RESIDENTIAL RENTAL REAL ESTATE INVESTMENT (RRREI) IN MELBOURNE: DEVELOPING AN INVESTOR MODEL

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INTRODUCTION

Real estate investment is about creating and adding value through the effective management of property assets. Real estate is fundamentally no different from other mainstream investments: the analysis of property investments can be easily integrated into the capital market framework. Capital asset pricing theory evolved into the capital asset pricing model (CAPM). The CAPM model, described by Franfurter (1995: 104) as the 'keystone' of financial theory, has been tested in financial securites (stock exchange) markets over three decades.

Accordingly CAPM was adapted in this study to incorporate real estate variables, and its accuracy was tested in modelling the price of three bedroom houses and two bedroom flats using Melbourne data extending back to 1967. However, in common with other recent capital market research (Cochrane, 1999), the findings of this study are that the capital asset pricing model using risk as its single causal variable alone does not adequately explain real estate returns. Further explanatory variables are required.

BACKGROUND

Home ownership has long been an Australian cultural icon - 'the great Australian dream' (Hayward 1992; McCormack 1995). But the decline in the past decade in the proportion of Australians purchasing their own homes (Yates 1999:29), coupled with recent federal governments moving away from the direct provision of public rental housing is resulting in increasing demand for privately-provided rental residential accommodation.

On the other hand, an ageing population and the limitations this will place on government-funded aged-pensions means that Australians wishing to maintain their standard of living in retirement will increasingly have to fund their retirement income from investments made during their working careers. There is a strong case for the inclusion of residential rental real estate (RRREI) in individuals' investment portfolios.

NEED FOR ECONOMICALLY RATIONAL REAL ESTATE INVESTMENT DECISIONS

Research shows that many RRREI investment decisions lack rational economic analysis (Maher & Burke, 1991; Housing Industry Association 1993; Australian Bureau of Statistics 1994a; Boyd, MacGillivray and Schwartz, 1995; O'Dwyer, 1998; Compton 1998). Anderson concluded that:

> *"Private landlords do not behave as economic, rational, and efficient actors."*
> (Anderson, 1998:177)

Given the above indication that the need for private rental residential accommodation will intensify, and given the prudence of individuals building their own retirement income-producing investment portfolios, it is important that investors have available to them a sound conceptual body of knowledge to guide them in their specific choice of real estate investments, ideally a rational investment model to assist them in their decision making.

REAL ESTATE INVESTMENT LITERATURE

The literature in this area can be classified into three tiers:

1. The popular 'how to' approaches
2. Traditional financial approaches
3. Modern capital budgeting approaches

The 'how to' approaches are typified by their 'wealth pyramiding' approach. The 'how to get rich' formulae these authors provide in their self-labelled 'best seller' texts typically portray real estate as the investor's best opportunity to 'create personal wealth'. The key element of this approach is to borrrow heavily to buy as many properties as possible. These properties are then re-mortgaged to draw on equity build-up to provide the deposit for the next investment

property. The implicit assumption of these authors is of a continuing strong growth in property values. Importantly, what many writers in this area have recognised is that the property market is less competititve than the share market. It can therefore offer outstanding buying opportunities for the astute, well informed investor. But most of the literature in the 'how to' category adds little to the development of a balanced, theoretically rigorous body of real estate investment knowledge. It emphasises high rates of return, but tends to downplay - or ignore – risk; it offers simple formulae for success, but it depends very little on analytical techniques or empirical research, other than selective anecdotal case studies.

Traditional financial approaches, on the other hand, measure financial dimensions, and provide quantitative data on which real estate investment decisions can be based. The most widely used of all financial ratios - in real estate or any other investment - is 'return on investment' (ROI). In attempting to define and quantify the investor's required rate of return, this area of the literature provides a more analytical approach than the 'how to' authors. Typically, the ROI approach is used to measure performance ‘ex poste’ - after the event. Where the widely-used ROI approach falters is that it gives little consideration to income taxes, changing cash flows over time, and the time value of money. Most notably, it does not include risk in its analysis.

The third approach, modern capital budgeting, recognises that today’s (present) value of an investment asset is the cash flow it can generate in the future, not the returns it has provided in the past. Accordingly, investment appraisal must adopt an ‘ex ante’ - forward-looking analysis - as distinct from the backward-looking focus of the traditional financial approaches typified by the ROI calculation. Modern capital budgeting, also known as ‘modern financial theory,’ focuses on deterministic discounted cash flow, and the probabilistic approaches of project risk analysis (Pyhrr, Cooper, Wofford, Kapplin, and Lapides (1989). Traditionally, under this approach, the required return on an investment is a function of its risk: the higher the risk, the greater is the required return. In searching the literature to develop a practical model applicable to rental residential real estate investment it became clear that capital (investment) asset pricing is the most promising contributor to the development of a simple, but conceptually sound RRREI model.

THE CAPITAL ASSET PRICING MODEL

The CAPM model has a linear form:

$$R_i = R_f + \beta(R_m - R_f)$$

Where R_i = Return on Investment i

R_f = Risk free rate of return (interest rate on 10 year Federal Government bonds)

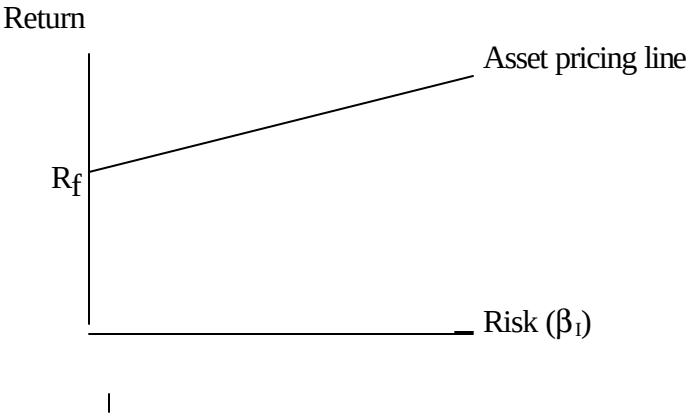
β = Beta (risk coefficient for Investment i)

R_m = Average return for all investments

The returns, by investment, can be plotted on a risk-return graph. In an efficient market, with prices in equilibrium, all returns would fit on an upward sloping line:

$$R_i - R_f/\beta_i$$

This is seen in the following graph:



In terms of the capital asset pricing model, real estate investments should be included in an investor's portfolio only if, for a given level of systematic risk, they lie above the security market

line, ie they are under-priced. Using this criterion for selection will ensure that the value of the portfolio increases, as each investment will yield a positive net present value, the investor's wealth is increased (Brown, 1991:28).

CAPITAL ASSET PRICING MODEL AS A BASIS FOR A RENTAL RESIDENTIAL REAL ESTATE INVESTMENT MODEL (RRREI)

For this study, the CAPM was adapated to RRREI. Because residential rental real estate investment in Melbourne ($RRREI_m$) is a risk-bearing investment, measurement of it's internal rate of return (IRR) must combine the government bond rate plus the risk premium for $RRREI_m$:

$$IRR_{RRREIm} = R_f + R(RRRREI_m - R_f)$$

Where:

IRR_{RRREIm} = average internal rate of return on residential rental real estate investment in Melbourne

R_f = risk free rate of return

$RRRREI_m - R_f$ = risk premium for residential rental real estate investment in Melbourne

Given that return is a reward for bearing risk, an RRREI pricing theory must be able to quantify risk. This can be done by adapting from financial theory the concept of the beta coefficient, recognising that beta measures the amount of systematic risk present in an individual risk-bearing asset, relative to an average risky asset. From the above quantitative analysis, it becomes possible to compile a return on rental residential real estate investments, at local government level:

$$R_{LGAi} = R_f + \beta_{LGAi}(R_m - R_f)$$

Where

R_{LGAi}	=	RRREI return for local government area i
R_f	=	ten year government bond rate
R_m	=	average return for Melbourne RRREI
$(R_m - R_f)$	=	risk premium for Melbourne RRREI
β_{LGAi}	=	beta (risk) coefficient for local government area i

The returns, by LGA, can be plotted on a risk-return graph. In an efficient market, with prices in equilibrium, all returns would fit on an upward sloping line:

$$R_{LGAi} - R_f/\beta_{LGAi}$$

This positively sloping line will describe the relationship between systematic risk and expected return. In financial market theory, this is known as the security market line (SML). Adapting it to this real estate study, it becomes the RRREI line. Applying this price line to the entire Melbourne urban area, and bearing in mind the model is based on expected (E) returns, it would have a slope of:

$$E(R_m) - R_f/\beta_m$$

$$= E(R_m) - R_f/1$$

$$= E(R_m) - R_f$$

Where

E	=	expected
R_m	=	average market return for Melbourne RRREIs
R_f	=	ten year government bond rate
β_m	=	average beta coefficient for Melbourne RRREIs

DATA COLLECTION

This study regressed annual Melbourne housing returns against the standard deviation of their returns. Given the CAPM basis of the derived RRREI model, the objective was to observe the extent to which returns (price gains plus gross rentals) related to risk or variation (standard deviation) of annual returns. A lengthy data collection was sought, to offset the particular characteristics of individual real estate pricing cycles. The Valuer General (Victoria) compiled median houses and flats sales prices, by number of bedrooms, for each Melbourne local government area (LGA) from 1967 to 1994 (prices were shown as averages until 1973). For this study, two bedroom flats and three bedroom houses were selected:

- as the most common bedroom sizes
- to provide some homogeneity in each of the two data sets
- to match the Ministry of Housing's (Victoria) bedroom numbers in their quarterly and annual rental reports.

Melbourne's LGAs were reconstituted into larger LGAs in 1995. These enlarged LGAs were not considered for this study as they lack the homogeneity of the previous smaller LGAs. An even better measure – for homogeneity – would be sale prices by suburb. But these are

only available for the past ten years. Hence the choice made was of pre-1995 LGAs, as these offered a twenty eight year data set from 1967 to 1994.

To continue the flats and houses price data sets from 1994 to 1999 (latest year data available), the author sought to rebuild the pre-1995 LGA's median prices from surburb prices. The Department of Human Services (Victoria) has documented the

suburbs within each pre-1995 LGA. But reconstructing prices by LGA on the basis of this document proved not sufficiently accurate for the continuity of the flats and houses price data sets: comparison of the overlapping time period (1989-1994) showed material differences.

However, researchers at Swinburne University have correlated postcodes with pre-1995 LGAs. Using Australia Post's internet site to identify these postcodes , and the Melways street directory, which superimposes postcodes and suburbs on its street maps – the author achieved a ninety seven percent agreement. Nevertheless there were apparent problems in reconstructing pre-1995 LGA prices from suburban houses and flats sales:

- The Valuer General's sales by suburb contain all bedroom sizes, and

- There were a limited number of instances in which postcodes overlapped LGA boundaries. But the resulting lengthy data set – up to thirty three years of prices for Melbourne houses and flats - was considered sufficiently robust for this study. The data was kept separate for houses and flats, as a difference of outcomes was anticipated.

Owner-occupiers purchase residential accommodation primarily as a consumer good. It provides them with an imputed rental, but it does not yield them a cash flow, apart from a likely inflation-enhanced capital gain on sale. On the other hand, a residential rental real estate investor buys a property for investment, anticipating:

- The cash flow from rentals

- A capital gain on sale

Having collected the two data sets of prices, the next phase of this study was to obtain historical rentals to couple with the above pricing (year on year capital gains – or losses) for houses and flats. Other states have a residential tenancy bond authority, which is able to collate

comprehensive rental statistics. But Victoria has lacked such an authority until the past two years. It was therefore necessary to compile the previous rental data sets from other sources.

Swinburne University produced rentals by LGA in 1971, 1976, 1978. 1981. 1982. 1983 and 1984. These were based on vacany advertisement in 'The Age' newspaper on the first Saturday of each month. There are possible biases in these figures in that:

- advertised or asking rentals may be higher than negotiated rentals
- lower priced rentals may only be advertised in suburban newspapers – or the local real estate agents' windows

Furthermore, Swinburne's figures by LGA were an average for flats and houses: these figures were likely to over-state rentals for flats and under-state them for houses. For the missing years, estimated rentals were derived by interpolation. In a revision of this paper, the estimated rentals will be recast as yield-based in an effort to improve accuracy.

To cover the next five years – 1985-1989 – the author used the Ministry of Housing and Construction's (Victoria) published statistics for two bedroom dwellings (defined for this study as 'flats') and three bedroom dwellings (defined here as 'houses'). In common with Swinburne University, the Ministry drew its figures from 'The Age' vacany advertisements. The Ministry's annual statistics were chosen ahead of its quarterly reports for this study, as the annual figures were more complete in terms of suburbs surveyed. But they were based on financial years: accuracy may have been lost in converting the data to calendar years for the current study. This will be checked against quarterly reports where possible in a revision of this paper.

Rental figures from 1990 to 1994 were taken from the above Ministry, re-named the Victorian Government's Department of Planning and Development. As the report pointed out in its introduction, it was "the only published source of data on Melbourne's rental market trends by municipality…". The data source was again the rental vacancies section of 'The Age' newspaper.

For 1995-98, the author drew on the yet again re-named Department of Human Services. While not as geographically complete as the previous annual reports, they allowed calendar year data to be extracted directly.

In the second half of 1999, the newly constituted Residential Tenancies Bond Authority's statistics came on stream. These provided – for the first time in Victoria – virtually a full set of rental statistics, as tenants and landlords are required by Victorian

government regulation to pay a bond to the above authority on signing a tenancy agree-ment. The 1999 figures for this study were compiled by striking an average of 'The Age' figures for the first half of the calendar year and the tenancy authority's figures for the latter part of the year.

The other data input used was the 'risk free' interest rate referred to in financial theory. This was interpreted for this study as the ten year Commonwealth Government bond rate. These annual rates was compiled from the Reserve Bank of Australia's monthly bulletins.

SUMMARY OF PRICE GAINS AND RENTALS

The Department of Human Services in its quarterly reporting of rentals by suburbs, segregates Melbourne into eight regions:

Map

For this study, the suburbs comprising these regions in the Department's rental reports were re-built into pre-1995 LGAs, as follows:

Inner Eastern
- Box Hill
- Camberwell
- Doncaster/Templestowe
- Hawthorn
- Kew
- Malvern
- Nunawading
- Oakleigh
- Waverley

Inner Urban
- Collingwood
- Fitzroy
- Melbourne
- Prahran
- Port Melbourne
- Richmond
- St Kilda
- South Melbourne

North Eastern
- Diamond Valley
- Eltham
- Heidelberg
- Northcote
- Preston
- Whittlesea

North Western
- Broadmeadows
- Brunswick
- Bulla
- Coburg
- Essendon

Outer Eastern
- Croydon

Knox
Lilydale
Ringwood
Sherbrooke

Southern

Brighton
Caulfield

Chelsea
Moorabbin
Mordialloc
Sandringham

Westernport

Berwick
Cranbourne
Dandenong
Flinders
Frankston
Hastings
Mornington
Springvale

Western

Altona
Footscray
Keilor
Melton
Sunshine
Werribee
Williamstown

PRICE AND RENTAL GAINS BY REGION

House Prices:

Three bedroom house prices were indexed by region, with the urban aggregate figure for 1975 set equal to 100. The region of greatest growth - Westernport - reflects the considerable government and private funding which has gone into developing Melbourne's south eastern growth corridor. The substantial growth which has occurred in the adjacent Mornington peninsula is shown up in the fact that the LGA of Hastings, although among those most distant from the Melbourne CBD, showed one of the highest LGA growths.

THREE BEDROOM HOUSES MEDIAN PRICE INDEX BY REGION

		1975	1980	1985	1990	1995	1999
INNER EAST AGGREGATE		104	152	299	551	592	849
INNER URBAN AGGREGATE		99	133	262	452	479	654
NORTH EAST AGGREGATE		89	126	248	463	469	696
NORTH WEST AGGREGATE		110	168	317	601	670	928
OUTER EAST AGGREGATE		101	148	287	529	579	766
SOUTHERN AGGREGATE		100	136	268	483	511	764
WEST/PORT AGGREGATE		97	154	311	594	608	974
WESTERN AGGREGATE	100	134	257	460	473	652	
URBAN AGGREGATE		**100**	**143**	**281**	**516**	**547**	**786**

House Rentals:

Turning to the growth in rentals for three bedroom houses, using a comparable 1975 urban aggregate index of 100, the following rent index table indicates that rentals have only grown at 74 percent of the indexed growth in housing prices (overall index growth of 580 for rentals, compared with 786 for prices). However, the rental growth was uneven across regions: the inner urban LGAs of Prahran and South Melbourne showed a growth in their respective rental indices of 1028 and 1013, clearly ahead of growth in their price indices of 494 and 942. The entire inner urban region showed an indexed growth in rentals of 852, 30 percent greater than a price growth index of 654. For outlying LGAs the picture was reversed: the distant suburbs of Dandenong and Keilor, on opposite sides of the city, both showed the lowest indexed rental growth of 374, but growth in prices of 580 and 431, suggesting housing landlords in outer suburbs have fared comparatively poorly, seeing their rental yields decline over the past twenty five years. Indeed Westernport, with the highest capital growth of any region at 974, conversely had the lowest rental growth at 401.

THREE BEDROOM HOUSES AVERAGE RENT INDEX BY REGION

	1975	1980	1985	1990	1995	1999
INNER EAST AGGREGATE	110	168	342	480	515	625
INNER URBAN AGGREGATE	80	146	353	577	679	852
NORTH EAST AGGREGATE	114	132	299	400	453	516

NORTH WEST AGGREGATE		89	144	279	393	408	518
OUTER EAST AGGREGATE		109	136	299	385	398	438
SOUTHERN AGGREGATE		99	169	339	500	562	695
WEST/PORT AGGREGATE		112	156	289	379	367	401
WESTERN AGGREGATE	91	132	282	382	394	452	
URBAN AGGREGATE		**100**	**149**	**312**	**442**	**484**	**580**

Flats Prices:

Turning to two bedroom flats, the greatest capital growth was again in the Westernport region, with the LGA of Cranbourne in the heart of the south eastern corridor showing a capital growth index more than 50 percent greater than that of any other Melbourne LGA. Surprisingly, one of the lowest capital growths - with an indexed growth of only 320 over the past quarter century - was the inner city suburb of Richmond, while the entire inner urban region was the poorest performing of all regions in the following median price growth index .

TWO BEDROOM FLATS MEDIAN PRICE INDEX BY REGION

		1975	**1980**	**1985**	**1990**	**1995**	**1999**
INNER EASTERN		109	142	260	470	462	645
INNER URBAN		96	121	243	413	432	537
NORTH EASTERN		93	117	219	374	401	538
NORTH WESTERN		107	146	272	487	477	673
OUTER EASTERN		98	135	245	441	468	589
SOUTHERN		102	125	241	437	477	670
WESTERNPORT	102	150	277	535	587	843	
WESTERN		92	113	222	403	384	540
URBAN AGGREGATE		**100**	**131**	**248**	**447**	**463**	**633**

Flats rentals:

Rentals of two bedroom flats showed a consistent growth across Melbourne regions, with the exception of the Westernport region, with its indexed growth 30 percent ahead of aggregate Melbourne rental growth. The consistency among other regions is not surprising, as RRREI investors, and real estate agents especially, are conscious of benchmark rental yields on residential properties. But awareness of yields not withstanding, the comparison of price gains with rentals for two bedroom flats over the past quarter century shows that rental yields have fallen across all Melbourne regions.

TWO BEDROOM FLATS
AVERAGE FLATS RENTAL INDEX BY REGION

	1975	**1980**	**1985**	**1990**	**1995**	**1999**
INNER EASTERN	104	153	275	360	386	471

INNER URBAN		98	144	275	338	340	436
NORTH EASTERN		96	136	255	306	335	459
NORTH WESTERN		104	144	266	339	374	470
OUTER EASTERN		101	161	282	376	386	450
SOUTHERN		99	150	260	329	339	426
WESTERNPORT	99	161	307	410	498	617	
WESTERN		100	142	259	325	357	429
URBAN AGGREGATE		**100**	**149**	**274**	**350**	**381**	**474**

DATA ANALYSIS: SUMMARY

The above outline of price gains and rentals, while of relevance to those with an interest in Melbourne RRREI, was a by product of this study. The main thrust was to use the real estate-adapted CAPM to see how well risk related to return in an RRREI context. The results of this modelling were as under:

	Multipe R	**R squared**
Three bedroom houses		
- average annual price gain	0.15	0.02
- average annual rental return	0.50	0.25
- combined price and rent returns	0.20	0.04
Two bedroom flats		
- average annual price gain	0.73	0.54
- average annual rental return	0.80	0.64
- combined price and rent returns	0.71	0.50

DATA ANALYSIS: COMMENT

The differences between the above statistical outcomes for three bedroom houses and two bedroom flats are noteworthy, particularly in average annual price gains. For houses, the correlation between the theoretical returns calculated using the RRREI-adjusted CAPM and the actual returns is only 0.15, whereas for flats the correlation is a vastly different 0.73. The reason would appear to lie in the fact that the majority of houses are purchased by owner-occupiers. Only 6 percent of the adult Australian population hold investment residential real estate, whereas almost 70% are owner-occupiers. This supports the earlier comment that the majority are

buying a house essentially as a consumption good. For them there is no risk-related rent return. Their rental return is merely imputed as the opportunity cost (saving) of avoiding rental outlays. The residential rental real estate investment model (RRREI) used in this study, adapted as it is from the capital asset pricing model (CAPM) of modern investment theory, has only one causal variable - risk. The fact that housing purchasers give little regard to risk is conveyed in the above R-squared outcome: risk has only a two percent bearing on the price they pay.

Conversely, for flats, the 73 percent correlation between the risk-derived modelled prices and the actual market prices shows the relevance of risk in the purchasing decision. Victoria's Residential Tenancies Bond Authority collected bonds on a total of 10,603 two bedroom flats and three bedroom houses in the three months to 30 June, 2000. Of these, 5842 - 55 percent - were flats. Given that the overwhelming majority of Melbourne residences are houses, this indicates the higher proportion of flats that are purchased for investment, compared with housing purchases. In recent years, with increased divorce rates - currently running at a record 46 percent of marriages - an increasing proportion of older Australians, and other numerically lesser causes, there has been an increase in single person and single-head households. It can be hypothesised from this that the number of owner-occupiers of flats is currently increasing.

But the data on which the above analysis is based covers almost a third of a century, extending back to 1967. The inference being made here - that a much higher proportion of those purchasing flats are investors, compared with those purchasing houses, appears valid. In negotiating a purchase price, buyers of flats would have regard to risk both in the short term as to uncertainty of cash flow from rentals, and in the longer term as to the capital gain to be realised on sale of the flat. The above statistical summary shows that risk represented 54 percent of the causal factors in the average price paid for flats in Melbourne between 1967 and 1999.

Turning to the analysis of average annual rental returns, there is a jump from a 15% correlation between the modelled and actual prices paid for houses to a 50% correlation for housing rentals. This indicates that two different housing samples are being measured. The prices sample would in fact represent the entire population of housing sales, as the Valuer General is privy to all recorded realty sales. On the other hand, the rental sample would apply to only those houses - the minority - which were being rented out. Indeed, for all but the last six months of the housing rentals analysed in this study, the data set appears to have been less than 25 percent of all housing rentals. The data set used by Victoria's Ministry of Housing for its quarterly rental report in March 1999 was based on 1025 three bedroom houses, taken from residential vacancy advertisements in 'The Age' newspaper. By June 2000, when the new Residential Tenancy Bond Authority's statistics came on stream, they showed a population of three bedroom housing rentals of 4626. The fact that the housing rental data set is a sub-set of

the housing price data set explains the increase in correlation. Risk, as a causal component, increases from 2 percent to 25 percent.

The statistic where risk is the highest causal factor is in rentals of two bedroom flats, with an 80 percent correlation between the modelled and the actual rentals, and with risk explaining 64 percent of the actual rental. Again this would be based on only a sub-set of two bedroom flats. But whereas with houses there would be considerable distortion of rental yield - given that the majority of houses are purchased for largely non-economic/investment reasons - with flats, the much higher proportion of risk-conscious investment buyers would impinge on market prices.

However, to conclude this commentary on the data outcomes, the CAPM-based RRREI investment model using only one causal factor - market-wide risk - has been shown to fall short of providing a reliable predictor of the price an RRREI investor should pay for a property - be it a house or a flat. The best outcome - an explanation of 64 percent of the rental for two bedroom flats - still leaves an error factor of more than a third. This error factor climbed to 75 percent for three bedroom houses. This finding for Melbourne residential investment property is consistent with findings for the financial (share) markets:

> *"We once thought that the capital asset pricing model (CAPM) provided a good description of why average returns on some stocks ... were higher than others. Now we recognise that the average returns of many investment opportunities cannot be explained by the CAPM, and 'multifactor models' are used in its place."*
>
> Cochrane (36: 1999)

Inherent in financial theory is the notion that significant risk can be diversified away with an appropriate selection of risk-offsetting investments. This shows there are two categories of risk:

One: Specific, or individual-asset risk, which in real estate will include location, structure, quality, social, depreciation and taxation factors, and which , in concept, can be diversified away by selecting negatively correlated portfolio investments, and

Two: Systematic, or market-wide risk, such as a general risk of interest rate increases, which cannot be diversified away, as all portfolio investments will be affected.

In considering the adaptation of financial theory to real estate investment, key areas of concern require consideration:

- Distribution of returns: portfolio theory is based on the assumption that the probability distribution of returns is 'normal'. But unlike comprehensively reported sharemarket 'trades' most real estate transactions are by private treaty. Because of the lack of a central market-place where properties can be bought and sold, as exists with sharemarkets (though internet listing will temper this), real estate agents, with their varying network of contacts, will conduct trades which can only represent an inefficient market (Brown, 1991). There is a data shortage and a lack of evidence on the correlation of real estate returns. Given the specific factors (unsystematic risk) applying to individual properties, correlation is likely to be low.

- Divisible assets: unlike shares, each property will likely represent a significant percentage of an individual investor's portfolio. Accordingly, the financial theorists' approach would argue that a real estate investor would be holding a sub-optimal portfolio because of the small number of properties held. Exacerbating this sub-optimality, Brown has estimated that the large component of unsystematic, asset-specific risk would require a portfolio of at least 200 properties to offset asset-specific risk (Brown, 1991:211). This is an impossibly large holding for most individual investors, given the Australian Bureau of Statistics (1994) finding that most Australian landlords hold six properties or fewer.

Paradigms of modern financial theory, such as efficient portfolio diversification, and the security (investment) market line, which establishes the theoretically correct price to pay for an asset in an equilibrium market, commend themselves to investors in RRREI, as in other investment markets. But in real estate investment they can only be followed in spirit, rather than in practice. Specifically, the elimination of unsystematic risk, so that only systematic (or market-wide) risk remains as the sole determinant of return, as implicit in the basic CAPM approach, has been indicated by Gau, 1984; Rayburn, Evans, 1986, Arnott, 1988, and Brown, 1991, 2000), and confirmed by the data analysis carried out in this study of Melbourne RRREI, to be of only limited validity in assessing prospective real estate investments.

HEDONIC ANALYSIS: A PRACTICAL ALTERNATIVE?

The fact that, unlike shares, every property is unique, if only because of location (Hewat, 1994; Hopkins, 1994: Maher, 1994; Walsh, 1994; and Clitheroe, 1994), suggests the need for analysis of the specific factors which contribute to the value of each realty asset. This approach is known as 'hedonic pricing' - a form of implicit pricing. Developed in the United States (Rosen, 1973: Dale-Johnson, 1980; Can, 1990; Allen, Springer and Waller, 1995) and extensively tested in the market place in the United Kingdom (Fleming and Nellis, 1981), it has only been touched on, with limited empirical testing in Australia (Abelson, 1993, Hopkins, 1994).

Under the hedonic approach, variations in the price of houses (given supply and demand conditions and the phase of the economic pricing cycle), are considered to depend on the specific attributes or characteristics making up the individual housing 'package'. These include characteristics of the house itself - such as land size, number of rooms, age and structure of building; and its location - including neighbourhood amenities, aesthetics, economic and social status; and its location within the metropolitan area.

As different combinations of these attributes are present in each property, the value of each of these attributes can be estimated. Fortunately, most of them are quantifiable. Others may be denoted by a dummy variable, such as whether or not the building was constructed after 1985, and therefore offers a tax shelter (deduction) for building depreciation, or the presence or absence of a qualitative factor, such as a shopping centre or public transport connection nearby. In simplified form, the hedonic price model is expressed as:

$$p = f(z_i, z_{ij}, ..., z_n)$$

Where

p	=	observed price of house
f	=	function of
z_i	=	amount of characteristic or attribute i per house, for i = 1, ..., n characteristics

Believed to be the largest of these hedonic pricing studies was that carried out in the early 1980's by English researchers, Fleming and Nellis 1985). Using information from 150,000

building society mortgage approvals, they used multi-variate regression analysis to construct a full hedonic pricing index. To construct their hedonic price model, they adopted a weighted average of the estimated regression coefficients, with each coefficient being regarded as an implicit characteristics price. The overall explanatory power of their equation for housing prices (as measured by the adjusted coefficient of determination - R^2) was 73 percent. Their hedonic index series was carried on by the then-largest provider of home mortgage finance in the United Kingdom, the Halifax Building Society, publishing quarterly hedonic house price indices at national and regional levels.

The literature reveals that in Australia, we have produced only partial hedonic house price models. Abelson, who in December 1993 reported on the results of the Federal Government's 1990 study into housing costs, found that within each of the three cities surveyed in the housing cost study (Sydney, Melbourne and Adelaide) approximately 75 percent of variation in housing prices was explained by:

- distance from central business district
- environmental quality
- house size

But Ableson did not develop his study into an index. The only known housing price index maintained in Australia is that of the Melbourne-based Australian Property Information Centre. Starting in December, 1989, it has published a monthly newsletter modelling hedonic price movements on housing size, construction, location and land size, based on Melbourne auction results (Hopkins, 1994). Using this approach, Hopkins achieved an 87 percent correlation between suburb and land value (multiple R) and was able to determine that 75% of land price is determined by suburb (R squared). And this was done on the basis of house prices, whereas the study reported in this paper achieved only a correlation of 15% and and a determination of a mere 2 percent.

However, to conclude this discussion on hedonic analysis, the reality is that it is not being widely used in Australia, nor is its use being widely promoted in the literature. Unquestionly it gives a sound audit of a property in its current condition. But it is akin to Brown's assertion that "most valuers prefer to make use of past yields and price data from recent sales of comparable properties- rather than expected rates of return and growth rates, given the level of risk" (Brown, 1991: 74).

THE DIRECTION OF FUTURE RESEARCH

The value of an asset is not it's earnings to date, as traditional financial profit and loss statements claim. Nor is the historical cost of the asset as the accompanying balance sheets assert. In this respect, accounting falls into the same backward-looking trap that Brown has claimed of some realty valuers. The only way a prospective investor can value the asset he is contemplating buying is by estimating its expected rates future returns and growth rates, discounted at an interest rate which compensates him for the risk he is assuming if he goes ahead with the purchase. Equating this discounted amount to his proposed purchase offer, so that the net present value is zero, will result in a discount (interest) rate which represents the internal rate of return on his investment

From this it follows that an RRREI model, if it is to be of aid to prospective investors, must pursue further the discounted cash flow approach of modern financial theory. The effort to pursue further a real estate-adapted capital asset pricing model should be persisted with, but with the addition of other relevant causal variables. The present study has collated a lengthy sequence of price gains and rentals by Melbourne LGA. With the addition of variables which measure specific as well as market risk, an internal rate of return can be provided for each of these LGAs which can be extrapolated into the future, with adjustment to the discount rate as the key variables determine.

What variables are we speaking of? 'Best selling' real estate authors tend to rest their case on assumptions, eg that real estate appreciates at around two percent above the inflation rate, that cash operating expenses are around 25 percent of gross rental, that interest rates are such and such a percent, that investment properties should be financed with 100 percent borrowing for taxation effectiveness, using interest only finance. But this is to ignore the equity build-up which comes from ongoing mortgage repayments of principal. Should investment properties be sold after seven years when the non-building depreciation is exhausted, as is claimed by some in the real estate profession? These assumptions need to be modelled and tested. Importantly it must be recognised that real estate is a derived demand. Lead statistics, such as expected population and production growth are relevant. In addition there will be specific local developments, such as a planned school or shopping centre, and changes in building codes affecting RRREI investment that the prospective investor should build into his discount rate.

CONCLUSION

This study assembled a lengthy sequence of annual price changes and rentals in separate houses and flats data sets by Melbourne local government areas. It tested a real estate-adapted variation of the capital asset pricing model to determine the extent to which market risk determined price and rental returns. The finding was that market risk alone offered an inadequate explanation of returns, notably for houses. The hedonic modelling approach was reviewed briefly, because it offered superior multiple R and R-squared measures. But it was rejected as offering a present audit of a property, akin to a valuation process which values a property on the basis of its past yields and the past sales prices of comparable local properties.

Given the importance of developing a conceptually sound model which will aid prospective residential rental real estate investors, future research should persist with the approach of discounting future cash flows and capital gains, using an internal rate of return by LGA which adjusts for both market and asset-specific risk. Thus, the basic CAPM approach needs to be extended to a multi-variate model incorporating the key variables shown to have determined the internal rate of returns for each of Melbourne's local government areas. The resulting internal rates of return calculated from the above historical data will then provide a starting point for prospective RRREI investors to adjust in the light of lead statistics, such as population and production projections and planned local developments.

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