# INVESTING IN NEW ZEALAND: A REVIEW

by

Martin Lally

Associate Professor

School of Economics and Finance

Victoria University

July 31 2003

## EXECUTIVE SUMMARY

The New Zealand Superannuation Fund (NZSF) is in the process of deciding upon the allocation of its portfolio, across asset types and countries. In response to this, the New Zealand Stock Exchange (NZX, 2003) has argued that a minimum of 20% of the NZSF portfolio should be invested into New Zealand equities. This paper has examined the arguments presented by the NZX. These arguments, and my responses to them, are as follows.

The first argument is that application of the Markowitz model for portfolio selection is subject to errors in estimating parameters ("estimation risk"), and this justifies tilting towards the home market. No arguments linking the premise to the conclusion are offered here. The premise is acknowledged, and a number of possible responses to the problem are examined. Contrary to the NZX suggestion, they suggest that the optimal portfolio of risky assets is the world market portfolio.

The second argument is that traditional studies in support of international diversification understate the currently prevailing correlation coefficients between markets, and therefore overstate the benefits of international diversification. However, it is shown that, even if this reasoning is correct, it does not justify tilting away from the world market portfolio of risky assets.

The third argument is that correlations rise in significant market downturns, implying that the benefits of international diversification are virtually zero. Accordingly, a significant tilt towards the home market is warranted. However, it is shown that unless the correlation coefficient reaches 1 (and this is not asserted by the NZX), then there is no justification for tilting away from the world market portfolio of risky assets.

The fourth argument offers the theoretical analysis of Hasan and Simaan (2000) in support of the proposition that "estimation risk" justifies tilting towards the local market. However their analysis compares only the local portfolio with an international portfolio, with the latter selected in accordance with the Markowitz mathematics and with estimation risk contaminating the parameter estimates.

Furthermore, by allowing short-selling, these estimation risks are significantly aggravated. Had the world market portfolio been included in the comparison, it is likely to have outperformed the two possibilities considered. Thus, in my view, the Hasan and Simaan analysis does not support tilting away from the world market portfolio of risky assets.

The fifth argument is that the Markowitz methodology assumes that returns are normally distributed, when they are not, and this justifies tilting away from the world market portfolio. However, the premise that the Markowitz methodology assumes normality of returns is incorrect. Furthermore, no linkage from the two premises to the conclusion is offered.

The sixth argument is that of Shore and White (2002). They define the risk of a portfolio to a particular investor as its return relative to the return earned by that investor's local peers, rather than in the usual way as dispersion around the mean, i.e., "peer benchmarking". In addition, they assume that some investors are bound to large weightings on local assets (such as small business owners and company executives). Consequently, the remaining investors are driven to replicate the portfolios of the first mentioned local investors. The difficulty with this argument lies in the definition of risk. If it is adopted then the local market portfolio is "risk free" and government bonds are risky. Thus the market risk premiums in a world of segmented markets would be negative, and this conflicts with the historical evidence. A related argument by DeMarzo et al (2002) is also presented, but they characterise the resulting local bias as suboptimal. Accordingly, the public policy implications of that argument, as conveyed by the authors, are that international diversification should be *encouraged* rather than discouraged.

The seventh argument is that the NZSF has local liabilities, and this justifies tilting towards the New Zealand market. However, the liabilities in question are not liabilities of the NZSF so much as of the New Zealand taxpayer. Thus, if one moves beyond consideration of the fund's assets to include these liabilities, one must include all other assets and liabilities of the New Zealand taxpayer. This may support the conclusion that the NZSF should tilt *away* rather than towards the local market, to

compensate for the unavoidably inadequate diversification inherent in the total set of assets.

The eighth argument is that currency risk adversely affects international diversification, and that the NZSF is too large an entity to be able to hedge this away except at prices that are particularly disadvantageous to it. Accordingly, local tilting is warranted. However, if the NZSF invests in the local equity market to the extent envisaged by the NZX, it will also move these asset prices against. Three extreme possibilities arise here: holding the world market portfolio unhedged against currency risk, holding this portfolio hedged, and holding the local market portfolio. The last two are subject to the NZSF moving prices against itself, whilst the first is subject to exchange rate risks. This paper does not attempt to assess the relative significance of these problems. However it is not obvious that local tilting is optimal.

The ninth argument is that local investors have an information advantage over foreign investors in selecting local assets, and should therefore tilt locally. The justifications offered here are debatable, and the evidence cited in Gehrig (1993) supports only a *belief* on the part of fund managers that they have this ability. Evidence from Coval and Moskowitz (2001) on the existence of this ability does not seem to warrant extrapolation to the NZSF.

Finally, the tenth argument is that local bias is very strong, and this suggests some rational explanation must exist. This argument has a certain appeal but it does not seem able to explain the marked shift over time in favour of international diversification. It also implies that all investor behaviour is rational, and this conflicts with other evidence including the size of the actively managed funds industry.

In summary, none of these arguments provides a clear justification for tilting away from the world market portfolio in favour of the New Zealand market, and some even point to the opposite conclusion. The strongest of the arguments in favour of local tilting is that of difficulties in hedging exchange rate risk, but even this does not point to a local tilt of at least the 20% suggested by the NZX.

Despite all this, a justification for local tilting can be offered, which has not been presented in the NZX paper. This derives from taxation considerations, although the form of the argument depends upon whether the NZSF concerns itself with all taxes paid or only those paid to foreign tax authorities. If the NZSF concerns itself with all taxes paid, then a local tilt is justified by the incremental dividend imputation benefits to local over foreign investors coupled with the likelihood that these incremental benefits are not fully priced into New Zealand assets. By contrast, if the NZSF concerns itself only with taxes paid to foreign tax authorities, then a local tilt is justified by the fact that the NZSF is tax-exempt on local but not foreign assets. Depending upon the approach taken to this tax issue, a local tilt of up to 15% could be justified. Nevertheless, this tax based justification for local tilting must be weighed against the previous arguments. In particular, concerns about local tilting driving up asset prices to the disadvantage of the NZSF, and the possibility that New Zealand taxpayers are already too strongly biased locally, might still argue for little or no local tilting.

## 1. Introduction

The New Zealand Superannuation Fund (NZSF) is in the process of deciding upon the allocation of its portfolio, across asset types and countries. In response to this, the New Zealand Stock Exchange (NZX, 2003) has argued that a minimum of 20% of the NZSF portfolio should be invested into New Zealand equities. These NZX arguments consist of theoretical failings in standard asset allocation models, which lead to under weighting of the home market, theoretical justifications for a substantial home country bias, and empirical evidence favouring substantial home country bias. This paper seeks to review the NZX arguments in the sequence in which they appear there, and this appears in sections 2, 3 and 4. Section 5 then examines an argument for home bias that has not been offered by the NZX, in the form of taxation advantages from local assets.

## 2. Theoretical Failings in Standard Asset Allocation Models

### *2.1 Failings of Mean-Variance Theory in the International Context*

The NZX advances four shortcomings in standard mean-variance analysis, i.e., that of Markowitz (1952, 1959). In particular, the out of sample performance of "optimal" portfolios is poor, the choice of "optimal" portfolios is highly sensitive to adding or subtracting a few data points from the sample, "optimal" portfolios are not well diversified, and the uncertainty in the estimates of parameters is ignored. The last of these points is the crucial one (the others are simply manifestations of it), and therefore we will characterise all of these points as additional risk arising from errors in estimating parameters in the Markowitz model, i.e., "estimation risk". In particular, the NZX seem to be focusing upon estimation risk arising from the simple use of historical data (for example, the estimator for the expected return on an asset is its average return over some period). It is implied that this problem justifies tilting towards the home market, but no explanation for this conclusion is offered in this section[1].

The problem of estimation risk has long been recognised in the literature (for example, Markowitz, 1952, p. 91; Frankfurter et al., 1971). One response has been to

[1] Section 2.4 does offer a justification, and will be discussed there.

invoke estimators that combine sample information for a particular asset with that for the entire set of assets, so that estimates for individual assets are pushed towards the overall average (Jobson and Korkie, 1980, 1981; Elton and Gruber, 1973). However, nothing in this approach suggests that tilting towards the home market would be justified. Nevertheless, even this approach still leaves some estimation risk, which is ignored. An alternative approach to the problem is the Bayesian approach, in which a subjective prior distribution is combined with sample information. This approach has very clear implications for the optimal portfolio of risky assets. In particular, in the presence of a risk free asset, the effect of estimation risk is to change the location of the Efficient Frontier in expected return/standard deviation space, but the optimal portfolio of risky assets is unaffected (see Barry, 1978; Brown, 1979). Thus, if the optimal portfolio of risky assets in the absence of estimation risk is the world market portfolio, it remains so in the presence of it. The presence of estimation risk merely implies that a less risky portfolio will be chosen, but this less risky portfolio involves increasing the weight on the risk free asset at the expense of the weight on the portfolio of risky assets; the composition of the portfolio of risky assets is unaffected.

A third possible response to the problem of estimation risk is to simply abandon the Markowitz approach, i.e., to select a portfolio of risky assets without recourse to the Markowitz methodology. The obvious candidates are the home market portfolio or the world market portfolio. To this set of possibilities the NZX might argue for including an intermediary position, such as one involving a 30% weight on the home market, and the rest allocated proportional to market weights. The difficulty with the latter is the arbitrary nature of the 30% tilt. Nevertheless, we will compare these three possible portfolios of risky assets. To do so, we must make some assumption about the equilibrium situation, and two possibilities are considered here: world markets are fully integrated, or they are fully segmented.

We start with the case of fully segmented markets, as in the standard capital asset pricing model of Sharpe (1964), Lintner (1965) and Mossin (1966), i.e., this model is assumed to determine expected returns, even if some investors do engage in international diversification. In this event, the MRPs in each market are determined independently. We need a model for this. Since the MRP is a reward for bearing risk, we assume that it is proportional to the market's risk (Merton, 1980). Friend and

Blume (1975) conclude that aggregate relative risk aversion is constant, and this implies that the MRP is proportional to variance (see Chan et al, 1992). Merton (1980) estimates this ratio of MRP to variance at 1.9, using US data over the period 1926-1978. Harvey (1991, Table VIII) offers estimates for 17 countries over the period 1970-1990, with a mean of 2.3 and a standard error of .30. All of this suggests a figure of around 2, but there is no reason to suppose that the ratio ($k$) is equal across countries. We now require estimates for market variances. Cavaglio et al (2000, Table 1) presents estimates for 21 markets (including New Zealand), using data from 1985-2000. The standard deviation for New Zealand is about .20, and this places it around the middle of the distribution. Purely for illustrative purposes, we therefore characterise the world as comprising four markets, with standard deviations ($\sigma$) and world market portfolio weights ($w$) as follows.

| Market | $\sigma$ | $w$ |
|---|---|---|
| 1 (NZ) | .20 | 0 |
| 2 | .15 | .30 |
| 3 | .20 | .40 |
| 4 | .25 | .30 |

In respect of correlation coefficients, Odier and Solnik (1993) indicate an average of .30 in respect of major markets, based on data over the period 1980-1990. More recently, Elton et al (2003, p. 266) gives an average of .48 for major markets, using data from 1991-2000. So, we choose a value of .50. All markets are assumed to have the same risk free rate of $R_f = .05$, and currency risks are assumed to be zero or to be hedged away. Depending upon the values of the correlation coefficients between the markets, and the ratios $k$, the best of the three portfolios is in general either the world market portfolio or the "tilted" portfolio. Here are two examples.

Example 1: All ratios $k$ are 2. The expected returns on the four markets are then

$$E_1 = .05 + MRP = .05 + 2(.20)^2 = .130$$

$$E_2 = .05 + MRP = .05 + 2(.15)^2 = .095$$

$$E_3 = .05 + MRP = .05 + 2(.20)^2 = .130$$

$$E_4 = .05 + MRP = .05 + 2(.25)^2 = .175$$

Coupled with the variances and correlation coefficients, the expected returns and standard deviations for the three portfolios can then be determined. To compare them, the Sharpe ratio for each portfolio *p* is then calculated, as follows

$$S_p = \frac{E_p - R_f}{\sigma_p}$$

This Sharpe ratio for portfolio *p* is the slope of a line in *E*, $\sigma$ space from the risk free rate to the portfolio *p*. If borrowing is possible at the risk free rate then the portfolio with the highest Sharpe ratio is the best portfolio of risky assets. The results for the three portfolios are as follows.

| | $E_p$ | $\sigma_p$ | $S_p$ |
|---|---|---|---|
| NZ | .130 | .20 | .40 |
| World | .133 | .164 | .51 |
| Tilted | .132 | .159 | .52 |

In this case then, amongst the three options, the best portfolio of risky assets is the "tilted" portfolio, followed closely by the world market portfolio.

Example 2: As per example 1, except that the ratios *k* are 1.8 for New Zealand and 2.2 for the other three markets. The expected returns on the four markets are then as follows.

$$E_1 = .05 + MRP = .05 + 1.8(.20)^2 = .122$$

$$E_2 = .05 + MRP = .05 + 2.2(.15)^2 = .100$$

$$E_3 = .05 + MRP = .05 + 2.2(.20)^2 = .138$$

$$E_4 = .05 + MRP = .05 + 2.2(.25)^2 = .188$$

The resulting expected returns, standard deviations and Sharpe ratios for the three portfolios (*p*) considered are then as follows.

| | $E_p$ | $\sigma_p$ | $S_p$ |
|---|---|---|---|
| NZ | .122 | .20 | .36 |
| World | .142 | .164 | .56 |
| Tilted | .136 | .159 | .54 |

In this case then, amongst the three options, the best portfolio of risky assets is now the world market portfolio, followed by the "tilted" portfolio.

We now turn to the case in which markets are fully integrated, as in the capital asset pricing models of Solnik (1974a) and Stulz (1995a). In this case, the optimal portfolio of risky assets is the world market portfolio (hedged against exchange rate risk). This is illustrated using the Sharpe ratio, as in the case of segmented markets. Since Example 1 indicated the superiority of the tilted portfolio over the world market portfolio, we will invoke the parameters in that example in so far as that is possible.

Example 3: As per Example 1, except that markets are now integrated. In Example 1, all markets under segregation were assumed to exhibit a *k* ratio of 2. Accordingly, that ratio would also apply under integration to the world market (Stulz, 1995b). Thus, under integrated markets, the world market risk premium will be twice its variance, i.e.,

$$MRP_w = 2(.164)^2 = .054$$

The expected return for the world market portfolio will then be the sum of this and the risk free rate, i.e., .104. The expected return for market 1 (New Zealand) will be

$$E_1 = .05 + .054\beta_{1w} \tag{1}$$

where $\beta_{1w}$ is the beta of the New Zealand market against the world market portfolio. This beta is

$$\beta_{1w} = \frac{Cov(R_1, R_w)}{Var(R_w)} = \frac{Cov(R_1, .3R_2 + .4R_3 + .3R_4)}{Var(R_w)} = \frac{.7\sigma_{12} + .3\sigma_{13} + .3\sigma_{14}}{Var(R_w)} \tag{2}$$

Substituting for the covariance and variance terms from Example 1 above, the result is a beta of .74. Substituting into equation (1) yields an expected return for the New Zealand market of .090. This is much less than in Example 1, because it is now determined by New Zealand's beta against the world market portfolio rather than New

Zealand's market variance. The expected returns, standard deviations and Sharpe ratios for the three portfolios considered earlier are then as follows.

| | $E_p$ | $\sigma_p$ | $S_p$ |
|---|---|---|---|
| NZ | .090 | .20 | .20 |
| World | .104 | .164 | .33 |
| Tilted | .100 | .159 | .31 |

Naturally, the world market portfolio is now the best of the three, followed by the "tilted" portfolio. This reverses the rank ordering in Example 1.

In summary, if world markets are integrated, the best portfolio of risky assets for an investor lacking superior insights into true parameter values is the world market portfolio. If markets are perfectly segmented, then (amongst the world market portfolio, the home market portfolio, or a "tilted" portfolio) the best portfolio is generally either the world or the tilted portfolio. However, it is impossible to know which is better, because it demands knowledge of expected returns and correlation coefficients to a degree that is not really attainable. All of this suggests that, unless an investor has superior insights into parameter values, the best risky portfolio to choose is the world market portfolio. Even if an investor does have some superior insights, the world market portfolio is a useful starting point, and the assumption that it is otherwise optimal allows initial estimates of expected returns to be deduced. In particular, Black and Litterman (1992) derive initial estimates in this way. Having done so, they then admit superior information on some assets, and present a methodology for adjusting the initial parameter estimates. The result is to tilt the chosen portfolio away from the world market portfolio. So, the fact that there is estimation risk does not of itself justify tilting towards home country assets. Tilting towards the home market requires superior (and favourable) information about the local market.

*2.2 Diversification Benefit Overstated*

The NZX next argues that, since the presentation of studies that appeared to show considerable benefits to international diversification (Grubel, 1968; Solnik, 1974b;

Bailey and Stulz, 1990), national stock markets are much more highly correlated. They also argue that correlation increases with the length of the future period to which the portfolio analysis is addressed (the investment "horizon"), and that the NZSF's horizon is very long-term. They conclude that these points significantly reduce the benefit to the NZSF from international diversification, and therefore imply that the NZSF should tilt towards the home market.

However the analysis in the previous section concludes that, in the absence of superior information, the optimal portfolio of risky assets is the world market portfolio, for any level of market correlations below 1. Of course, the benefits to international diversification are reduced by any increase in correlations, but it does not follow from this that one tilts away from the world market portfolio. To illustrate this, the table in Example 3 is recomputed using a correlation coefficient between all pairs of markets of .70 rather than .50. The result is as follows.

| | $E_p$ | $\sigma_p$ | $S_p$ |
|---|---|---|---|
| NZ | .106 | .20 | .28 |
| World | .114 | .179 | .36 |
| Tilted | .112 | .176 | .35 |

The world market portfolio is still superior to the "tilted" portfolio, but not to the same degree.

*2.3 Higher Correlations in Market Downturns*

The NZX raises a number of arguments here. The first is that correlations rise in significant market downturns, implying that the benefits of international diversification are virtually zero. Accordingly, a significant tilt towards the home market is warranted. However, unless the correlation coefficient reaches 1 (and this is not asserted), the analysis in section 2.1 still holds. Absent investor specific information, the optimal risky portfolio to hold is still the world market portfolio.

Having said this, it is nevertheless interesting to examine the papers that the NZX cites in favour of tilting towards the home market. Butler and Joaquin (2002) present

empirical evidence showing that correlations rise during pronounced market downturns. They go on to suggest that, in so far as these increased correlations can be predicted, then a reduction in international diversification is warranted. Nevertheless, they are clearly sceptical about the ability of investors to forecast these changes in correlations. To quote them (ibid, p. 1008):

"Because of the infrequency and randomness of extreme market events, this prediction is difficult to make with precision."

Furthermore, even if such prediction could be made with perfect precision, unless one is suggesting that only some investors have access to this information (hardly likely if it comes from a publicly available source), the analysis in sections 2.1 and 2.2 still holds, i.e., with integrated capital markets, an increase in correlation coefficients simply leads to changes in expected returns, not to tilting the optimal portfolio away from the world market portfolio.

Ang and Bekaert (2002) conduct a theoretical analysis of the issue. In particular they examine whether a shift from a low to a high correlation regime should induce a substantial tilt towards the home market. They find that that the portfolio weight for the home market generally increases. However, their study has at least two significant limitations, which they specifically acknowledge. First, it assumes that investors have perfect knowledge of future return distributions and therefore always know whether the future is characterised by a high or low correlation regime. As they note, uncertainty on this point would leave investors with less justification for altering their portfolios in the face of a regime change (ibid, p. 1182). Secondly, their model does not incorporate equilibrium considerations, as in Solnik (1974a), Stulz (1995a) or Black and Litterman (1992). In particular, if markets are integrated, then regardless of correlation coefficients, the optimal portfolio of risky assets is the world market portfolio (assuming no investor specific information).

Finally, Malkiel (2002) is cited in support of the proposition that international diversification now has little value. Malkiel certainly presents this proposition, but then proceeds to *rebut* rather than support it. In particular, he presents empirical evidence that a portfolio comprising only US stocks was outperformed in the

Markowitz sense by a portfolio that also included European and Asian stocks, using data from 1970-1998 (ibid, Figure 4). Furthermore, in respect of the claim that correlations between markets are now so high as to largely undercut the benefits of international diversification, he suggests that the high recent estimated sample correlations between US and EAFE (European and Asian) stocks are indicative merely of sampling error. To quote (ibid, p. 21)

"I would not necessarily take the past few years as an indication of future market behaviour, i.e., continued high or increasing correlations."

The NZX then goes on to observe that "..there is little evidence that international diversified portfolios actually perform better than domestic ones..", and cite Elton and Gruber (1995, p. 280) in support of this. However the relevant words in Elton and Gruber are a reference to the fact that US funds have not held internationally diversified portfolios over long periods. This does not prevent us from ascertaining what their returns would have been if they had done so, at least in respect of passive policies. This is standard practice in assessing the effects of international diversification, and Elton and Gruber (ibid, Ch. 12) present numerous tables formed in that way. These tables contribute to their unambiguous endorsement of international diversification. The conclude as follows (ibid, p. 288)

"The evidence that international diversification reduces risk is uniform and extensive. Given the low risk, international diversification is justified even if expected returns are less internationally than domestically."

The NZX then goes on to observe that asset specific risk has increased in the last 30 years. It then cites Malkiel (2002) in support of the statement that "portfolio theory as it pertains to diversification and idiosyncratic risk is longer accurate" (NZX, p. 9). No further discussion of this point occurs. All of this could lead the reader to conclude that Malkiel believes that international diversification is no longer effective. However, as noted above, the overall tenor of Malkiel's paper is supportive of international diversification. Furthermore he notes a readily available solution to the problem of increased idiosyncratic risk, i.e., to the problem that more highly

diversified portfolios are now required to eliminate most idiosyncratic risk. The solution is to purchase a well-diversified fund (ibid, p. 18).

Finally, the NZX asserts that the increasing availability of locally traded assets with claims over foreign assets makes it possible to capture the benefits of international diversification without holding offshore assets, and cites Errunza et al (1999) in support. However, notwithstanding this paper, the literature survey on this question by Lewis (1999, p. 582) does not support this conclusion. Furthermore, the market examined by Errunza et al is the US, in which there are large numbers of locally traded assets with claims over foreign assets. As noted by the authors (ibid, p. 2075)

"..over the past 20 years, an increasing number of country funds and depository receipts have started trading in the US that, along with shares of multinational corporations, can be used to gain benefits from international diversification."

This hardly seems like a description of the New Zealand market, and therefore extrapolation of the Errunza et al conclusion to the New Zealand market seems premature.

*2.4 Further Implications of Estimation Risk*

The NZX next argues that portfolio selection in the Markowitz framework is bedevilled by errors in estimating expected returns and covariances from past returns[2]. It suggests that these errors can be partially mitigated by incorporating economic variables such as market dividend yields, interest rates and the exchange rate forward premium. Furthermore, it is argued that these variables reduce the degree of estimation error more in domestic assets than foreign assets, due to "geographic information asymmetry" (ibid, p. 9), i.e., local investors know more about the values of the local economic variables than do foreigners. Accordingly, one should tilt towards domestic assets. There are three premises here, followed by a conclusion. The first two premises are uncontroversial, and Hasan and Simaan (2000) are cited in support of them. The third states that using the market dividend yield, interest rates

[2] Section 2.1 is also concerned with estimation risk. However, in that section, the NZX advances no arguments linking the presence of estimation risk to the desirability of tilting towards the home market. In the current section, it now does so.

and the exchange rate forward premium can reduce the degree of error in estimating expected returns for domestic assets more than for foreign assets. However, the predictors mentioned are publicly available information[3]. Accordingly, it seems inconceivable that their use could yield greater benefits to local than foreign investors.

By contrast with the NZX paper, Hasan and Simaan assume equal ignorance on the part of both local and foreign investors in respect of the expected returns and covariances of all assets. Nevertheless, they conclude under certain conditions that holding the domestic portfolio is superior to international diversification. The essence of their paper can be illustrated as follows. Suppose that there are two markets, in which the expected returns are each .10, the standard deviations are each .20 and the correlation coefficient is zero. In addition, market capitalisations are equal. If investors are fully informed about these parameter values, they will each choose the world market portfolio (50% weight on each market), involving an expected return of .10 and standard deviation of

$$\sigma = \sqrt{.5^2(.20) \ + .5^2(.20)^2} = .14$$

This is superior to holding either country's portfolio, with the same expected return but with a lower standard deviation. They now recognise that investors are subject to estimation errors in respect of these parameters. For the purposes of illustration, assume that they are fully informed about the standard deviations and the correlation coefficient. Thus, estimation error relates to expected returns. To illustrate the problem, suppose that an investor concludes that the expected return for market 1 is greater than .10 whilst that for market 2 is less than .10. In the absence of restrictions on short sales, this may lead to choosing a portfolio in which the weight on market 1 exceeds 1 and that on market 2 is negative. For example, suppose the weights are 2 and –1 respectively. Of course the belief that the expected returns on the two assets differ is in error. The true expected return on their portfolio is still .10, but the shorting of market 1 leads to a standard deviation on the portfolio of

$$\sigma = \sqrt{2^2(.20) \ + (-1)^2(.20)^2} = .44$$

[3] Hasan and Simaan obtain the data from Datastream.

This is dramatically inferior to choosing the local market. It is essentially through such reasoning that Hasan and Simaan conclude that holding the local market portfolio is superior to international diversification. However there are two significant difficulties with their reasoning. First, they allow short selling. In its absence, the problem largely evaporates, i.e., in its absence from this example, the worst international portfolio will have a standard deviation equal to that of either of the individual markets. Hasan and Simaan in fact examine the consequences of eliminating short-selling, and they find that international diversification is then superior to holding only the local market portfolio, although the degree of superiority is small (ibid, section 3.3). The second difficulty here is that Hasan and Simaan admit only two possibilities: holding the domestic portfolio and choosing an internationally diversified portfolio on the basis of Markowitz parameters that are erroneously estimated through the use of historical data. In particular, expected returns are estimated through 5 years of monthly data. Of course, such limited historical data is bound to produce deficient estimates, and presumably many of them will even be negative; this biases the test against international diversification. Had Hasan and Simaan included the world market portfolio of risky assets in their analysis, they would presumably have reached the conclusion that this portfolio was in fact superior to the domestic portfolio. This is the conclusion reached in section 2.1 of the present paper.

*2.5 Inapplicability of the Normal Distribution*

The NZX next argues that return distributions are non-normal, and therefore "..the optimal solution set looks significantly different than the one based on an unlikely to hold normal distribution (i.e., mean-variance's basic assumption)". However it is never stated here what the optimal solution would be. The implication is that tilting towards the home market is justified. However, mean-variance theory does not require that return distributions are normal. It requires only that investors choose portfolios on the basis of mean and variance. Normality of returns is sufficient for this, but it is not necessary. An alternative assumption is that investors have quadratic utility functions. Markowitz (1952) refers only to the more general requirement. Subsequently, Sharpe (1964, pp. 427-8) mentions quadratic utility whilst Lintner (1965, p. 16) mentions both normality and quadratic utility. In a more recent discussion, Elton et al (2003, p. 293) simply restate the general requirement that

investors make decisions on the basis of mean and variance. Furthermore, even if none of these assumptions held, it does not imply that one should tilt to the home market. The analysis in section 2.1 would still lead an uninformed investor to choose the world market portfolio of risky assets.

## 3. Rationale for a Substantial Home Country Bias

### *3.1 Peer Benchmarking*

The NZX cites Shore and White (2002), who offer an explanation for local bias as follows. The risk of a portfolio to a particular investor is defined as its return relative to the return earned by that investor's local peers, rather than in the usual way as dispersion around the mean, i.e., "peer benchmarking". In addition, it is assumed that some investors are unavoidably bound to large weightings on local assets (such as small business owners and company executives). Consequently, the remaining investors are driven to replicate the portfolios of the first mentioned local investors.

The concept can be illustrated using the example in section 2.4, i.e., two markets with expected returns of .10 each, standard deviations of .20, zero correlation coefficient and equal market weights. As shown earlier, the optimal portfolio of risky assets is then the global market portfolio with expected return of .10 and standard deviation of .14. This approach implicitly assumes that risk is defined as dispersion about the mean outcome. However, suppose that risk is defined as departures from the portfolio outcome for those local investors who are bound to hold only local assets. To see the effects of this upon portfolio choice, let the distribution for returns ($R$) in each of the markets involve equal probability on .30 and -.10, i.e.,

| *R* | *Prob* |
|---|---|
| .30 | .50 |
| -.10 | .50 |

This distribution is consistent with a mean of .10 and a standard deviation of .20. If the local portfolio return is the benchmark, then choosing the local portfolio will always yield a return equal to the benchmark. Thus, the risk in the local portfolio relative to the benchmark is zero. The risk measure for the world market portfolio, relative to the benchmark, is .14, as derived in the Table below. The Table shows the

four possible combinations of the benchmark return $R_B$ (.30 or -.10) and the return in the foreign market $R_F$ (.30 or -.10). Since the two markets are uncorrelated, the four possible outcomes are equally likely, as reflected in the probabilities recorded in the first column (*Prob*). Since the world market portfolio is equally weighted on the two markets, its return $R_w$ is the simple average of $R_B$ and $R_F$. The last column then shows the deviation (*Dev*) of $R_w$ from the benchmark return $R_B$. As is apparent, there is a 25% chance of a deviation of .20, a 25% chance of a deviation of -.20, and a 50% chance of no deviation. Accordingly the standard deviation of the world market portfolio return (relative to the benchmark) is .14.

| *Prob* | $R_B$ | $R_F$ | $R_w$ | *Dev* |
|---|---|---|---|---|
| .25 | .30 | .30 | .30 | 0 |
| .25 | .30 | -.10 | .10 | -.20 |
| .25 | -.10 | .30 | .10 | .20 |
| .25 | -.10 | -.10 | -.10 | 0 |

So, if risk is defined relative to the local portfolio, then the local portfolio is superior to the world market portfolio for local investors. Does this approach make sense? If it does, then it can be applied to any portfolio. Consider government bonds, offering .05 for certain. This would generally be called a risk free asset, because dispersion about the mean is zero. However, in the Shore and White framework, the risk would be defined as dispersion about the benchmark, which is the local portfolio. Following the analysis in the above Table, the risk of the local portfolio would be zero whilst that of government bonds would be .21. This is higher than the risk of both the local portfolio (zero) and the world portfolio (.14). These are strange results. Even stranger is the following implication. Since the local portfolio is "riskfree", but government bonds are not, then in a world of segmented markets the expected return on the local portfolio should exceed that of government bonds, i.e., the "market risk premium" should be negative! This conflicts with most of the historical evidence on this question, not only in New Zealand but elsewhere (Lally and Marsden, 2003; Dimson et al, 2002; Fama and French, 2002)[4].

[4] This historical evidence consists of returns data over the last several decades. Most of the data therefore precedes 1975, which is the earliest point at which significant integration of markets could have occurred. Accordingly the data largely reflects the situation in respect of segmented markets.

The NZX also cite DeMarzo et al (2002), who also offer an explanation of local bias. DeMarzo et al frame their argument in two equivalent ways, and one of these bears a strong similarity to the Shore and White argument. In particular, they assume that investors are concerned by their status relative to other local investors. This is equivalent to the "peer benchmarking" of Shore and White. However, unlike Shore and White, there are no assets that any local investor is bound to hold. If some investors tilt their portfolios locally, the rest are driven to do likewise by peer benchmarking considerations. However, if every local investor believes that their peers will not tilt their portfolios in this way, there is no incentive for them to do so, and all local investors are then better off. DeMarzo et al show that equilibriums of the former type are stable whilst those of the latter type are unstable. So, local bias is then likely. As they note, this is akin to a "prisoner's dilemma" problem in game theory[5]. Thus, whilst these ideas might explain local bias, they also generate a public policy argument for encouraging international diversification. To quote (ibid, p. 29)

> "..there is a role for social policies which subsidize investor diversification."

So, ironically, the implications of this paper for the NZSF are that it should *not* tilt towards the New Zealand market even if there are some (other) arguments to support doing so. This principle also extrapolates to the Shore and White paper, so long as the local portfolio holdings of investors that are unavoidable are not overwhelmingly large.

*3.2 Matching Assets to Liabilities*

The NZX next argues that local portfolio tilting is warranted by the fact that the NZSF has local liabilities, and cites Griffin (1997) in support. In the presence of liabilities whose future payouts are fixed, and hence whose present value is sensitive only to local interest rates, assets with higher correlations against local interest rates are more desirable to the portfolio manager. Thus, if local equities are more highly correlated

[5] Each of two (guilty) prisoners is prompted to confess, out of fear that the other prisoner will do so, and thereby earn a lighter sentence. However the optimal strategy is to each to remain silent.

with local interest rates than are foreign equities, then they are desirable on account of that fact. Thus, local tilting could be justified.

However, it is implicit in this reasoning that the liabilities in question will be met only from the portfolio in question. The NZSF is not in this position. The liabilities in question are not liabilities of the NZSF so much as of the New Zealand taxpayer; this is apparent from the fact that the New Zealand taxpayer will meet any shortfall in the fund's assets relative to the liabilities in question. Thus, if one moves beyond consideration of the fund's assets to include these liabilities, one should include all other assets and liabilities of the New Zealand taxpayer. These assets include human capital and real estate, which are the dominant elements in their aggregate portfolio of assets. Thus, even in the absence of the NZSF tilting towards the local market, the aggregate assets of New Zealand taxpayers are already heavily tilted in this direction. Given that there are advantages to some degree of international diversification (and even the NZX does not disagree with this), it may be the case that New Zealand taxpayers are tilted too heavily towards the local market. In that event, the NZSF should be used to correct that position, and this would involve tilting *away* rather than towards the local market. In respect of human capital, this conclusion is supported by the analysis of Baxter and Jermann (1997).

*3.3 Currency Risk*

The NZX next introduces the issue of currency risk. They note that its presence adversely affects international diversification, but that it can be hedged away by some portfolio managers. However the NZSF is too large an entity to be able to do this, except at prices that are particularly disadvantageous to it. Accordingly, local tilting is warranted.

The extent to which the NZSF will move market prices against it in respect of currency hedging is unclear. However, if the NZSF invests in the local equity market to the extent envisaged by the NZX, it will also move these asset prices against itself, and the NZX paper offers no comments on this problem. Three extreme possibilities arise here: holding the world market portfolio unhedged against currency risk, holding this portfolio hedged, and holding the local market portfolio. The last two are subject to the NZSF moving prices against itself, whilst the first is subject to exchange rate

risks. This paper does not attempt to assess the relative significance of these problems. However it is not obvious that the optimal solution involves local tilting.

*3.4 Information Disadvantages of Investing in Foreign Assets*

The NZX next introduces the issue of informational disadvantages from investing in foreign stocks, i.e., local investors have an advantage in terms of the information that they receive and in their ability to interpret it compared to foreign investors. In support of this, they cite Gehrig (1993), and Coval and Moskowitz (2001).

Gehrig (1993) offers some justifications for an informational advantage to local investors, models the consequences for portfolio choice (local bias results), and offers some empirical evidence consistent with this conclusion. That local bias would arise for an investor with a local information advantage seems clear. The justifications for the premise comprise local investors having a better understanding of the nature of local businesses, and the difficulties experienced by foreigners in translating and interpreting balance sheet information. However the fact that New Zealand is an English speaking country, and its accounting policy standards generally conform to those of other Anglo-Saxon countries, does not argue for any great weight being placed on the translation and interpretation issues. Lewis (1999, p. 585) makes a similar point in respect of US investment in Germany, in which the language barrier is still present. This leaves the claim that local investors will have a better understanding of local businesses. This is doubtless true for some local investors. Whether the NZSF would be a member of that elite group is far from obvious. In respect of empirical work, Gehrig (ibid, Table 1, Table 2) documents the fact that German and Swiss funds exhibited much greater local bias in respect of stocks than for bonds. Gehrig attributes this to informational advantages in respect of local stocks. However what he is really documenting (at most) is a *belief* on the part of these funds that they have such an informational advantage. Belief is not equivalent to fact. For example, active funds presumably believe that they add value, a belief that does not seem to be supported by the empirical evidence, and even Gehrig acknowledges the latter point (ibid, p. 99). In addition to this potential distinction between belief and fact, the empirical evidence on the question of local bias in equities relative to bonds is mixed. Griffin (1997, Exhibit 1) provides contrary evidence for US insurance companies and pension funds.

Coval and Moskowitz (2001) examine the returns to active fund managers from holding local rather than non-local assets, and find that the local assets not only outperform the non-local assets but earn an average of 1.84% more than a passive benchmark. From this the NZX concludes (ibid, p. 13) that "..local fund managers are able to exploit the informational advantage of local investments." However the definition of a "local" asset employed in the Coval and Moskowitz paper is not a domestic asset but an asset whose headquarters is located within 100km of the fund's headquarters. Consequently, the implications of the Coval and Moskowitz paper for the NZX (if any) are that the latter should tilt towards Auckland rather than New Zealand assets. Of course, this aggravates the problem discussed in the previous section, of the NZSF driving up market prices to its disadvantage. Various other aspects of the paper also suggest that the implications for the NZSF are limited. Firstly, only a minority of the funds examined in the study exhibit local bias (the rest are biased in the other direction), and these are presumably the ones with a local information advantage (ibid, pp. 825-826). Thus the NZX's claim that "..local fund managers are able to exploit the informational advantage of local investments" is far too strong. Instead, it can be said that a minority of funds possess a local information advantage. It seems optimistic to suppose that the NZSF would belong to that elite group. Secondly, the funds exhibiting the local bias in the Coval and Moskowitz study tend to be small, long-established, centered in smaller cities, and focussed upon smaller stocks (ibid, pp. 827-828). Of course, the NZSF does not meet the first three of these criteria, and does not seem capable of meeting the fourth on account of the size of the fund. Finally, amongst the funds with the local bias, the subgroup with the largest performance gain from doing so (a risk adjusted excess return of 3.18% per yr) exhibits a local bias of only 1.2%, i.e., it holds 5.8% of its assets locally compared to a market percentage of 4.6% (ibid, Table 3). Thus, even if it were possible for the NZSF to replicate the performance of this elite group, the effect upon its overall rate of return would be only 16 basis points (3.18% on 5.2%). In addition, this 1.2% tilt towards local stocks (i.e., Auckland, and therefore, New Zealand stocks) would be only a fraction of the 25-30% tilt argued for by the NZX.

## 4. Empirical Support for Home Bias

The NZX finally observes that home bias is very pronounced, and this implies some rational explanation must exist for it[6]. There are at least four difficulties in this argument. First, surveys of the phenomenon generally conclude that there is no persuasive explanation for it (for example, Lewis, 1999). Secondly, there is some evidence from psychological economics that investors do exhibit unjustified concerns over unknown scenarios (for example, Heath and Tversky, 1991). French and Poterba (1991) reach the same conclusion. Thirdly, over the past several years, the extent of home bias has significantly decreased. The NZX cite figures from French and Poterba (1991), in which the domestic ownership of stocks in the world's five largest markets averaged 90%; more recent figures from Coen (2001) give the average of the same five markets as 80%. This time trend is not obviously consistent with a rational but unknown reason for home country bias. It is consistent with the alternative hypothesis that investors do exhibit an irrational aversion to international diversification, and this aversion is eroding as investors gradually become more aware of the benefits of international diversification. Finally, if one adopts the presumption of rationality in respect of investor diversification across markets, the same presumption would have to be adopted in respect of other investment phenomena. For example, the size of the actively managed portfolio industry would have to be attributed to investor rationality, and there seems little possible rationale for this except the earning of superior returns. However, the weight of evidence in this area does not support this, and the conclusion is generally accepted even amongst the papers cited by the NZX. For example, Coval and Moskowitz (2001, p. 812) states that

"Studies of mutual fund managers, pension fund managers, and individual investors, all find that their investors, if anything, consistently underperform the market and other passive benchmark portfolios."

Thus, there would seem to be strong evidence of investor irrationality in this area (active management bias), and this is inconsistent with the proposition that investors

[6] New Zealand fund managers seem to exhibit less than the normal level of home bias. Application of the argument to them would suggest that they must be wrong.

always act rationally. Interestingly, the size of the actively managed relative to the passively managed funds industry has declined over time. The hypothesis that investors are less than fully rational, but gradually improve over time in the face of empirical evidence, could explain both the existence and gradual diminution in both the active management and home biases.

## 5. An Alternative Rationale for Home Bias

So far, a number of arguments presented by the NZX for a strong home market bias have been examined, and none found to be compelling. Whilst the list of arguments presented is extensive, it omits any consideration of taxation based arguments for local bias[7]. Accordingly this section now investigates that issue. The treatment of this issue depends upon the way in which the NZSF treats tax (it is taxed in the normal way). One approach is for the NZSF to treat the tax in the usual fashion, i.e., to focus upon returns net of all tax. In this case, the NZSF (like other local investors) enjoys benefits from imputation credits in excess of those enjoyed by foreigners, and it is likely that this effect is less than fully priced into New Zealand assets due to the effect of foreigners on these prices. This justifies New Zealand investors tilting towards New Zealand stocks.

To determine whether this tilting is significant, we return to Example 3 of section 2.1. This involved four national markets (New Zealand and three others), with standard deviations ($\sigma$) and world market portfolio weights ($w$) as follows.

| Market | $\sigma$ | $w$ |
|---|---|---|
| 1 (NZ) | .20 | 0 |
| 2 | .15 | .30 |
| 3 | .20 | .40 |
| 4 | .25 | .30 |

[7] The seminal paper in this area is Black (1974).

All markets are fully integrated, with the same risk free rate of $R_f = .05$, currency risks are assumed to be zero or to be hedged away, all correlation coefficients between markets are .50, and the world market risk premium is .054. Example 3 showed that, in equilibrium, the expected return for the New Zealand market was $E_1 = .090$. By the same process, reflected in equations (1) and (2), the expected returns for the other three markets are $E_2 = .087$, $E_3 = .106$, and $E_4 = .119$. The set of expected returns ($E$) and the covariance matrix ($\Sigma$) are then as follows.

$$E = \begin{matrix} .090 \\ .087 \\ .106 \\ .119 \end{matrix} \qquad \Sigma = \begin{matrix} .040 & .015 & .020 & .025 \\ .015 & .0225 & .015 & .01875 \\ .020 & .015 & .040 & .025 \\ .025 & .01875 & .025 & .0625 \end{matrix}$$

Coupled with a risk free rate, this set of expected returns and covariance matrix could be used to determine the optimal portfolio of risky assets for any investor. Of course, the solution is the weights in the world market portfolio, i.e.,[8]

$$w_1 = 0, \quad w_2 = .30, \quad w_3 = .40, \quad w_4 = .30$$

We now examine the consequences of dividend imputation credits for the optimal risky asset weights of New Zealand investors. These imputation credits lower the effective tax rate on cash dividends to New Zealand investors to a greater degree than foreigners. Assume a base tax rate of 33% for all investors. Then, with credits attached at the maximum rate, the effective tax rate on cash dividends to New Zealanders is reduced to zero whilst that to foreigners is reduced to 21% (see Lally, 1998, p. 23). However the average rate of credits for New Zealand companies is about 80% of the maximum rate (see Lally, 2000, p. 6). Thus, the effective tax rate for New Zealanders would be reduced from 33% to 7% and that of foreigners from 33% to 23%. With a cash dividend yield in the New Zealand market of about 4% (see Lally, 2000, p. 6), the effect upon the after tax return to New Zealanders is an increase of 1.1% whilst that for foreigners is an increase of 0.4%. The incremental benefit to New Zealanders is then 0.7%. There is room for debate on many of these

[8] Elton et al (2003, Ch. 6) presents the methodology.

calculations. In particular the base tax rate facing foreign investors in New Zealand equities may be less than 33%, in which case the incremental benefit to New Zealanders relative to foreigners may be as much as 1%. We will use this figure. Such a figure is equivalent to raising the expected return on New Zealand assets to New Zealanders by 1%, whilst leaving the expected return to other investors unchanged. Consequently, we raise the expected return on New Zealand equities to New Zealanders from the .090 above to .100. All other expected returns, and the covariance matrix, are unaffected. So, in respect of a New Zealand investor, the expected returns on the four markets, and the covariance matrix are now as follows.

$$E = \begin{matrix} .100 \\ .087 \\ .106 \\ .119 \end{matrix} \qquad \Sigma = \begin{matrix} .040 & .015 & .020 & .025 \\ .015 & .0225 & .015 & .01875 \\ .020 & .015 & .040 & .025 \\ .025 & .01875 & .025 & .0625 \end{matrix}$$

Along with a risk free rate of .05, the optimal risky portfolio weights are then re-determined. The results are as follows.

$$w_1 = .15, \quad w_2 = .20, \quad w_3 = .37, \quad w_4 = .28$$

Thus, if markets are fully integrated, the fact that New Zealanders enjoy greater benefits than foreigners from New Zealand imputation credits suggests that the optimal weight on the New Zealand market for a New Zealand investor is raised from zero to 15%, i.e., a tilt of 15% towards the New Zealand market. This figure is subject to two caveats. Firstly, the calculations assume that assets are priced internationally; to the extent that this is not completely true, the appropriate tilt towards New Zealand assets would be less. Secondly, the expected return increment of 1% is an upper bound even within the context of these calculations, and therefore the tilt towards New Zealand assets may be overstated.

We now consider the alternative approach to the taxation issue, which the NZSF has taken, i.e., the NZSF concerns itself with foreign but not local taxes, because the net effect of paying the latter upon the taxpaying owners of the NZSF is zero. Whether

this approach to taxation issues is appropriate is not assessed in this paper. However, if it is adopted, then the only relevant tax on any assets is withholding tax on foreign assets. In respect of the NZSF, this still imparts a tax advantage in favour of local assets, and this will justify tilting towards the local market. Furthermore, this effect operates regardless of whether markets are segmented or integrated. However, the maximum rates of withholding tax on foreign assets, and the opportunities to avoid this tax in respect of capital gains, suggests that the tax advantage of New Zealand assets to the NZSF would be equivalent to raising their expected returns by less than the 1% appearing in the previous calculations. Accordingly, the local tilt calculated above is likely to be too high.

## 6. Summary

This paper has examined a number of arguments presented by the NZX for the NZSF to tilt significantly towards the New Zealand market. These arguments, and my responses to them, are as follows.

The first is that application of the Markowitz model is subject to estimation risk, and this justifies tilting towards the home market. No arguments linking the premise to the conclusion are offered here. The premise is acknowledged, and a number of possible responses to the problem are examined. Contrary to the NZX suggestion, they suggest that the optimal portfolio of risky assets is the world market portfolio.

The second argument is that traditional studies in support of international diversification understate the currently prevailing correlation coefficients between markets, and therefore overstate the benefits of international diversification. It is shown that, even if this reasoning is correct, it does not justify tilting away from the world market portfolio of risky assets.

The third argument is that correlations rise in significant market downturns, implying that the benefits of international diversification are virtually zero. Accordingly, a significant tilt towards the home market is warranted. However, unless the correlation coefficient reaches 1 (and this is not asserted by the NZX), then there is no justification for tilting away from the world market portfolio of risky assets.

The fourth argument offers the theoretical analysis of Hasan and Simaan (2000) in support of the proposition that "estimation risk" justifies tilting towards the local market. However their analysis compares only the local portfolio with an international portfolio, with the latter selected in accordance with the Markowitz mathematics and with estimation risk contaminating the parameter estimates. Furthermore, by allowing short-selling, these estimation risks are significantly aggravated. Had the world market portfolio been included in the comparison, it is likely to have outperformed the two possibilities considered. Thus, in my view, the Hasan and Simaan analysis does not support tilting away from the world market portfolio of risky assets.

The fifth argument is that the Markowitz methodology assumes that returns are normally distributed, which is not the case, and this justifies tilting away from the world market portfolio. However, the premise that the Markowitz methodology assumes normality of returns is incorrect. Furthermore, no linkage from the two premises to the conclusion is offered.

The sixth argument is that of Shore and White (2002). They define the risk of a portfolio to a particular investor as its return relative to the return earned by that investors local peers, rather than in the usual way as dispersion around the mean, i.e., "peer benchmarking". In addition, they assume that some investors are bound to large weightings on local assets (such as small business owners and company executives). Consequently, the remaining investors are driven to replicate the portfolios of the first mentioned local investors. The difficulty with this argument lies in the definition of risk. If it is adopted then the local market portfolio is "risk free" and government bonds are risky. Thus the market risk premiums in a world of segmented markets would be negative, and this conflicts with the historical evidence. A related argument by DeMarzo et al (2002) is also presented, but they characterise the resulting local bias as suboptimal. Accordingly, the public policy implications of that argument, as conveyed by the authors, are that international diversification should be *encouraged* rather than discouraged.

The seventh argument is that the NZSF has local liabilities, and this justifies tilting towards the New Zealand market. However, the liabilities in question are not liabilities of the NZSF so much as of the New Zealand taxpayer. Thus, if one moves beyond consideration of the fund's assets to include these liabilities, one must include all other assets and liabilities of the New Zealand taxpayer. This may support the conclusion that the NZSF should tilt *away* rather than towards the local market, to compensate for the unavoidably inadequate diversification inherent in that total set of assets.

The eighth argument is that currency risk adversely affects international diversification, and that the NZSF is too large an entity to be able to hedge this away except at prices that are particularly disadvantageous to it. Accordingly, local tilting is warranted. However, if the NZSF invests in the local equity market to the extent envisaged by the NZX, it will also move these asset prices against. Three extreme possibilities arise here: holding the world market portfolio unhedged against currency risk, holding this portfolio hedged, and holding the local market portfolio. The last two are subject to the NZSF moving prices against itself, whilst the first is subject to exchange rate risks. This paper does not attempt to assess the relative significance of these problems. However it is not obvious that local tilting is optimal.

The ninth argument is that local investors have an information advantage over foreign investors in selecting local assets, and should therefore tilt locally. The justifications offered here are not particularly compelling, and the evidence cited in Gehrig (1993) supports only a *belief* on the part of fund managers that they have this ability. Evidence from Coval and Moskowitz (2001) on the existence of this ability does not seem to warrant extrapolation to the NZSF.

Finally, the tenth argument is that local bias is very strong, and this suggests some rational explanation must exist. This argument has a certain appeal, but it does not seem able to explain the marked shift over time in favour of international diversification. It also implies that all investor behaviour is rational, and this conflicts with other evidence including the size of the actively managed funds industry.

In summary, none of these arguments provides a strong justification for tilting away from the world market portfolio in favour of the New Zealand market, and some even point to the opposite conclusion. The strongest of the arguments in favour of local tilting is that of difficulties in hedging exchange rate risk, but even this does not point to a local tilt of at least the 20% suggested by the NZX.

Despite all this, a justification for local tilting can be offered, which has not been presented in the NZX paper. This derives from taxation considerations, although the form of the argument depends upon whether the NZSF concerns itself with all taxes paid or only those paid to foreign tax authorities. If the NZSF concerns itself with all taxes paid, then a local tilt is justified by the incremental dividend imputation benefits to local over foreign investors, coupled with the likelihood that these incremental benefits are not fully priced into New Zealand assets. By contrast, if the NZSF concerns itself only with taxes paid to foreign tax authorities, then a local tilt is justified by the fact that the NZSF is tax-exempt on local but not foreign assets. Depending upon the approach taken to this tax issue, a local tilt of up to 15% could be justified. Nevertheless, this tax based justification for local tilting must be weighed against the previous arguments. In particular, concerns about local tilting driving up asset prices to the disadvantage of the NZSF, and the possibility that New Zealand taxpayers are already too strongly biased locally, might still argue for little or no local tilting.

**References**


Ang, A. and Bekaert, G., 2002. "International Asset Allocation with Regime Shifts", *Review of Financial Studies*, vol. 15(4), pp. 1137-1187.

Bailey, W. and Stulz, R., 1990. "Benefits of International Diversification: The Case of Pacific Basin Stock Markets", *The Journal of Portfolio Management*, Summer, pp. 57-61.

Barry, C., 1978. "Effects of Uncertain and Nonstationary Parameters upon Capital Market Equilibrium Conditions", *Journal of Financial and Quantitative Analysis*, vol. 13(3), pp. 419-433.

Baxter, M. and Jermann, U., 1997. "The International Diversification Puzzle is worse than you think", *American Economic Review*, vol. 87, pp. 170-181.

Black, F., 1974. "International Capital Market Equilibrium with Investment Barriers", *Journal of Financial Economics*, vol. 1, pp. 337-352.

_____ and Litterman, R., 1992. "Global Portfolio Optimisation", *Financial Analysts Journal*, September-October, pp. 28-43.

Brown, S., 1979. "The Effect of Estimation Risk on Capital Market Equilibrium", *Journal of Financial and Quantitative Analysis*, vol. 14(2), pp. 215-220.

Butler, K. and Joaquin, D., 2002. "Are the Gains from International Portfolio Diversification Exaggerated? The Influence of Downside Risk in Bear Markets", *Journal of International Money and Finance*, vol. 21(7), pp. 981-1110.

Cavaglia, S., Brightman, C. & Aked, M., 2000. "The Increasing Importance of Industry Factors", *Financial Analysts Journal*, Sept-Oct, pp. 41-54.

Chan, K., Karolyi, A. and Stulz, R., 1992. "Global Financial Markets and the Risk Premium on US Equity", *Journal of Financial Economics*, vol.32, pp.137-67.

Coval, J. and Moskowitz, T., 2001. "The Geography of Investment: Informed Trading and Asset Prices", *Journal of Political Economy*, vol. 109(4), pp. 811-841.

Coen, A., 2001. "Home Bias and International Capital Asset Pricing Model with Human Capital", *Journal of Multinational Financial Management*, vol. 11 (4/5), pp. 497-513.

DeMarzo, P., Kaniel, R, and Kremer, I., 2002. "Community Effects and Externalities in Portfolio Choice", working paper, Stanford University.

Dimson, E., Marsh, M. and Staunton, M., 2002. *Global Investment Returns Yearbook 2002*, ABN-AMRO and London Business School.

Elton, E. and Gruber, M., 1973. "Estimating the Dependence Structure of Share Prices: Implications for Portfolio Selection", *The Journal of Finance*, vol. 28(5), pp. 1203-1232.

_____ 1995. *Modern Portfolio Theory and Investment Analysis*, 5th edition, John Wiley & Sons (New York).

_____ Brown, S. and Goetzmann, W., 2003. *Modern Portfolio Theory and Investment Analysis*, 6th edition, John Wiley & Sons (New York).

Errunza, V., Hogan, K. and Hung, M., 1999. "Can the Gains from International Diversification be Achieved Without Trading Abroad", *The Journal of Finance*, vol. 54(6), pp. 2075-2107.

Fama, E. and French, J., 2002. "The Equity Premium", *The Journal of Finance*, vol. 57, pp. 637-659.

Frankfurter, G., Phillips, H., and Seagle, J., 1971. "Portfolio Selection: The Effects of Uncertain Means, Variances and Covariances", *Journal of Financial and Quantitative Analysis*, vol. 6(5), pp. 1251-1262.

French, K. and Poterba, J., 1991. "Investor Diversification and International Equity Markets", *American Economic Review*, vol. 81, pp. 222-226.

Friend, I. and Blume, M., 1975. "The Demand for Risky Assets", *American Economic Review*, vol. 65, pp.900-22.

Gehrig, T., 1993. "An Information Based Explanation of Domestic Bias in International Equity Investment", *Scandinavian Journal of Economics*, vol. 95(1), pp. 97-109.

Griffin, M., 1997. "Why do Pension and Insurance Portfolios hold so few International Assets", *The Journal of Portfolio Management*, Summer, pp. 45-50.

Grubel, H., 1968. "Internationally Diversified Portfolios: Welfare Gains and Capital Flows", *American Economic Review*, vol. 58, pp. 1299-1314.

Harvey, C., 1991. "The World Price of Covariance Risk", *The Journal of Finance*, vol. 46(1), pp. 111-157.

Hasan, I. And Simaan, Y., 2000. "A Rational Explanation for Home Country Bias", *Journal of International Money and Finance*, vol. 19, pp. 331-361.

Heath, C. and Tversky, A., 1991. "Preference and Belief: Ambiguity and Competence in Choice under Uncertainty", *Journal of Risk and Uncertainty*, vol. 4, pp. 5-28.

Jobson, J. and Korkie, B., 1980. "Estimation for Markowitz Efficient Portfolios", *Journal of the American Statistical Association*, vol. 75, pp. 544-554.

_____ 1981. “Putting Markowitz Theory to Work”, *The Journal of Portfolio Management*, vol. 7(4), 70-74.

Lally, M., 1998. “The CAPM with Personal Taxes and International Portfolio Selection”, *The New Zealand Investment Analyst*, vol.19, pp. 22-24.

_____ 2000, *The Real Cost of Capital in New Zealand: Is it too High?*, New Zealand Business Roundtable, Wellington.

_____ and Marsden, A., 2003 “Tax-Adjusted Market Risk Premiums in New Zealand 1931-2002”, *Pacific-Basin Finance Journal*, forthcoming.

Lewis, K., 1999. “Trying to Explain Home Bias in Equities and Consumption”, *Journal of Economic Literature*, vol. 37, pp. 571-608.

Lintner, J., 1965. “The Valuation of Risky Assets and the Selection of Investments in Stock Portfolios and Capital Budgets”, *Review of Economics and Statistics*, vol. 47, pp.13-37.

Malkiel, B., 2002. “How Much Diversification is Enough?”, *AIMR Conference Proceedings*, pp. 18-28.

Markowitz, H., 1952. “Portfolio Selection”, *The Journal of Finance*, vol. 7, pp. 77-91.

_____ 1959, *Portfolio Selection*, Yale University Press (New Haven).

Merton, R., 1980. “On Estimating the Expected Return on the Market”, *Journal of Financial Economics*, vol. 8, pp.323-61.

Mossin, J., 1966. “Equilibrium in a Capital Asset Market”, *Econometrica*, vol. 24, pp. 768-83.

New Zealand Stock Exchange, 2003. *Investing in New Zealand*, Wellington.

Odier, P. and Solnik, B., 1993. “Lessons for International Asset Allocation”, *Financial Analysts Journal*, March/April, pp. 63-77.

Sharpe, W., 1964. “Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk”, *The Journal of Finance*, vol. 19, pp. 425-42.

Shore, S. and White, J., 2002. “External Habit Formation and the Home Bias Puzzle”, working paper, Harvard University.

Solnik, B., 1974a. “An Equilibrium Model of the International Capital Market”, *Journal of Economic Theory*, vol. 8, pp. 500-24.

_____ 1974b. “Why not Diversify Internationally?”, *Financial Analysts Journal*, vol. 30(4), pp. 48-54.

Stulz, R., 1995a. “International Portfolio Choice and Asset Pricing: An Integrative Survey”, in R. Jarrow (ed): *Handbooks in OR and MS*, vol. 9, Elsevier Science.

_____ 1995b. “The Cost of Capital in Internationally Integrated Markets: The Case of Nestle”, *European Financial Management*, vol. 1, pp. 11-22.