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RISK ADJUSTED PERFORMANCE: BRICKS OR PAPER?

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1. Introduction

This article addresses two familiar cocktail party concerns:

1) "Is it better to invest in direct or indirect property? In other words, are bricks (direct property) better than paper (units in securitised properties)?
2) Is it better to invest in paper properties than in "normal" paper (the Share market)?

These questions are a perennial feature of the US literature and have recently been treated in the Australian context?. [(Newell and MacFarlane 1996) and (Newell, Acheapong et al. 1998)].

Another recent treatment of the second question lead to the conclusion that the Index of Australian Listed Property Trusts (ALPT) is cointegrated with the Australian Stock Exchange (ASX) all ordinary index (Achour-Fischer and Monsingh 1998) and thus that paper-ALPT investors do not enjoy any particular specific return advantage over paper-ASX investors. In fact, since paper-ALPT is less diversified than paper-ASX the risk adjusted return of Listed property trust is lower than the ASX index return.

Technically, because the series are cointegrated, standard parametric econometrics are not appropriate tools. However, a non-parametric analysis concluded, "Australian Listed Property Trust[s]? do not offer any particular timing or selectivity advantages among each other and, more importantly they do not provide any advantage over the Market Portfolio." (Achour-Fischer 1998).

If paper-property is not an advisable investment (compared to ASX ordinary shares), what can be said about a notional portfolio of direct properties (PCA indices) compared to the return of a notional portfolio of Australian ordinary shares? Thus we may again restate the question: is paper (in general) better than brick?

This question will be addressed with the help of a recent risk-return treatment suggested by Modigliani-Modigliani (henceforth noted as MM²), (Modigliani and Modigliani 1997) and applied to U.S. real estate assets (Hopkins and Acton 1999). In the present preliminary study, I apply a similar treatment to notional Australian property portfolios proxied by the various indices of the Property Council of Australia.[1]

2. The MM2 framework

The Modigliani-Modigliani analysis is based on the traditional risk-return dilemma: higher expected returns must be traded off against

[1] The author gratefully acknowledges his access to the Property Council of Australia database The present results cannot be endorsed, confirmed or infirmed by the Property Council.

higher expected risk. Thus, when an investment vehicle offers higher returns than alternative investments, one must then ask whether this performance has been achieved by an increased exposure to risk. In other words, returns have to be risk adjusted to be truly comparable.

There are several well-known measures of risk-adjusted returns. The Sharpe ratio (1966) measures return per unit of total risk, the Treynor index (1966) measures excess returns for the capital market beta and the Jensen's (1968) alpha measures the excess return over a systematic risk adjusted benchmark. A recent extension of Jenson's approach has also been suggested (Liang and McIntosh 1998). The authors developed a so-called "Sharpe alpha" that measures the excess return of an asset relative to the composite benchmark. This approach was recently applied to the Australian situation (Newell, Acheapong et al. 1998).

The MM² Risk Adjusted Performance (RAP) concept is very similar to the Sharpe ratio, but is intuitively clearer to investors since it compares percentage of returns instead of "unit less" ratios.

The RAP adjusts all portfolios to the level of risk in the unmanaged market benchmark (e.g., the Australian Stock Index) and then measures the returns of this risk-matched portfolio.

3. Concepts and notations

The basic MM² idea is to compare the performance of any specific "subject" portfolio (p) to the performance of a relevant unmanaged market benchmark portfolio (m) that will, in our case, be the ASX index[2]. Then the subject portfolio (p) is adjusted to reflect the same level of risk than the benchmark (m). The adjustment is performed by varying the degree of leverage of the subject (p) as explained below. Finally the risk-matched portfolio (p) returns are compared to the risk-comparable benchmark (m) and the difference in returns are simply measured in % points "which investors are familiar with and understand—and can be compared with the risk adjusted performance of any other portfolio [adjusted in the same way]...." [3]

The following description is based on MM² initial article, but the notation has been modified for the sake of clarity.

We will define:

R_f = the short-term risk-free interest rate;

R_p = average return of portfolio p

RAP_p = average return of risk-adjusted return of portfolio p (Risk Adjusted Performance of p);

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[2] The ASX index portfolio is not a notional benchmark since it is effectively traded as in indexed fund on the Sydney market (Vanguard Australian fund).

[3] MM² art.cit. p 46

$RAPX_p$ = average excess return of the risk adjusted portfolio = RAP_p- R_f

E_p = average excess return of portfolio p ($E_p = R_p - R_f$);

σ_p = standard deviation of R_p and E_p;

σ_{RAP} = standard deviation of the matched portfolio RAPP;

R_m = average return of the market portfolio;

E_m = average excess return of the market portfolio ($E_m = R_m - R_f$)

σ_m = standard deviation of Rm and Em.

The matching of the risk level of the subject portfolio to the market portfolio is obtained by adjusting the level of leverage of p. The risk — measured as the dispersion of portfolio p returns — is increased by increasing the level debt in the portfolio make-up and conversely, the level of risk can be decreased by selling risky assets in order to purchase risk-free assets (eg. Bank Bills).

The risk-adjusted return of portfolio p, RAP_p is the return of portfolio p, levered by an amount L_p, which may be positive or negative.

We can deduce the value of L_p from the definition:

$$\sigma_{RAP} = (1 + L_p)\,\sigma_p \qquad (1)$$

and, since, by construction, we have :

$$\sigma_m = \sigma_{RAP}$$

We can write :

$$L_p = (\sigma_m/\sigma_p) - 1 \qquad (2)$$

Levering up will increase the level of risk and the expected portfolio returns. Levering down will decrease the risk and the expected portfolio returns.

In a case of levering up, and if we assume, for simplicity sake, that the cost of debt is equal to safe return i_f , we can write the subject portfolio adjusted return as:

$$RAP_p = (1+ L_p)\,R_p - L_p\,R_f \qquad (3)$$

Where the leveraged return $(1+ L_p)\,R_p$ is reduced by the interest to be paid on the debt L_p

Substituting equation (2) into equation (3) we get:

$$RAP_p = (\sigma_m/\sigma_p)\,(R_p - R_f) + R_f \qquad (4)$$

Or, by using the portfolio excess return notation ($E_p = R_p - R_f$), we can rewrite:

$$RAP_p = (\sigma_m/\sigma_p)\,E_p + R_f$$

Since the excess portfolio return was written:

$$RAPX_p = RAP_p) - R_f$$

We can also obtain:

$$RAPX_p = (\sigma_m/\sigma_p)\,E_p$$

The excess return of the risk-adjusted portfolio is equal to the excess return of the initial subject portfolio multiplied by the relative risk. This familiar measure is simply the equity premium required to compensate for the relative risk of the portfolio p compared to the benchmark market.

Since the difference between the risk adjusted return (RAP) and the risk adjusted excess return (RAPX) is constant (and equal to the risk free rate R_f), the ranking of portfolios will be the same for both measurements, nevertheless, the excess return formulation (RAPX) may be a more intuitively common measure of differential performance.

For any portfolio, the best portfolio performance is obtained by maximising the RAP of the matched portfolio by making the best selection of assets. Then the manager can choose to reduce or increase his level of risk by buying or selling debt. This two steps treatment is quite crucial for portfolio managers. They can independently select the optimal return for a given package of assets and then adjust their required level of risk by the appropriate leverage.

A simplified example may clarify the previous discussion.

Table 1: Construction table of the basic ratios

	Annual return	Risk	Sharpe index	Required leverage adjustment	Risk Adjusted Return	Excess return over market	Excess return due to risk	Excess return due to asset selection
Bank Bill	**4.00%**	0						
Market return	**15.00%**	10.0%	1.10	0.00	**15.00%**	0.00%		
Fund 1	**20.00%**	15.0%	1.07	-0.33	**14.67%**	5.00%	5.33%	-0.33%
Fund 2	**10.00%**	5.0%	1.20	1.00	**16.00%**	-5.00%	-6.00%	1.00%

In this example, the apparent best performer (Fund 1) is carrying too much risk. After adjustment, the market-matched portfolio would only have a return of 14.67%. The fund manager was not smarter (in fact her asset selection was not good); she was simply accepting too much dispersion of her returns. In order to judge her true asset selection performance, 1/3 of her assets—that are too risky—should be traded against risk-free assets.

For Fund 1, the matching of the risk level of the subject portfolio to the market portfolio is obtained by reducing the level of leverage of p by L%:

$L_p = (10\%/15\%) - 1 = -0.33\%$

Thus, the risk adjusted return is obtained as:

$RAP_p = (1+ L_p) R_p - L_p R_f$

$= (1 - 0.33) * 20\% + 0.33*4\%$

$= 14.67\%$

The excess return over the market is simply:

$R_p - R_m = 5\%$

The excess return due to the higher leverage (higher risk) is derived as:

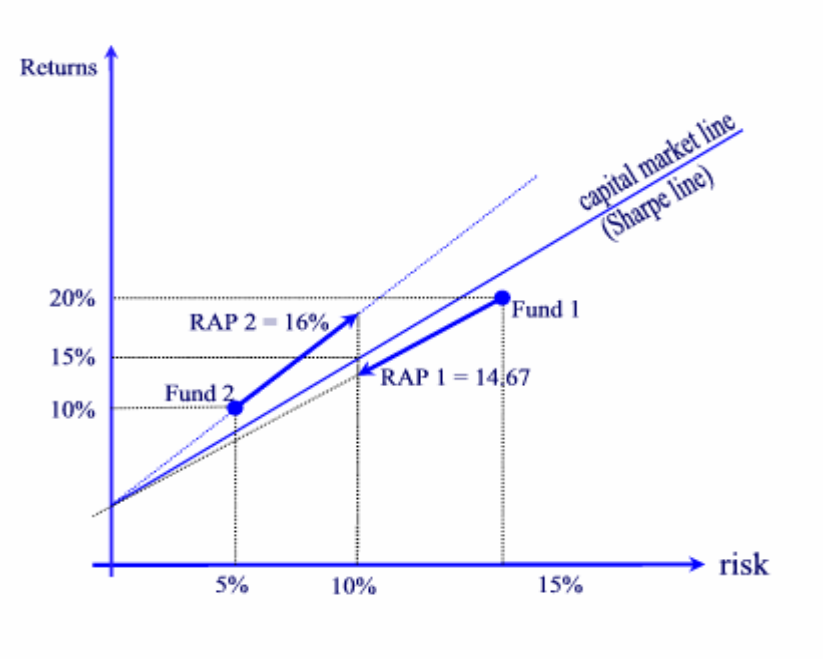
$R_p - RAP_p = 5.33\%$

The return due to the asset selection is:

$RAP_p - R_m = - 0.33\%$

The following graph may facilitate the interpretation of the previous results.

Figure 1


Returns
capital market line
(Sharpe line)
20%
15%
10%
RAP 2 = 16%
Fund 1
RAP 1 = 14.67
Fund 2
risk
5%
10%
15%

4. Comparing risk adjusted performance of brick and paper

The Property Council of Australia publishes the annual performance of 22 samples of Australian commercial properties (see appendix 2). The returns and return dispersion on these various samples have been used as a proxy of direct Australian commercial property investment for this analysis.

The series for the various types of properties, the ASX index, and the Australian Listed Property Trust index are taken directly from the PCA annual publication (1999). Thus, the periods and measurements are compatible.

The analysis uses the MM^2 procedure described previously. The full table of computations is provided in appendix 1.

Table 2 only presents the annual results and respective rankings.

Table 2

December 1984 - June 1998	**RAP**		**Rp**	
WA Retail	26.92%	**1**	15.54%	**2**
Queensland Retail	26.28%	**2**	14.02%	**3**
Australian Retail	24.48%	**3**	13.42%	**5**
NSW Retail	22.48%	**4**	13.62%	**4**
Victorian Retail	17.04%	**5**	12.35%	**6**
ASX	15.75%	**6**	15.75%	**1**
Australian Industrial	13.52%	**7**	11.13%	**8**
ALPT	13.36%	**8**	12.25%	**7**
Sydney Industrial	12.43%	**9**	10.80%	**9**
Australian composite	10.19%	**10**	9.92%	**10**
Sydney CBD Office	8.25%	**11**	8.71%	**12**
North Sydney Office	8.07%	**12**	8.66%	**13**
Australian Non CBD office	7.98%	**13**	8.88%	**11**
Perth CBD Office	7.26%	**14**	7.98%	**17**
Australian Office	7.17%	**15**	8.31%	**15**
Australian CBD Office	6.95%	**16**	8.14%	**16**
Brisbane CBD Office	6.23%	**17**	8.47%	**14**
Melbourne CBD Office	5.55%	**18**	7.21%	**19**
Canberra Region Office	5.39%	**19**	7.82%	**18**
Adelaide CBD Office	-1.77%	**20**	4.20%	**20**

5. Interpretation of the results

The results of table 2 may please some brick investors… but not all of them.

We observe that the best apparent performer (the ASX share market index) is not the best risk adjusted performer (ranked 5). We also confirm that Listed property investors are worse off than ASX index investors. This result is consistent with results obtained from non-CAPM and non-parametric treatments (Achour-Fischer 1998).

We could thus confirm that a "paper ASX" investment is better that " paper-property" investments over the long term Australian investment past (1984 to 1999). This result should not be too surprising and it confirms that capital markets are reasonably efficient and that they do reflect the expected risk-return characteristics of respective assets and portfolios.

If we now compare the "paper-property" results (LPT) with a notional composite package of real properties proxied by the PCA index (bricks), we observe that paper-properties are more profitable than a diversified bundle of brick properties represented by the PCA composite index. If such notional packages of real properties could be fully securitised, then investors would be better of with a diversified portfolio of ALPT.

This result may reflect various measurement factors, or it may reflect the fact the ALPT index has a higher composition of retail properties that are performing much better than other assets.

Indeed the most striking result is that some specific property assets (thus less diversified notional packages of properties) outperform both the paper-ASX and *a fortiori* the paper-property and composite index of properties.

All the top risk-adjusted performers are commercial retail assets. The retail assets over-performance is clear and the geographical advantages of Queensland and Western Australia confirms the general demographic trends that are so determinant in the shopping centers performances.

However, our results may also illustrate a more sinister evidence: shopping centers have monopoly powers protected by planning legislation, regulations or practices. Planning tools have the unavoidable consequence of restricting supply by creating spatial monopolies. They may thus have the indirect effect of juicing up retail assets returns. The reasons of this apparent over performance may require a more detailed analysis, but at least these results are consistent with the findings of Pagliari Jr; Webb; Canter; and Lieblich, 1997:

> "The Australian retail sector consistently outperformed its counterparts in terms of total returns; this was true in all but one of the smaller time periods as well as the

overall, eleven-year time period, 1985-1995."

6. Conclusion

Marketed assets are equally affected by systematic risks (macro-risks) and thus, in a well functioning capital market, we can expect that proxies of securitised property assets (Listed property trusts index), when adjusted for risk, are not likely to over perform proxies of the general economy (ASX index shares).

It seems that the same relationship applies to a notional portfolio of traded direct property assets proxied by the composite index of the Property Council of Australia.

Again, one may wonder why owners of property assets (property) should perform better than their customers (their commercial tenants) when transactions costs and illiquidity factors are taken into account. In fact, in the long term and in the absence of major supply restrictions, they don't. This is quite reassuring and perfectly consistent with our faith in the virtues of efficient open markets.

Nevertheless, non-systematic risks (sector specific risks) are not diversified away in sector-specific portfolios such as the sector-regional specific indexes provided by the PCA. Thus, one could expect differential performance of such sub-portfolios. Indeed, we do observe such differences even after adjusting for specific-sector risk. Some sectors (retail) and some regions (Western Australia and Queensland) perform better during the observed period.

A closer examination of the results (Appendix 1) reveals that the over performance cannot be attributed by a higher level of risk exposure but by a "good choice" of assets (see columns 7 and 8 in appendix 1 table).

These reassuring results have been demonstrated with the help of a recent model developed by Modigliani and Modigliani to measure risk-adjustment performance.

The model is not a major innovation since it relies on the very same principle used to perform the traditional Sharpe return corrections, but it offers a much simpler and intuitive picture of a portfolio relative performance. It also offers an additional insight of the risk-exposure traits of the compared portfolio of assets. In the present paper, the analysis demonstrates the merits of this technique that will be extended in order to offer fresh perspectives in the comparison of Australian Listed Property Trusts (Fischer and Hafez 2000)

December 1984 - June 1998	Semester returns	Risk (semestrial)	Sharpe	Leverage %	Risk equivalent return	Excess return over the ASX	Portfolio effect	Risk effect
	1	2	3	4	5	6	7	8
Bank Bill	4.74%							
ASX	7.59%	11.94%	0.24	0.00	7.59%	0.00%	0.00%	0.00%
ALPT	5.95%	8.34%	0.14	0.43	6.47%	-1.64%	-1.12%	-0.52%
Australian composite	4.84%	5.26%	0.02	1.27	4.97%	-2.75%	-2.61%	-0.13%
Australian Office	4.07%	6.53%	-0.10	0.83	3.52%	-3.52%	-4.07%	0.55%
Australian CBD Office	3.99%	6.76%	-0.11	0.77	3.42%	-3.60%	-4.17%	0.57%
Sydney CBD Office	4.26%	8.14%	-0.06	0.47	4.04%	-3.32%	-3.55%	0.22%
Melbourne CBD Office	3.54%	7.14%	-0.17	0.67	2.74%	-4.04%	-4.85%	0.80%
Brisbane CBD Office	4.15%	4.23%	-0.14	1.82	3.07%	-3.44%	-4.52%	1.08%
Canberra Region Office	3.83%	5.20%	-0.17	1.30	2.66%	-3.75%	-4.93%	1.17%
Adelaide CBD Office	2.08%	5.64%	-0.47	1.12	-0.89%	-5.51%	-8.48%	2.97%
Perth CBD Office	3.91%	8.44%	-0.10	0.41	3.57%	-3.68%	-4.02%	0.34%
Australian Non CBD office	4.34%	5.72%	-0.07	1.09	3.91%	-3.24%	-3.67%	0.43%
North Sydney Office	4.24%	7.62%	-0.07	0.57	3.96%	-3.35%	-3.63%	0.28%
Australian Retail	6.50%	3.07%	0.57	2.89	11.57%	-1.09%	3.98%	-5.08%
NSW Retail	6.59%	3.73%	0.50	2.20	10.67%	-1.00%	3.08%	-4.08%
Victorian Retail	5.99%	4.34%	0.29	1.75	8.19%	-1.59%	0.60%	-2.19%
Queensland Retail	6.78%	3.20%	0.64	2.74	12.37%	-0.81%	4.79%	-5.59%
WA Retail	7.49%	4.14%	0.66	1.88	12.66%	-0.10%	5.07%	-5.17%
Australian Industrial	5.42%	4.51%	0.15	1.65	6.54%	-2.17%	-1.04%	-1.12%
Sydney Industrial	5.26%	4.83%	0.11	1.47	6.03%	-2.32%	-1.55%	-0.77%

The Property council index

The Property Council Index is a capital valued weighted, appraisal based price and accumulation index measuring the income; capital and total return performance of commercial property in Australia.

The assumption of all accumulation indices whether they are for property, equities or bonds is that all income (dividends) received are re-invested into the security. The Property Council uses percentage change between reporting periods to derive index values, i.e. it is a chain-linked index. The Index is a time weighted index as opposed to a money weighted index. It is published in nominal *not* real terms.

The following notations are used:

CV_t = Capital value at end of period

CV_{t-1} = Capital value at beginning of period

CI_t = Capital expenditure during period

I_t = Net income received during period

PS_t = Partial sales transaction receipts received during period

The Index formulae are as follows:

(i) Income Returns

Income return is the net income received in the current period, after allowing for additions to or deletions from the Index portfolio.

$$\text{Income Return} = \frac{I_t}{CV_{t-1} + 0.5(CI_t - PS_t) - 0.5I_t}$$

Capital improvements are included in the denominator because they increase the base capital value of the asset. Since the index is computed each quarter, half of the net increase in capital value is used to reflect the fact that capital improvement and partial disposition could equally take place during the first half or the second half of a quarter.

Half of annual incomes are deducted from the denominator to allow comparisons with other assets that do not have a monthly distribution. By taking half a year it is assumed that distribution for other assets could equally take place in the first half or the second half of the year.

The NCREIF and the Frank Russell Canadian Index use the same formula except that they assume a monthly distribution of income (using a 0.33 factor per quarter, instead of 0.5 as for the Australian CPA index). The difference of treatment is inconsequential.

(ii) Capital Return

Capital return is the difference between the capital value of the Index portfolio at the beginning and the end of the reporting period, after allowing for additions to or deletions from the Index portfolio.

$$\text{Capital Return} = \frac{(CV_t - CV_{t-1}) - CI_t + PS_t}{CV_{t-1} + 0.5(CI_t - PS_t) - 0.5I_t}$$

(iii) Total Return

Total returns are the sum of income and capital return.

$$\text{Total Return} = \frac{\left(CV_t - CV_{t-1}\right) - CI_t + PS_t + I_t}{CV_{t-1} + 0.5(CI_t - PS_t) - 0.5I_t}$$

From quarterly results, the annual rate of return is obtained by compounding the quarterly rates:

(1+ annual rate) = (1 + Q1) * (1 + Q2) * (1 + Q3) * (1 + Q4)

Property Council Investment Performance Index	Value-weighted, appraisal-based index. Computed from the quarterly income, capital and total return performance of more than 690 properties valued in excess of $40 bn. As at December 1998, 22 separate indices covering CBD and non-CBD office, retail and industrial markets were published. The Index represents 34% of the total Australian CBD office market and 37% of the total Australian retail market. The Index is dominated by Office properties (56%) and Retail properties (39.7%)
ASX Listed Property Trust	Value-weighted, around 4.5% of the All Ordinaries Index. Represents a capitalisation of $28bn. The Index is dominated by retail properties (55%) followed by Office properties (34.9%)

Source: Property Council of Australia (1999) documentation

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