in Section 4(a): however, it should be noted that the data period starts around the time of a metals-driven boom. Apart from Hong Kong, Australian returns show the greatest volatility. It is also apparent that the World Index has a lower variance than all individual national indices, reflecting the effects of diversification.

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[5] Because exchange rate data were not available for Hong Kong, it could not be included in the analysis below, but the summary statistics are provided here for interest.

Table 1: Summary Statistics, SDR Returns, Dec 1969-Dec 1990

Country	Standard Deviation of Monthly Returns[6] (per cent)	Compound Annual Return[7] (per cent)	Dec 1990 Index Value (Dec 1969 = 100)
Australia	8.30	5.80	326.5
Canada	5.84	8.27	530.2
France	6.74	10.52	817.5
West Germany	5.74	10.37	794.8
Hong Kong	11.78	16.78	2598.5
Italy	7.34	4.62	258.4
Japan	5.93	17.14	2773.4
Netherlands	5.14	13.38	1397.9
Sweden	6.26	13.55	1442.4
Switzerland	5.22	9.69	698.1
United Kingdom	7.23	11.61	1003.7
United States	5.01	8.22	524.9
World	4.13	9.76	707.5

Because of the selective nature of the stocks included in the MSCI database, the MSCI series for Australia and the US were compared with other accumulation indices for these countries: for Australia, with the All Ordinaries and Fifty Leaders indices produced by the Australian Stock Exchange, and for the US, with the series produced by Ibbotson Associates (1990). In each case, there was extremely high correlation in the returns series, so it seems reasonable to conclude that the MSCI series are good proxies for individual national markets, and by extension, that they provide a good proxy for world equity market returns.

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[6] Calculated as the standard deviation of the difference in logs of the indices.

[7] Calculated as the geometric growth rate from starting-values and end-values of the indices.

3. THE COST OF EQUITY - THEORY

(a) Average Realised Returns

According to one view, we need only look at average realised returns on stocks over a long period of time to get a measure of required returns on equity. This view starts with the observation that *ex post* realised returns are equal to *ex ante* expected returns plus an unexpected component. But, according to the theory of rational expectations, this unexpected component should have an expectation of zero, so over a sufficiently long time period it should average to zero. Thus, average historical returns will be a good proxy for the required return on equity.

(b) Earnings/Price Ratios

However, *ex post* returns are not the only way of investigating required rates of return. Indeed, many studies shy away from *ex post* returns, and instead use approaches based on the market valuation of earnings or dividends.[8] According to these approaches, it is better to take observed earnings/price (E/P), or dividend/price ratios, since these actually reflect the way that the market has discounted an expected set of future cash flows.

The earnings yield approach is based on the assumption that a company pays out all its earnings in perpetuity, and has the advantage of lifting the corporate veil between earnings retained in the company and those paid out as dividends. Under the assumption that E_1 are the after-tax earnings available either for payout as dividends or for reinvestment, that g_e is the constant rate of growth in earnings that could be maintained (with no reinvestment of earnings) in perpetuity, and that r is the appropriate discount rate, we can derive the following formula for the value of a share:

$$P_0 = E_1/(r-g_e) \qquad (1)$$

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[8] The dividend discount model is similar to the earnings approach, and gives similar conclusions, so I concentrate on the earnings yield approach.

which implies:

$$r = E_1/P_0 + g_e \qquad (2)$$

That is, the cost of equity is equal to the prospective earnings yield (E_1/P_0), plus the expected growth of earnings. Note that the earnings growth rate to be used is the rate that would be expected assuming full payout of earnings, so it will be lower than historical earnings growth rates which are boosted by earnings that have been retained in the firm. Note also that the earnings measure used should represent true economic earnings, and not a measure that has been affected by arbitrary accounting decisions.

The issue of whether the formula given by equation 2 is a nominal or a real discount rate is rarely discussed, but some studies have treated E/P ratios differently. For example, both McCauley and Zimmer (1989, p. 27) and the Australian Manufacturing Council (1990, p. 89) assume that E/P ratios correspond to the real cost of equity, while Irvine (1991, p. 15) treats E/P ratios as a measure of the nominal cost of equity.

It is fairly obvious that the answer to this question will depend on whether g_e is a nominal or a real growth rate. Since real earnings growth rates are usually used, it is clear that E/P ratios are a measure of the **real** cost of equity. That is, a stock can be thought of as an indexed security in many senses.[9]

However, a slight offsetting factor is that the E/P ratios normally quoted use earnings in the most recent period (E_0), instead of expected earnings (E_1), which will generally be higher than previous earnings, as a result both of inflation and real earnings growth. Assuming growth in the current period due both to real growth in the economy g_y,[10] and to the inflation rate π, we have:

$$r = E_0*(1 + g_y + \pi)/P_0 + g_e \qquad (3)$$

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[9] This view is supported by Carmichael (1978, pp. 94-95).

[10] I use g_y as a simplification for the measured growth of earnings, to distinguish it from g_e in equation 2, which is the expected growth of earnings under the full payout assumption.

That is, a small adjustment should ideally be made to E/P ratios that have been calculated using retrospective earnings, but E/P ratios should still be thought of as proxies for the real cost of equity.

(c) The Capital Asset Pricing Model

The two previous measures for the cost of equity say nothing about why required rates of return might vary across stocks or countries. However, another method of estimating the cost of equity is the class of asset pricing theories, starting with the CAPM, and continuing with its extension into the international framework, which attempts to explain **why** different securities yield different rates of return.[11] I begin discussion of this literature by reviewing the domestic CAPM.

(i) The Domestic CAPM

According to the standard one-factor CAPM for a domestic market, the risk of a security can be split into two components: risk that is related to the overall market, and risk that is independent of the overall market. Since the latter can be diversified away in a portfolio, but the former remains even in a large portfolio, only market risk is rewarded or priced. It can then be shown that the required return on a security depends on its "beta" (β), which is defined as the expected covariance of that security's return (R_i) with the market return (R_m), divided by the expected variance of the market return. In practice, with R_f as the risk free rate of return, beta is estimated by estimating the following equation:

$$R_{it} - R_{ft} = a_i + b_i*(R_{mt} - R_{ft}) + error_{it} \qquad (4)$$

According to the CAPM, a security with a high beta will have a high required rate of return. A security's beta will depend on two factors, the risk of the cashflows that the underlying asset generates, and the degree of leverage of the firm. Since additional debt makes the returns to equity more risky, the observed beta for any firm is an increasing function of the company's leverage. When estimating the cost of equity for a company, one

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[11] Much of the analysis can also be thought of in terms of the consumption-based CAPM.

usually starts with the observed "levered" (or equity) beta (β_l) of the security, and then uses the observed capital structure to "unlever" this beta, to get an "unlevered" (or asset) beta (β_u). If debt is riskless, the formula, known as the Hamada (1969) formula, is as follows:

$$\beta_u = \beta_l/(1 + (1-t_c)*B/S) \qquad (5)$$

where t_c is the corporate tax rate, and B/S is the firm's debt/equity ratio, at market values.

The unlevered beta reflects the underlying risk of the asset in question, irrespective of whether it is debt-financed or equity-financed (but after taking account of the tax treatment of the particular financing mix that is used). It can then can be used to "relever" under alternative financing assumptions, to obtain the beta, and the cost of equity that would eventuate under those different assumptions. For the present purposes, the important point is that it is the unlevered beta which is the primary input into the cost of equity (and the cost of capital) for each firm.

(ii) The IAPM

The theoretical literature on the pricing of securities in an international context begins with the work of Solnik (1974) who developed an International Asset Pricing Model (IAPM) similar to the CAPM for securities in a domestic market. Subsequently, Solnik (1983) also extended the Arbitrage Pricing Theory (APT) model into an international context (IAPT). In addition, Stulz (1981) has extended the model along the lines that the consumption-based CAPM extends the simple CAPM.

One problem with models of international asset pricing is that investors in different countries face different opportunity sets since national markets are denominated in different national currencies. If investors of different nationalities had similar consumption tastes and if purchasing power parity (PPP) held for exchange rates, the CAPM could easily be extended internationally. Regrettably PPP has proved to be a poor approximation to reality. However, Solnik (1983) shows that many of these problems would be reduced if exchange rates were determined (in an APT framework) by a

similar set of factors to those which determine security returns in each country.

Another problem is that the conditions for arbitrage that the CAPM or APT require are less likely to be observed across countries, because of a range of factors including restrictions on international investment, taxes, and informational problems. However, these factors are presumably becoming much less important as capital controls are removed and as new markets and instruments make international investment easier.

Despite these and other problems, this class of models of international asset pricing all retain the essential insight of the CAPM - that assets will be priced according to the risk that they add, whether it be to the market portfolio, or the level of consumption. Subject to some restrictive assumptions, the IAPM states, "the risk that is priced in the market is measured by the international beta of a security, that is, the beta relative to the world market portfolio hedged against exchange risk" (Solnik, 1988, p. 134). However, the world market portfolio, or any portfolio of risky foreign securities cannot be perfectly hedged against exchange risk, since only principal amounts can be perfectly hedged, leaving the uncertain return component subject to currency risk. As a result, in the analysis of Sections 4 and 5, I make the assumption that by analysing all returns in a common (and in a sense, average) currency like the SDR, I capture most of the insights of the IAPM.

So, to use the IAPM to get estimates of the cost of equity across countries, one must estimate betas for each country relative to the world market, then account for differences in gearing ratios and the tax advantage to debt, and if necessary, then add a factor for the currency risk of investing in each market.

4. MEASURES OF THE COST OF EQUITY

(a) Data on Average Realised Returns

Typically, researchers look at realised returns in a country by looking at excess returns for investments denominated in that country's currency. However, in an integrated world capital market all investors have access to all markets, and it seems appropriate to look at all excess returns in a single currency, such as the SDR. This becomes more important in a world where exchange rate movements can be large, and might significantly change the picture given by looking at each country in its home currency.

Table 2 presents some estimates of the equity premium for 11 countries and the world index over a 21-year period. Two measures are shown. First is a measure of the home currency equity premium over this period, derived by taking the average local currency stockmarket return for each country (from the geometric rate of return) and subtracting the average short-term interest rate over the same period.[12] Second, I calculate an SDR-denominated equity premium to a hypothetical world investor. This is derived by taking the average home currency return, then adding a factor for the average change in the SDR exchange rate over the period, and then subtracting an average world interest rate.[13]

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[12] Following Mehra and Prescott (1985), Ibbotson Associates (1990), and the CAPM literature, the equity premium is calculated using short-term interest rates rather than long-term (risky) ones. All interest rate data are from OECD *Main Economic Indicators* and the IMF *International Financial Statistics*. I thank Mark Rider and Michele Bullock for providing the data. For the world interest rate, I use an average of interest rates in the US, Japan, Germany, France, and the UK, using the currency weights of the SDR. The interest rates used for each country are slightly different, but an attempt was made to get a measure as close as possible to a three-month government security for each country. Where the rate is a money market or interbank rate there will be slight biases, but these will be fairly minor compared with the differences from other sources.

[13] For most countries the equity premium to the hypothetical world investor is similar to the conventional local currency equity premium. This reflects the fact that interest rate differentials in this period have largely been offset by exchange rate changes. Indeed, it is straightforward to show that if exchange rates are determined in an interest parity framework, the two definitions of the equity premium are exactly the same.

Table 2: Estimates of the Equity Premium, Dec 1969-Dec 1990

Country	Local Currency Returns	Short-term Interest Rate	Equity Premium in Local Currency	Average Exchange Rate Change	Equity Premium to World Investor
Australia	9.5	11.7	-1.9	-3.4	-1.9
Canada	10.5	9.3	1.1	-2.0	0.4
France	11.9	9.6	2.1	-1.3	2.5
Germany	7.5	6.8	0.6	2.7	2.3
Italy	9.4	12.5	-2.7	-4.4	-3.0
Japan	13.8	6.7	6.6	3.0	8.6
Netherlands	11.1	6.9	4.0	2.0	5.1
Sweden	15.9	9.2	6.2	-2.1	5.3
Switzerland	5.3	3.9	1.3	4.2	1.7
UK	14.7	10.3	4.0	-2.7	3.5
US	10.0	7.5	2.3	-1.7	0.3
World	9.8	7.9	1.8	0.0	1.8

The calculations indicate that the returns from investing in the Australian equity market over this 21-year period would not have exceeded the returns from investing in short term assets over the period, either for an Australian investor, or a world investor. **That is, the equity "premium" in Australia was actually negative in this period.** Most other countries show positive equity premia in SDR terms: my measure of the world equity premium over this period is 1.8 per cent.[14] The highest yielding stockmarket on this measure is Japan which shows an equity premium to local investors of 6.6 per cent, and one of 8.6 per cent to a world investor, reflecting the rise of the yen over this period.

[14] This is somewhat below the 6 or more per cent which various studies have found for longer time periods in a few different countries. This is largely attributable to the poor performance of most stockmarkets in the first half of the 1970s. It may be, however, that the required equity premium is now lower than earlier data suggest, as there is no reason why required rates of return might not have fallen over time. If so, this would be consistent with the literature, starting with Mehra and Prescott (1985), that is unable to explain the magnitude of historical equity premia by theoretical models of asset pricing.

The finding that Australia shows a negative equity premium over this period deserves further comment. If we used the Statex accumulation index (which is available only from December 1971) we would get a slightly higher growth rate for equities in the period for which both indices are available, though the overall conclusions would still be very similar. (Any differences may reflect a "small firm effect" since the Statex index has broader coverage than the MSCI index: however, if other countries have similar effects then this bias will exist there as well.) Alternatively, if we deflated the MSCI data by the average growth in the CPI since December 1969, real equity prices would show a very small increase over the period, though still significantly less than the real increases that other countries would show. This suggests that the weak performance of the Australian market is a fairly robust finding, at least for this period. Part of the reason for this weakness may be that the starting point was near a major peak in the Australian market associated with a metals boom. Any starting point will be somewhat arbitrary: other starting dates would give different, and sometimes higher, returns for the Australian market.

If a 21-year period is sufficiently long for errors in expectations to average to zero, the average realised returns in Table 2 provide measures of the required rate of return in each country. According to this rational expectations view, because Australian stocks have shown relatively low returns, they must have some other desirable properties that allow them to have lower required rates of returns than other countries. In addition, Japanese equities which have had high rates of return must have some properties which make them unattractive to investors, and which increase their required rates of return. It hardly need be said that this implication is contrary to the conventional wisdom of recent years.

However, it is not obvious that realised returns will be a good proxy for expected returns. A fundamental reason is that realised returns will also reflect unexpected developments that occurred during the period. In the case of Australia, two factors spring to mind. First, the growth of the industrial sector will be significantly affected by GDP growth. However, per capita GDP growth in the period 1970-1990 averaged around 1.5 per

cent per annum in Australia, compared with around 3.7 per cent for Japan.[15] Of course, according to the rational expectations hypothesis, this difference in growth rates will not have mattered for realised returns unless it were unexpected. If it was **not** fully expected, as seems reasonable, Japanese equity prices would have increased relative to Australian equities as it became apparent, boosting returns in Japan. That is, relative GDP growth performances can probably explain *ex post* outcomes to a large extent.

Second, the performance of the resources sector (and indirectly the industrial sector) will be significantly affected by metals prices. Between December 1969 and December 1990, real metals prices fell by a massive 63 per cent.[16] It seems most unlikely that this fall (equivalent to nearly 5 per cent per year) could have been fully anticipated, so it probably also helps explain the poor outcome in Australia.

Problems with the realised returns approach will not necessarily go away by simply using longer periods of data. Data on long term excess returns are only available for a few countries: the US, Australia and the UK. The data that do exist suggest that the equity premium is something over 6 per cent for all three countries. However, as Poterba (1991, pp. 24-25) points out, the standard deviation of annual excess returns data is so large as to prevent any convincing conclusions about the cost of equity. In addition, there are at least three reasons for thinking that there are limits to what we can learn about the cost of equity from standard measures of the historical equity premium in Australia.

First, the per capita growth performance of the Australian economy for the century as a whole has been (with the UK) the lowest in the OECD. Cumulative growth in GDP over the period 1900-1987 was around 80 per cent higher in the total OECD than in Australia. Unless Australia's rather dramatic slide down the OECD rankings was anticipated, and hence already reflected in stock prices, realised returns in Australia will be biased

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[15] The data for GDP growth are taken from Table B3 in Maddison (1989), updated to June quarter 1990 from OECD sources. The population adjustments are approximate, and use the average population rate growth rates from Table 1.2 for the period 1950-1987.

[16] Calculated using the IMF metals index in SDRs, deflated by the CPI of the industrial countries, using data from *International Financial Statistics*.

downwards as a measure of expected returns. That is, to rely on realised rates of return, we have to try to adjust for unexpected outcomes.

Second, historical estimates of the equity premium in Australia (e.g. Officer (1989)) tend to rely on data from Lamberton (1958 a,b) for the period to 1955. However, Lamberton's data contain few resource stocks. Yet the resources sector is generally thought to be riskier than the industrial sector, so exclusion of the resources sector may understate the true required rate of return for the economy as a whole. That sector currently accounts for around 35 per cent of total Australian market capitalisation, so one must ask whether the historical data are really representative of the Australian market today. In any case, we must also ask if other fundamental structural changes have occurred in the economy, making it dangerous to infer too much about the present, from data from the first half of this century.

Third, if countries have had permanently different debt-equity ratios, this will have affected returns. Australian equities have, at least in recent years, had lower debt ratios than other countries, so in this period they should have been less risky and should have had lower rates of return. Adjusting for this is difficult: while data for stockmarket returns over long periods of time are not good, data on debt/equity ratios would presumably be far worse. All that can be done is to highlight the possibility that differences in leverage across countries might overturn any inferences on the cost of equity that are based purely on historical equity premia.

(b) Data on E/P Ratios

Table 3 provides some data on E/P ratios. The first column contains average E/P ratios for five countries and the world index for the period 1984-1990 from the MSCI database. The second column makes two adjustments to the data. First, it adjusts for the fact that the data use retrospective rather than prospective earnings. For this adjustment, the average annual growth in nominal GDP is used to proxy nominal earnings growth in each country, along the lines of equation 3 in Section 3(b). Second, the arbitrary assumption that real earnings were expected to grow by 2 per cent per annum in each country is then made, to derive simple

proxies for the real cost of equity.[17] The last column provides estimates of the real cost of equity in 1988 from McCauley and Zimmer (1989) and the Australian Manufacturing Council (1990).

Table 3: Data for E/P Ratios

Country	Average E_0/P_1 Ratio (1984-1990)	E_1/P_1 Ratio Plus Growth Factor	Real Cost of Equity, 1988 (per cent)[18]
Australia	0.085	0.114	13.4
Germany	0.070	0.094	3.0
Japan	0.027	0.048	5.0
UK	0.086	0.113	8.0
US	0.077	0.103	11.0
World	0.062	0.086	n.a.

The estimates from McCauley and Zimmer, and the AMC Report have corrected measured E/P ratios for cross country differences in a number of factors which affect measured earnings. These include adjustments for the effect of inflation upon depreciation allowances, on inventory profits, on nominal interest payments, and for the effect of crossholdings between Japanese companies. These estimates suggest that in 1988 the cost of equity **was** higher in Australia than overseas. Given the volatility of E/P ratios, it would be interesting to see the comparison over several years, so as to abstract from temporary factors. However, my own simple measure

[17] The assumption of a 2 per cent annual growth rate of earnings should not be considered to apply literally for every year to every stock in every country. Start-up companies will obviously have very high (and volatile) expected growth rates, while mature companies may even have negative ones. However, when averaged over companies, and over several years the assumption of similar growth rates may be reasonable. Alternatively, one could use forecasts of earnings growth in each country, but typically these would show little variation in a group of countries of similar stages of industrialisation. The one component of growth that might be forecastable is the part driven by the population growth of a company's dominant (usually home) market. Australia's population growth is expected to remain higher than other countries: on this view, a higher growth rate could be applied to some Australian companies.

[18] Source: Australian Manufacturing Council (1990, p. 89).

derived from the MSCI data averaged over 7 years is also consistent with the hypothesis that the real cost of equity in Australia is a little higher than some other countries. It should be noted that these estimates are for the cost of equity, **given existing debt/equity ratios**. But the Australian market has had lower debt ratios over this period: if Australian firms had ratios similar to foreign countries one would expect that earnings/price ratios would be even higher in Australia.

A rough check of the plausibility of the framework (including the assertion that E/P ratios proxy the real rather than nominal cost of equity) is provided by the implied cost of equity for the world market as a whole. If we start with the estimate for the real cost of equity of 8.6 per cent for the world market as a whole, and then assume an average real short-term interest rate of 4 per cent,[19] we obtain a world equity premium of around 4 1/2 per cent, which is somewhere between standard historical estimates and the values that are suggested by theoretical models of asset pricing.

Irvine (1991) discusses a number of drawbacks in the use of E/P ratios as measures of the cost of equity. Two major criticisms are discussed below.

First, E/P ratios are volatile and have a cyclical pattern, since stock prices fall before earnings as the economy goes into a downturn, and rise before earnings during the recovery. It may be that Irvine's view on the volatility of E/P ratios is due to his incorrect use of E/P ratios as nominal discount rates. Thus, he apparently subtracts a nominal interest rate from the E/P ratio in an attempt to obtain a real equity premium for the UK (p. 15). However, as discussed in Section 3(b), E/P ratios are measures of the real cost of equity, so it is not surprising that he obtains a number that is volatile, and sometimes negative. As to the cyclicality of E/P ratios, some of this will be due to the tendency of markets to use backward looking E/P ratios: consensus forecasts of prospective earnings would generally yield a smoother ratio. Alternatively, if E/P ratios are averaged over periods of time which include both slowdowns and upturns, the effect of this cyclicality will be removed. Thus, comparisons across countries should use recent data averaged over a number of years.

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[19] Bullock and Rider (1991) obtain real interest rates around 4 per cent for most countries in their sample.

Second, despite adjustments to accounting earnings to make them closer to true economic earnings, Irvine claims that these measures will be poor indicators of free cash flow, which he describes as the real source of shareholder returns. In addition, differences in accounting rules mean that accounting earnings will not be comparable across countries. These points have been widely canvassed in the discussion over whether the cost of equity is lower in Japan than in the US. A number of points emerge from the most recent literature. First, adjusting Japanese earnings to a similar basis to US depreciation rules increases E/P ratios in Japan, but leaves a significant gap still unexplained. In any case, price/cash earnings ratios tend to show differences that are nearly as large as with conventional P/E ratios, so the treatment of depreciation may not be that important.[20] Second, adjusting for intercorporate holdings which are very significant in Japan does increase E/P ratios, but making this adjustment will also increase US E/P ratios, so Japanese ratios remain significantly below US ratios.[21] Third, correcting Japanese earnings for unrealised capital gains on land does increase E/P ratios significantly, and may account for the difference in E/P ratios.[22] That is, a number of adjustments to E/P ratios have been tried, but only a phenomenon as extreme as the recent massive land price inflation in Japan appears able to significantly change the picture given by standard E/P ratios. In any case, as McCauley and Zimmer (1989, Table 1) show, some of the adjustments that can be made to E/P ratios act in different directions in different years, hence using averages over a number of years may remove many of the problems. Thus, one conclusion from this body of literature might be that E/P-based rankings of the cost of equity are not easily overturned. It would still be interesting, however, to see how Australian E/P ratios are affected by this barrage of adjustments.

It is apparent, therefore, that the earnings yield approach is not without flaws, but given that the required rate of return on equity is unobservable, we must expect that any proxy for it will have weaknesses. The main strength of E/P ratios is that they do contain information as to the market's valuation of earnings flows, so it would seem dangerous to ignore them.

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[20] French and Poterba (1990, pp. 17-18).

[21] French and Poterba (1990, p. 18), Ando and Auerbach (1990, p. 12).

[22] Ando and Auerbach (1990, p. 18). However, this adjustment has only been made in Japan, and could increase E/P ratios (to a lesser extent) in other countries which have also had land price appreciations.

From the point of view of the firm, E/P ratios may provide a useful signal of when equity issues will be easiest, and when averaged over the recent past, they may provide a reasonably good indicator of the cost of equity that firms can use for investment appraisal. In addition, if national E/P ratios are averaged over time, they contain valuable information about the way that the world market values the earnings of Australian companies relative to the earnings of foreign companies.

5. ESTIMATES OF THE IAPM

For estimation, the MSCI World index in SDR terms is taken as the relevant market portfolio. A broader market index, including other types of assets, might be desirable: this could be the subject of subsequent work. All analysis is in pre-tax terms. This may be justified by factors like those discussed below in Section 7(b), or by the observation that equities are often held by institutions with relatively low tax rates. The estimation period is the period since the float of the Australian dollar, January 1984 to December 1990. Thus, it includes the stockmarket crash of October 1987. There may be arguments to suggest that the crash was a "Peso-problem" type occurrence and that these data will give undue attention to that episode. However, if memories of such episodes are long, this may not be inappropriate.

(a) Stockmarket Returns

The analysis uses the data described in Section 2, and the accumulation indices for the All Industrials and All Resources produced by the Australian Stock Exchange. Following standard practice, monthly stockmarket returns are calculated as the difference in the logged accumulation series. The following equation is estimated:

$$R_{it} = a + b_i * R_{wt} + error_{it} \qquad (6)$$

for i = countries 1 to 11

where R_W denotes returns in the world market denominated in SDRs, and R_i denotes returns in each of the 11 national markets denominated in their national currency.[23]

The results are shown in Table 4.[24] The estimates reveal that individual country returns are explained to a significant extent by world market returns. For some markets such as the US and Japan, this is hardly surprising since those markets constitute a significant proportion of the world market. But returns in smaller countries such as Australia and Sweden are also highly correlated with world market returns. The results also reveal that for all countries, the parameter estimates on the world market term (which will be referred to as the beta estimate) are close to unity.

However, beta estimates may be biased if there are omitted factors which happen to be correlated with the world market return. An obvious candidate for Australia is the influence of commodity prices. To take account of these possible biases, two other factors are included to explain the local currency stockmarket returns, consistent with stockmarkets being determined in an APT framework by a number of factors. These extra factors are variables for metals and oil prices, both measured in SDRs, and expressed as differences of logs.[25] Metals prices are measured by the *Economist* index on the Tuesday nearest the end of the month. Oil prices

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[23] Strictly speaking, the CAPM and the IAPM are based on excess returns, i.e. returns above the risk-free rate. In other work I have estimated the results in Table 4 and Table 6 using excess returns (over a weighted average short-term rate), and obtained almost unchanged results. In this period, the estimated standard deviation of monthly world stockmarket returns is 52 times greater than that of the monthly risk-free rate, so it is hardly surprising that the stockmarket component dominates other movements.

[24] For brevity, diagnostic statistics for these equations have not been provided. Note, however, that Durbin-Watson coefficients for the estimates tend to be quite close to 2, so I have not looked further at any dynamic adjustment process. On this point, Solnik (1988, p. 42) notes: "Some investigators have attempted to find leads or lags between markets. However, no evidence of a systematic delayed reaction of one national market to another has ever been found. The existence of such simple market inefficiencies is, indeed, unlikely, since it would be so easy to exploit them to make an abnormal profit."

[25] In preliminary regressions, a rural commodity price variable was also included, as with the exchange rate results, but it was not significant for any country.

Table 4: Estimating the IAPM for National Stockmarkets (Standard Errors in Parentheses)

	Simple IAPM			IAPM with extra factors				
Country	const	beta	adjR^2	const	beta	metals	oil	adjR^2
Australia	0.16	0.98	0.35	0.20	1.05	0.28	0.07	0.42
	(0.70)	(0.14)		(0.67)	(0.14)	(0.09)	(0.06)	
- Industrials	0.28	0.98	0.40	0.27	1.02	0.22	0.04	0.43
	(0.64)	(0.13)		(0.62)	(0.13)	(0.09)	(0.05)	
- Resources	-0.37	1.00	0.24	-0.30	1.12	0.38	0.17	0.35
	(0.94)	(0.19)		(0.87)	(0.18)	(0.12)	(0.07)	
Canada	-0.12	0.75	0.55	-0.06	0.79	0.12	0.06	0.62
	(0.36)	(0.07)		(0.33)	(0.07)	(0.05)	(0.03)	
France	0.35	1.00	0.47	0.28	0.97	0.23	-0.06	0.47
	(0.56)	(0.12)		(0.56)	(0.12)	(0.08)	(0.05)	
Germany	0.00	0.90	0.35	-0.02	0.91	-0.01	0.03	0.33
	(0.65)	(0.13)		(0.66)	(0.14)	(0.09)	(0.06)	
Italy	0.53	0.89	0.33	0.35	0.85	-0.03	-0.07	0.34
	(0.66)	(0.14)		(0.64)	(0.13)	(0.09)	(0.05)	
Japan	0.05	1.08	0.60	0.01	1.04	-0.07	-0.06	0.61
	(0.47)	(0.10)		(0.47)	(0.10)	(0.07)	(0.04)	
Netherlands	0.17	0.90	0.56	0.24	0.95	0.05	0.12	0.65
	(0.43)	(0.09)		(0.37)	(0.08)	(0.05)	(0.03)	
Sweden	0.09	0.99	0.44	-0.01	0.97	0.11	-0.06	0.45
	(0.59)	(0.12)		(0.59)	(0.12)	(0.08)	(0.05)	
Switzerland	-0.26	0.94	0.56	-0.23	0.97	0.03	0.06	0.57
	(0.44)	(0.09)		(0.44)	(0.09)	(0.06)	(0.04)	
UK	0.34	1.00	0.63	0.28	1.01	0.00	0.03	0.62
	(0.41)	(0.08)		(0.42)	(0.09)	(0.06)	(0.04)	
US	0.26	0.90	0.72	0.30	0.91	0.03	0.01	0.72
	(0.30)	(0.06)		(0.30)	(0.06)	(0.04)	(0.03)	

are measured by the price of West Texas Intermediate oil on the New York Mercantile Exchange.

The results from including these extra factors are also included in Table 4. Metals and oil prices are significant explanators for a number of countries, with signs that tend to be consistent with resource endowments. For example, for Australia and Canada, both variables show positive signs; for the Netherlands (home of Royal Dutch Petroleum) oil prices carry a positive sign, while for Japan both variables show negative signs. But as expected, the world stockmarket variable remains the most important explanator. In the Australian market, the resources sector is estimated to have a beta that is above unity, though the difference is not statistically significant. One reason why the beta estimate for the resources sector rises following the inclusion of other factors could be that oil prices may have affected the world stockmarket. When oil prices rise, as in August and September 1990, the world market may fall, but the resources sector will be less affected and may even benefit. Thus the energy sector may appear to have low or negative covariance with the world market at such times, but this effect is removed by taking account of the other factors.

But, as discussed in Section 3, one determinant of the observed betas in each country should be the degree of leverage in that market. That is, returns in countries which have higher debt/equity ratios might be expected to show greater volatility. So, to draw inferences as to whether or not the underlying risk (i.e. the asset beta) of a particular national market is greater or less than in other countries, we should try to take out the effects of differing debt/equity ratios across countries.

One problem is that the debt/equity ratio used will ideally be a forward-looking one, since future financing decisions will affect the risk of future cash flows. However, there is no good indicator of such intentions. (One reason why firms might not announce future issues would be that it may increase the cost of raising funds in the current period.) Hence, we must be satisfied with using observed debt ratios as an approximation. Another problem is that debt/equity ratios have varied significantly in my estimation period. Poterba (1991, p. 28) shows that Japanese debt/equity ratios fell significantly through the second half of the 1980s, while US ratios rose. In addition, Australian debt/equity ratios also tended to rise somewhat over

this period. As a result of these changes, the use of debt/equity ratios from any single year will be open to dispute, but the use of the middle year of the sample may be the least arbitrary choice. Debt/market value ratios for 7 countries in 1987 from Borio (1990, p. 11) and EPAC (1990, p. 18) are used. Corporate tax rates for foreign countries are obtained from Borio (1990, p. 20). Based on these, and equation 5 above, we can estimate the unlevered (or asset) betas that are implied for each country. After normalisation to unity, these are shown in Table 5 below, along with their transformed standard errors.[26]

Table 5: Adjusting IAPM Estimates for Differences in Leverage

Country	Estimated β_l	Debt/Market Value	Implied β_u	Implied Std. Error
Australia	1.05	0.41	1.30	0.17
- Industrials	1.02	0.42	1.24	0.16
- Resources	1.12	0.38	1.43	0.23
Canada	0.79	0.45	0.94	0.08
France	0.97	0.47	1.14	0.14
Germany	0.91	0.77	0.60	0.09
Japan	1.04	0.59	0.97	0.09
UK	1.01	0.48	1.11	0.10
US	0.91	0.51	0.95	0.07

As can be seen, after taking out the effects of leverage, the implied unlevered (or asset) betas estimated for Australia are between 1.5 and 2 standard errors greater than unity. The reason for this is straightforward: if Australian equities have lower debt ratios than other markets, but show average volatility (as measured by levered betas), it follows that they would show greater than average volatility if they had greater use of debt. Hence there is some evidence that Australia is a risky country in the CAPM sense.

[26] The unlevered beta estimates used in these calculations are from the multi-factor rather than the one-factor regressions. The implications of this choice are discussed below in Section 7(a). The debt/market value ratios for the industrial and resource sectors are my own estimates, and are based on Statex data for these sectors for 1987, adjusted in line with the EPAC number for the Australian market as a whole.

There may be a number of reasons why asset betas might be higher in Australia than overseas. The obvious one is if there is more market or cyclical risk in the Australian economy and Australian stockmarket than in other countries. The Australian market has, for example, more resource stocks than most other countries. These are relatively risky, as the asset beta estimates in Table 5 indicate. But the Australian industrials sector also appears to have a relatively high asset beta. This may reflect the fact that Australia has fewer stocks in some low-beta sectors such as consumer goods and services, and utilities, which tend to be government-owned in this country but are often publicly listed in other countries. In addition, industrial stocks in Australia are probably affected somewhat when the resource sector suffers.

A further reason could be the particular arrangements in some other countries (notably Japan and Germany) by which banks have equity holdings in firms whose debt they also hold. As debt-holders, they may make concessions at times when the firm is in trouble. Thus, there is a case for arguing that some of what is measured as "debt" in these countries, is more like equity. Thus, measured debt/equity ratios may be overstated a little, and unlevered betas (especially in Germany) may not be quite as low as my figuring suggests. On the other hand, these financial arrangements may reduce the risks of bankruptcy, and may make equity safer. As a result, for those equity-holders who are not also debt-holders, Japanese and German stocks may still be relatively low-beta investments.

What are the implications if asset betas are higher in Australia than overseas? According to the CAPM, it is the asset beta that is the primary input into the required rate of return on an asset. Indeed, if we assumed a certain value for a world equity premium, we could estimate the effect on the cost of equity in Australia. Estimates for particular countries often put the equity premium at something over 6 per cent. However, there are many who are surprised by the magnitude of this historical risk premium, hence the growing literature beginning with Mehra and Prescott (1985) trying, but failing, to explain it using theoretical models of asset pricing. Assuming for illustrative purposes a required world premium of 4 per cent, we can simply multiply by the estimated asset betas for each country to get an estimate of the equity premium that might be observed in each country **if all countries had average debt/equity ratios**. This rough figuring would suggest that the

equity premium might be about 5.2 per cent in Australia or 1.2 per cent above the average world equity premium. Within this total, the industrial and resource sectors would be estimated to have equity premia of around 5.0 per cent and 5.7 per cent, respectively. This figuring should be considered as indicative only, but it does not seem implausible.

(b) Exchange Rate Risk

Since investment in a particular national equity market will always be denominated in the currency of that nation, the riskiness of each market to a foreign investor will also depend on the risk of that national currency. And if the relevant measure of risk for any asset is the correlation of the asset's returns with the world market return, we must examine whether exchange rate returns in any country are correlated with the world stockmarket return.

Table 6 contains estimates from regressions explaining exchange rate changes by the world market return and changes in a number of commodity prices.[27] The data for exchange rate changes are measured as SDRs per unit of domestic currency so that increases correspond to appreciations. These other factors are consistent with exchange rates being determined by an APT model, and were selected with particular reference to Australia. Again I include metals prices and oil prices, as well as an index of rural prices.[28]

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[27] Note that I do not attempt to divide price movements into "expected" and "unexpected" components. Since all variables are financial prices, measured on an end-period basis, any "expected" component would represent a profit opportunity.

[28] The index of rural prices is based on Australian export weights and end-month SDR prices for wheat, beef and sugar. Wool was excluded since the reserve price scheme (which was set in Australian dollars) could induce spurious correlation with the exchange rate.

Table 6: Estimating the IAPM for Exchange Rates (Standard Errors in Parentheses)

Country	const	beta	metals	oil	rural	adjR^2
Australia	-0.54	0.13	0.13	0.07	0.32	0.20
	(0.40)	(0.08)	(0.06)	(0.03)	(0.10)	
Canada	-0.28	0.10	0.02	0.03	0.27	0.31
	(0.20)	(0.04)	(0.03)	(0.02)	(0.05)	
France	0.26	-0.07	-0.01	-0.03	-0.07	0.06
	(0.18)	(0.04)	(0.03)	(0.02)	(0.05)	
Germany	0.40	-0.09	-0.03	-0.03	-0.10	0.10
	(0.19)	(0.04)	(0.03)	(0.02)	(0.05)	
Italy	0.11	-0.05	-0.01	-0.03	-0.08	0.11
	(0.16)	(0.03)	(0.02)	(0.01)	(0.04)	
Japan	0.20	0.04	-0.02	-0.02	-0.09	0.01
	(0.22)	(0.05)	(0.03)	(0.02)	(0.06)	
Netherlands	0.39	-0.08	-0.02	-0.02	-0.10	0.08
	(0.20)	(0.04)	(0.03)	(0.02)	(0.05)	
Sweden	0.05	-0.01	-0.01	0.00	-0.06	-0.04
	(0.10)	(0.02)	(0.01)	(0.01)	(0.03)	
Switzerland	0.32	-0.11	-0.03	-0.03	-0.15	0.15
	(0.21)	(0.05)	(0.03)	(0.02)	(0.05)	
UK	-0.10	0.02	0.02	0.01	-0.22	0.10
	(0.25)	(0.05)	(0.03)	(0.02)	(0.06)	
US	-0.34	0.05	0.01	0.03	0.22	0.22
	(0.19)	(0.04)	(0.03)	(0.02)	(0.05)	

As might be expected, exchange rate movements are far less well explained than local stockmarkets. For Australia, oil, metals and rural prices are all significant explanators of the exchange rate, consistent both with natural resource endowments, and some other empirical work.[29] For other

[29] For example, Macfarlane and Tease (1989) also find evidence that the Australian dollar is affected by commodity prices. They find that the response to commodity

countries, rural prices are estimated to have larger effects than seems reasonable, casting some doubt on the estimates. The regressions also suggest that world stockmarket returns have only weak explanatory power for exchange rates. However, they suggest that the exchange rates of Australia and Canada are positively correlated with the world stockmarket return, while the exchange rates of some European countries (roughly speaking, the Deutschemark bloc) appear to be negatively correlated with this measure of the world stockmarket.

While world stockmarket movements are not generally included as regressors in exchange rate equations in Australia,[30] there seems to be no reason why they should not be. In particular, world stock returns are measured very precisely and contain significant information about expected future outcomes in the world economy. This approach may not be too much at odds with the usual practice of explaining exchange rates in terms of largely domestic factors (e.g. domestic interest rates), since it may well be that most domestic factors (especially in a small economy such as Australia) have international causes. In addition, to the extent that some purely domestic factors do impact on the exchange rate, they may be diversifiable for the typical world investor, and if so, are of little concern. As for the criticism that theoretical exchange rate models provide no role for variables such as stockmarket returns, it should be remembered that such models have not proved especially robust from an empirical point of view. Exchange rate markets often seem to be driven by sentiment: it may be that a variable that measures the performance of world equity markets can capture some of these factors.

But the relevant point for this paper is that the estimates above provide some weak evidence that the Australian exchange rate is correlated with world stockmarket movements. That is, the Australian dollar may be something of a "fair weather" currency: this may not be much of a surprise

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prices is greatest when the Australian dollar is measured against the Deutschemark. In effect, they are estimating the effect on two currencies: these results suggest that the DM responds negatively to commodity prices, which explains their finding.

[30] An exception is Cosset (1984) who finds no stable role for such effects in data for the period March 1973 to February 1980. One reservation about Cosset's work is that all exchange rates are measured against the US dollar. However, if the US dollar behaves perversely, this method would imply that all other countries' exchange rates do as well. Using SDR rates (or some other average) seems more sensible.

to many. And since foreign investors can only invest in the Australian stockmarket by incurring Australian exchange rate risk,[31] this apparent "exchange rate beta" may require an additional risk premium before foreign investors will hold Australian equities.[32] Similarly, Australian investors may find it more favourable to invest overseas if exchange rate risk provides some insurance at times when stockmarkets fall. Again, this finding is preliminary, but it seems relatively plausible.

6. CAN STOCKMARKET RISK BE EXPLAINED BY REAL EARNINGS RISK IN AUSTRALIA ?

Section 5(a) suggested that Australian equity returns may be relatively risky when compared with the world market, and after leverage considerations are taken into account. This section looks closer at whether there are fundamental factors which can explain the local stockmarket risk. That is, while the previous section looked at risk in financial markets, this section will analyse data from the real economy. If there is no evidence of this fundamental risk, we may be forced to conclude that the financial market risk is due to some irrational factor. An example might be simple excess volatility to fundamentals, as Shiller (1981) and others have suggested for the US stockmarket.

This suggests that we should look at actual dividends or earnings across countries over a long period of time, and to see whether earnings in

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[31] It is, of course, possible to use forward markets to perfectly hedge foreign currency cashflows that are known with certainty. However, equity returns are uncertain (and fairly volatile) and therefore cannot be perfectly hedged. In any case, because hedging involves persuading someone else to bear risk, even a risk that can be perfectly hedged will attract a risk premium if it is not diversifiable.

[32] The evidence of correlation between the Australian dollar and the world stockmarket implies that debt denominated in Australian dollars could carry a risk premium as well. Smith and Gruen (1989) find evidence that Australian risk-free assets yield higher returns over recent years than foreign risk-free assets, but are unable to explain the difference in a consumption-CAPM (CCAPM) framework. If the equity premium on the world market was 4 per cent, my estimates of a beta of 0.13 could imply a risk premium from this factor of around half a percentage point. Thus, the IAPM might be a better explanator of exchange rates than a CCAPM model, just as Mankiw and Shapiro (1986) have shown that the CAPM outperforms the CCAPM in the US equity market.

particular countries have traditionally showed excess sensitivity to world movements. Good data on dividends are available across countries, but countries may have different norms of dividend distribution. In particular, there may be differing propensities to increase or cut dividends in response to changes in earnings. Thus, earnings data may be a theoretically better way to address the question.

However, data on reported earnings are not available on a consistent basis because of differences in accounting rules. A compromise is to use data from national accounts sources which are usually constructed on quite similar bases. Accordingly, OECD data are used for total operating surplus, net of depreciation, in each country. An advantage of these data is that they measure the total return to capital, before payments to debt and equity: that is, they ignore the financing mix and measure true economic earnings flows.

There are, of course, some weaknesses with these data: they include a number of components that are not normally included in financial-market research. As well as returns to private corporate trading enterprises, they include returns to unincorporated enterprises, dwellings, public traded enterprises and general government. However, there are arguments for including all of these: investment in dwellings can be regarded as an alternative to investing in equities, and must be priced using similar principles. Similarly, to the extent that public ownership can be treated as a veil for individual ownership it should be considered as normal equity. In addition, the data will remove any differences across countries according to whether some sectors such as utilities are government-owned or privately-owned.

The methodology is to derive a measure for real operating surplus in each of 11 countries, and then to aggregate them to form an index for the total.[33] Table 7 shows the regression results from estimating the extent to which earnings in each country "respond" to world earnings.[34] The first estimates

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[33] Overseas data are taken from OECD *National Accounts: Main Aggregates, Vol. 1.* Australian data are taken from ABS *Australian National Accounts.* To aggregate, I calculate the change in real earnings in each country, and then weight to give the aggregate change in world earnings. Three alternative sets of weights were used, but the results are not especially different, so only one set of results is quoted.

[34] The analysis would ideally use rates of return rather than changes in earnings. Consistent estimates of the capital stock for each country were not available, hence it

use annual data from 1961 to 1988, and regress the change in earnings in each country against a constant and the change in world earnings. For all countries except Sweden (where the results appear to be driven by a single outlier, 1977) there is significant explanatory power, suggesting that world factors do systematically affect earnings in different countries. For Australia, the standard error on the estimate is 0.29, so there is evidence that Australian operating surplus responds more than one-for-one with world operating surplus.[35]

Table 7: Correlating National Earnings with World Earnings

Country	const	World Operating Surplus (t)	adjR^2	const	World Operating Surplus (t-1,t,t+1)	adjR^2
Australia	-1.0	1.57	0.52	0.2	1.17	0.51
Canada	2.1	0.83	0.28	3.4	0.35	0.33
France	0.3	0.75	0.43	-0.7	1.00	0.53
Germany	0.0	0.77	0.48	0.0	0.79	0.47
Italy	2.4	0.37	0.08	2.7	0.24	0.46
Japan	2.4	0.70	0.18	1.6	0.92	0.19
Netherlands	0.4	0.65	0.22	1.5	0.29	0.21
Sweden	1.8	-0.19	-0.03	2.1	-0.37	-0.03
Switzerland	0.5	0.35	0.13	-0.4	0.61	0.37
UK	-1.8	1.44	0.40	-2.8	1.93	0.45
US	-1.0	1.36	0.76	-0.6	1.20	0.79

is not possible to get true rates of return. However, rates of return will be dominated by movements in real earnings since earnings show significant volatility, but capital stocks will change only slowly.

[35] The change in real commodity prices was also included as a regressor for each country, but for most countries, including Australia, there was little extra explanatory power. One might have expected part of Australia's excess cyclicality to explained by real commodity price movements, which might also be correlated with world earnings. However, there was only a small correlation between world operating surplus and commodity prices, hence multicollinearity is not the explanation, at least in this data set. Another data set with more observations might yield different conclusions.

However, because some countries may lead or lag the world business cycle, a one-period lead and lag are also included as explanatory variables. These results are shown for the period 1962-1987. The coefficients on the three explanators have been summed to give the total effect. Standard errors are not provided: it will suffice to note that they are large, with only 22 degrees of freedom. However, these estimates are also consistent with the hypothesis that Australian earnings show more cyclical volatility than earnings in most other countries. That is, there appears to be some evidence from the real sector to lend support to the evidence on asset betas that was presented in Section 5(a).

7. DISCUSSION

(a) The IAPM

The analysis in Sections 5 and 6 has suggested that there may be more non-diversifiable risk in the Australian economy than in the typical foreign country. If the IAPM is valid, this implies that the required rates of return may be higher in Australia than in other countries.

This paper has not provided a formal test of the IAPM: such a test requires data for a large number of individual stocks across different countries. However, the assumption that the IAPM does hold across countries seems a reasonable starting point, as many studies of the cost of capital assume that the worldwide capital market is now well-integrated. A formal test of the IAPM is provided by Wood (1990, ch. 5), who uses Australian data to test whether the Australian market is segmented or integrated with the world market. His results do not provide clear support for either hypothesis: this may be a function of the high degree of noise in equity market data.

While Wood tests a one-factor model, the results of this paper suggest that a multi-factor model might be an interesting extension. In particular, Section 5 identifies metals prices and oil prices as having explanatory power for a number of countries. However, the existence of these covariances does not necessarily imply that a multi-factor model is the appropriate one. As Roll (1988, p. 543) points out: "Several factors may turn out to explain a larger proportion of intertemporal return volatility than a single factor, but this

finding alone would not constitute evidence that a multiple-factor theory is better. That conclusion would also require an empirical finding that additional factors are indeed pervasive, non-diversifiable, and most important, that they are associated with additional risk premia."

Therefore, to overturn the implication that high-beta countries will have higher required rates of return, there must be other non-diversifiable and priced factors that make those countries attractive to world investors. One possibility is that Australia's energy exposure may reduce its cost of equity. Individuals can hedge oil price risk by trading in energy stocks or futures: however, this risk will be fully diversifiable only if changes in oil prices have no effect on aggregate wealth. There is some evidence, though, that changes in oil prices do not simply represent a pure redistribution from consumers to producers, and that there are effects on the world economy. If so, further investigation of the premium on energy risk could be useful.

There may well be a number of reasons why the cost of equity might not differ across countries by as much as IAPM estimates might suggest. However, an offsetting factor that may boost the risk premium for Australia, is that if the IAPM or IAPT do not fully hold, residual, or non-market risk will become important. Table 4 does not report the level of unexplained variance for each country, but the regressions underlying those tables indicate that the unexplained variance of returns in Australia is higher than in other countries. If imperfect capital mobility means that investors in Australia do not undertake as much foreign investment as an arbitrage-based model would suggest,[36] they will not have fully succeeded in diversifying this non-market risk away, as asset pricing models require. The equity premium in Australia will thus become dependent on the overall level of risk in Australian returns, and not just the world market component. And since there is apparently more unexplained variance in the Australian market, the equity premium in Australia might be higher than under the perfect capital-mobility assumption.[37]

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[36] French and Poterba (1991) show that international investment is a far smaller proportion of total wealth than is implied by standard portfolio allocation models.

[37] In a closed economy model, the equity premium will presumably be determined, as in the consumption-oriented CAPM, by the overall level of consumption (or marginal utility) risk. Thus, McCauley and Zimmer (1989) use the volatility of real GNP growth as a proxy for earnings risk in various countries. However, in an open-

(b) The Effects of Taxation

The measures of risk and return used in this paper are generally made on an after corporate-tax but before personal-tax basis. These after corporate-tax returns were used to draw inferences about the risk premium on equity capital in Australia. The adjusted asset betas presented in Table 5 take account of the effects of corporate taxation and leverage on the risk premium, but no allowance is made for the effects of personal taxation. Also, the paper has not attempted to measure the effect of the corporate taxation system in driving a wedge between pre- and post-tax required rates of return.

The issue of the effect of personal tax rates is discussed by Miller (1977) who showed how personal tax rates would affect the willingness of lenders to invest in debt and equity, thus affecting the overall supply of debt and equity finance at the aggregate level. His analysis might suggest that an investigation of the cost of capital at a national level should proceed along the lines of King and Fullerton (1984): that is by looking at the particular tax arrangements for each type of personal income, and for each source of corporate finance.

However, a problem with some of these approaches is that the tax rates used are often the statutory marginal rates, which may bear little resemblance to actual rates paid by individuals. It has been argued for the United States, for example, that tax rates on dividends and capital gains are effectively zero.[38] More generally, one should presume that companies will find ways to minimise the taxes that are paid both at the firm level **and** at the investor level. This suggests that tax rates on equity may effectively be quite low, and that even in classical tax systems, equity is not really taxed twice. It also suggests that any analysis based on personal statutory rates may place more importance than is warranted on tax factors.

An example of this is the argument that the introduction of dividend imputation significantly lowers the cost of equity in Australia. It is true that dividend imputation reduces the total tax paid on income that is distributed

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economy framework, the volatility of earnings will be less important than the way that those earnings covary with world earnings.

[38] See Hamada and Scholes (1985).

as dividends to eligible investors if they were previously paying tax. However, a number of points should be made. First, not all companies are able to pay fully franked dividends, nor are all investors (especially foreign investors) able to take full advantage of imputation. Second, imputation is a benefit already available (often to lesser extents) in a number of other countries, for example the UK, Canada, Germany, France, Italy, and now New Zealand.[39] Third, the effect of imputation in Australia cannot be considered in isolation. The package of tax changes that introduced imputation made a number of other changes including the introduction of a real capital gains tax. That is, there was an offsetting change to the taxation of equity which by itself might have **raised** the cost of equity. One interpretation would be that dividend imputation has simply changed the incentives from paying out returns as capital gains which were untaxed at the personal level, to paying returns out as dividends which are now also only taxed once. As it turned out, Australian stock prices actually fell on the day that dividend imputation (and the rest of the tax package) was announced, so this interpretation may not be entirely incorrect.[40] This lends support to the notion that analyses based on personal statutory rates may place more importance than is warranted on tax factors.[41]

8. CONCLUSION

This paper has reviewed the evidence on the cost of equity in Australia. Two standard measures of the cost of equity are the realised rate of return

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[39] See Borio (1990, p. 20) for imputation rates in some other countries.

[40] The tax package that included imputation was announced on 19 September 1985. The legislation was introduced on 2 April 1987, and imputation was implemented on 1 July 1987. Because parts of the initial announcement were known in advance, it may not be entirely appropriate to look only at the stock price movement on the day of the announcement. In addition, there may have been uncertainty as to whether or not imputation would actually be implemented. Nevertheless it is hard to ignore quotes from the *Australian Financial Review* like "Stockmarket dives ahead of tax package" (19/9/85, p. 1) and "It is very hard to think of stocks for which there will be a positive reassessment flowing from the tax reform" (23/9/85, p. 64).

[41] Alternatively, it may suggest that the cost of capital is simply not as important a factor as is often assumed. The stock price movement around the time of the tax reform announcement may have largely reflected other changes, such as those to fringe benefits taxation. Such factors affect the value of firms via cashflow calculations but do not affect discount rates.

on equity, and the earnings yield. The former measure suggests that the cost of equity in Australia may be similar to or lower than overseas, while the latter suggests that the cost of equity may be higher than overseas. There are a number of reasons, however, why historical rates of return may not provide good measures of the cost of equity. Earnings/price ratios also have drawbacks, but if certain adjustments to earnings are made, and data are averaged over the recent past, they may provide better measures of the required return on equity. In particular, earnings/price ratios provide some evidence of how the stockmarket values earnings flows and it would seem dangerous to ignore this information. However, this paper has also highlighted the need for more detailed analysis of E/P ratios, along the lines of recent work which compares US and Japanese data.

The evidence on E/P ratios suggest that the cost of equity may be higher in Australia, but offers no insights as to why this might be. Accordingly this paper has also estimated a version of the International Asset Pricing Model. I find that the Australian stockmarket appears to respond more to movements in the world market than is justified by its relatively low debt/equity ratio. This implies that the level of non-diversifiable risk may be higher in Australia than overseas. If so, the equity risk premium may be higher in Australia. In addition, I find some tentative evidence that the Australian exchange rate may have some correlation with the world equity market return, which may imply a further risk premium on both debt and equity. The analysis also suggests that further work could profitably investigate the premium (if any) on energy price risk.

To further investigate the risk that is suggested by data from financial markets, the paper has looked briefly for the source of these fluctuations. It seems that a very broad measure of earnings in the Australian economy shows excess sensitivity to world earnings. Hence the riskiness that is suggested by financial markets data may have a fundamental cause in the real economy. This evidence on real earnings risk and financial market risk may help to explain the large flow of investment abroad by Australians, especially by life offices and superannuation funds, when official controls on investment abroad were eased in the early 1980s.

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