Eighth Annual Pacific-Rim Real Estate Society Conference

Christchurch, New Zealand, 21-23 January 2002

Calculating a better index of return for the residential property sector

Peter Rossini*, Valerie Kupke, Wayne Marano and Paul Kershaw

Centre for Land Economics and Real Estate Research (CLEARER)
University of South Australia, Australia

Keywords: housing markets, residential property, residential property yield index, residential investment, private residential rentals, yield analysis, housing policy

Abstract: This paper examines the development of a residential investment property yield index. At present those Australian housing policies which seek to encourage private residential investment are hampered by the lack of a such an index. As well those indices which do exist are based on aggregate data and lack financial statistical validity. This paper outlines preliminary work on a project that seeks to calculate a yield index based on transaction level data. The index utilises an explicit equated yield approach based on actual price and rental figures, capital and annual expense estimates and capital growth based on constant quality prices indices. The research is based on South Australian data but the methodologies, once developed, could be applied nationally

Introduction

The private rental housing market generally is not well understood in Australia. However knowledge about Australian housing sub-markets and in particular the low cost private rental sub-market is of special importance given current economic and social changes. This paper is part of a larger study into the private rental market within Metropolitan Adelaide. The broader study which aims to identify supply factors and appropriate incentives for investors, is in two parts ; a survey of investors and a large scale analysis of rentals, costs and returns. This paper examines some of the preliminary work on the development of a rental index based on a data base of individual transactions of residential investment properties. This data base was created by linking the South Australian sales history file and the South Australian rental bond file. A series of yield estimates have been determined based on stratifying the transactions by geographical region, dwelling type and (in the case of separate houses) dwelling size. These results are discussed and compared to estimates based on aggregate data.

Private rental housing in Australia

The private rental sector is the sector of the housing system most likely to be significantly impacted by shifts in the public housing and home purchase sectors. As the private rental market currently functions, there are increasing concerns about the ability of the rental market to cater for sustained high levels of demand, particularly from those in significant housing need. For over 30 years the private rental market has represented approximately 20 per cent of the Australian housing stock. Yet the private rental has not been considered an important means of housingprovision as private renters were considered to be merely in transit to another tenure. However, since the 1990-92 National Housing Strategy inquiry, which highlighted the affordability difficulties faced by many low-income private renters, this attitude has changed. For example, it has been noted that households in private rental dwellings are no longer the 'residual tenure' in transit between other

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

'more permanent' tenures. Wulff & Maher (1998) have demonstrated that a significant proportion of tenants (40%) have spent more than ten years as private renters.

Thus there have been changes in the role of the private rental market, arguably attributed to a combination of economic and demographic restructuring, and to policy changes, particularly with respect to the provision of public housing. Consequently, the private rental market is becoming more important to a wider range of population groups than previously, particularly younger age groups now taking longer to achieve home ownership, but also to low income groups unable to access public housing. As of 2000 some 20.5% of households in Australia are in private rental sector and this proportion is increasing. Thus pressure is increasing on the private rental market to accommodate a larger proportion of low-to-moderate income earners and for a longer period of time. As it currently operates, the private rental market tends to offer advantages to short term dwellers (such as ease of access and exit from this tenure, and convenient locations), but disadvantages to longer term tenants (including lack of security and higher long term housing costs).

Private rental housing is provided by a diverse group of property owners ranging from householders to non-profit institutions, employers and corporations. The largest group of providers comprises private households who have invested in residential rental properties. These investors have been described as "unsophisticated and unintentional" meaning in that they display irrational economic behaviour and do not necessarily respond in a classical economic way to the laws of supply and demand (Yates, 1996). Thus they may not respond to policy initiatives as expected. However this project seeks to investigate such assumptions by surveying landlords on the basis that a better information base if supported by rational investors, will allow for better policy outcomes.

The increasing importance of the private rental tenure has resulted from fundamental transitions of the Australian economy and society since the mid-1980s including

- the changing nature of the labour market, resulting in less job security. This in turn has the 'double' impact of decreasing supply of rental investment properties because less people are able to afford to purchase residential properties (given that much of the private rental sector is supplied by unsophisticated and unintentional investors), and increasing demand because less people buy and therefore have to rent,
- the role of existing tax regimes including negative gearing and the introduction of the new tax system with implications for duties, rents and capital gains,
- the changing role of social housing, from an economic development role (where there were relatively few eligibility criteria for public housing) to a welfare role for public housing (where public housing is targeted to those 'in need' according to pre-defined eligibility criteria),
- the growth of Commonwealth rent assistance in terms of policy importance, arguably at the expense of public housing, and
- the gentrification of capital cities, whereby cheaper inner city suburbs undergo a process of urban regeneration and become less affordable.

While these changes have occurred, there has also been evidence of decreasing supply of low cost private rental as evidenced by:

- in the decade to 1996, mean national household incomes of those in the private rental sector declined from $759 to $714, but mean rents paid increased from $139 per week to $155 per week. Wulff (1997) & Yates (1996, 1999)) , note that while this may in part reflect an increase in the demands for higher housing standards of living, it is more likely to reflect a reduced availability of low cost rental housing;
- in the decade to 1996, the total rental stock in Australia increased by 34%. However, at the same time, the low cost stock declined by 28% such that low cost stock as a proportion of all rental stock declined from 26% (in 1986) to 14% (in 1996).

The national decline in low priced rental stock occurred at a time when the need for it was increasing as a result of a disproportionate increase in the number of low income households who are renting. This contributed significantly to the measured shortage in stock affordable for households on low incomes when affordability is defined in terms of rent exceeding 30% of gross income.

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

Returns and yields from private rental housing

With the growing pressure on the private rental market in Australia (Berry et al 2000 and Yates et al., 1999) various incentives have been proposed including taxation reform, construction subsidies and issuing of government bonds (Wood & Watson 2001, Stroder & Reiger 2001, AHNRC 2001). However as most investors own only one investment property (Yates, 1996) and with demand strongest for at the lower end of the rent scale it is necessary to bring a larger number of players into the private rental market. Governments including those in the UK (Hughes 1999) are keen to modernise the ownership of private rental housing by broadening the landlord base to include financial institutions. However this requires a better information base and the application of appropriate property investment criteria to raise interest in such opportunities. In the UK there is access to such data. The University of York rental index is a valuation based index using a cross section of residential properties (Collett A, 2000). In Australia the data is less robust and relies largely on aggregate indices through industry groups such as the Real Estate Institute. Conclusions about the behaviour of private renters is often based on these aggregate indices. It is generally believed that the trade off for owners of higher income rental property that have lower initial yields, is lower operating costs, greater capital gains and lower risk. (Yates J. et al., 1999). However research by Yates for AHURI (1997) could not fully support this explanation. For this hypothesis to be tested market values, real capital gains and consistent rates of return across submarkets need to be calculated. A more useful index would be based on individual transaction and incorporate constant quality concepts. Hendershot and Turner (1999) propose such an index and tested its use using 422 transactions in Stockholm. Their research used an hedonic function to develop an index where aspects such as floor space and year of construction were held constant. This paper adopts a simple stratification method to minimise quality changes.. It also considers the broader issue of yields and which are most appropriate.

Which Yield?

Studies of investments usually involve some analysis of yields. Unfortunately the term "yield" has many different interpretations and in most cases one "yield" cannot be compared to another "yield". An understanding of these different yields and how they are calculated is fundamental to understanding how and when they can be compared.

The most basic calculation of yield is the **gross yield** calculated from the market price (taken from a transaction) and its market gross income (annual rental assuming it is at a market rate)

$$\text{Gross Yield} = \frac{\text{Market Gross Income}}{\text{Market Sales Price}}$$

This is a highly simplistic yield calculation but is often adopted in situations where there are a substantial number of rack-rented properties (rented at market income) and costs are relatively even across the population of properties. This yield is not capable of comparison with most other investments since it makes unrealistic assumptions such as an infinite investment life, no capital or rental growth and no capital or annual expenditure. Notwithstanding these shortcomings the gross yield is often used as a means of comparison between simple investment properties that are within the same general property sub market. One important point here is that the yield calculation relates to a specific sales transaction. If a large number of transactions are examined it is possible to calculate the arithmetic mean (or average) of these yields by calculating

$$\overline{\text{Gross Yield}}_s = \frac{\sum_{j=1}^{n} \text{Gross Yield}_j}{n}$$

where $\overline{\text{Gross Yield}}_s$ = the mean of a sample of Gross Yield

Gross Yield_j = The observed Gross Yield from property j

n = the number of observed values of Gross Yield_j

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

Or simply, sum the gross yields and divide by the number of gross yields. An alternative methodology which is used in some cases is to use aggregate data. In this case you might calculate

where $$\text{Gross Yield}_A = \overline{\text{Market Gross Income}}_A \Big/ \overline{\text{Market Sales Price}}_A$$

$$\text{Gross Yield}_A = \text{"typical" gross yield based on agregated data}$$

$$\overline{\text{Market Gross Income}}_A = \text{Mean of all Gross Incomes at aggregate level}$$

$$\overline{\text{Market Sales Prices}}_A = \text{Mean of all Market Sales Prices at aggregate level}$$

Thus the aggregated gross yield is calculated simply by dividing the mean market gross income by the mean sale price.

Importantly, even if the sample data is used to form the aggregated data, the mean of the sample does not equal the mean of the aggregate, except in the highly unlikely circumstance where all of the sample yields are identical. Thus

$$\overline{\text{Gross Yield}}_s \neq \text{Gross Yield}_A$$

This is proved in Appendix 2. In practice the aggregated gross yield is calculated from existing aggregate data. Usually the mean income figure is derived from a sample of investment properties that are rented. By comparison, the mean sale price is usually derived from a sample of properties that have sold and is usually dominated by owner occupied residences. Since investment properties are often at the lower end of the price bracket, it follows that the mean sales price for all properties will over estimate the sale prices for the investment properties and that the yield will be correspondingly underestimated. Since the aggregated gross yield is not the “average yield” and that it is based on non-comparable data, it seems reasonable to argue that the methodology is flawed and it is hypothesized that it will often give a pessimistic view of investment returns. Also the calculation using the aggregate provides no insight into the distribution of yields. Analysis of yields from individual sales can provide this insight through calculation of other characteristic of the distribution including the standard deviation, skewness and kurtosis.

While the gross yield is simple, its lack of comparability to other yields seriously decreases its utility. Less simplistic versions of the yield calculation provide for greater comparability with other competing investment opportunities. The first improvement is to include issues such as expenses and vacancy losses in the calculation of the net yield.

The **net yield** is based on the market net operating income (NOI). The NOI is calculated from the gross income and takes into consideration the annual expenses that must be met by the landlord as well as making an allowance for vacancies and credit loss. The NOI can be calculated as

$$\text{Net Operating Income} = (\text{Market Gross Income} - \text{Vacancy Loss} - \text{Operating Expenses})$$

and the net yield is then calculated as

$$\text{Net Yield} = \frac{\text{Net Operating Income}}{\text{Market Sale Price}}$$

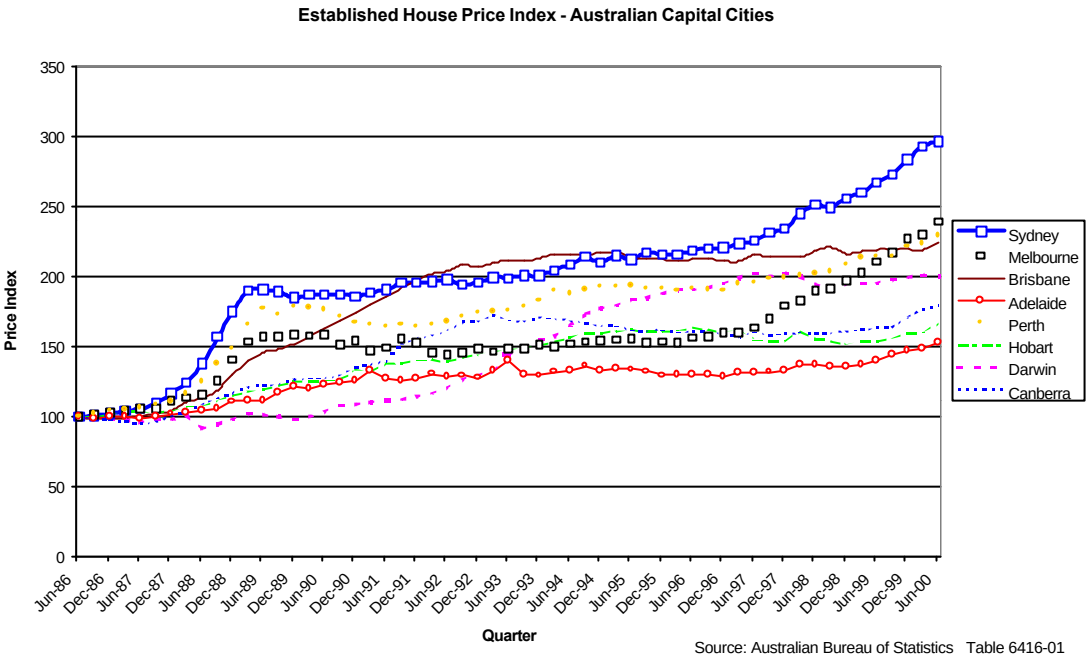
As with the gross yield, the net yield is often erroneously calculated with aggregate data. In this case the operating expenses and vacancy rates are often derived from a different sample that differs from the market

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

gross income and the sales price. This may further compound the problems and produce yields that bear very little resemblance to the real world.

The net yield provides for a reasonable comparison of yields across markets where properties are rack rented, where capital expenditure is not required and where there is nil or constant expectations of capital and rental growth. Within an Australian context, comparison is difficult since there is considerable difference in expected growth rates. Figure 1 indicates the established house price indices for all Australian capital cities. It shows the dramatic difference in the indices over the period 1986 - 2000. This shows that an existing house in Sydney with a value of $100,000 in 1986 would now have a value (on average) of about $300,000 while the same house in Adelaide would have a value just over $150,000. This large variation in capital growth needs to be accounted for in the yield analysis since an investor will be seeking both annual income and capital gain.

Figure 1 - Chart of Established House Price Indices for Australian Capital Cities Jun 1986 to Jun 2000



Source: Australian Bureau of Statistics Table 6416-01

An effective method to allow for all possible variations including different growth rates and annual and capital costs, is to derive the yield by calculating the internal rate of return from an explicit discounted cash flow calculation. This method allows the calculation of the **equated yield**, which provides a more appropriate measure of the return from the investment considering all issues. This yield is comparable with the yield from other forms of investment and is also comparable across a diverse range of locations and investment situations.

The internal rate of return or equated yield can be established by solving for the rate (r) in the following equation

$$\text{Market Sale Price} + AC = \sum_{i=1}^{n} \frac{NCF_i}{(1+r)^i} + \frac{(RV - DC)_n}{(1+r)^n}$$

Where

NCF_i = Net Cash Flow at time period i

RV = Reversionary Value of the Property at time n

AC = Acquisition costs

DC = Disposal Costs

n = Typical holding period for the investment

r = Internal Rate of Return or Equated Yield

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

This is a typical discounted cash flow calculation. The introduction of growth factor maybe be based on a number of different indicators but it is envisaged that the calculation will be based on

$$NCF_i = (\text{Net Operating Income}_0)(1+g)^i - \text{Capital Expenditur e}_i$$

$$RV_n = \text{Market Sale Price}\,(1+g)^n$$

Where ***g*** = estimated growth rate based on constant rates for regions, housing types and price ranges

Clearly the jump from the net yield to an equated yield is a large one. However the advantage is that this yield can be compared to yields from other investments and may be compared to a risk free rate in order to estimate the risk premium that is received.

A less complex calculation involves the use of the basic gross yield and the growth factor, while ignoring the various other costs. This enables a calculation of a capital growth adjusted gross yield and explicitly adjusts for a situation where income return is augmented by capital growth. Since the capital growth estimate is essentially an aggregate figure, it is inappropriate to apply this at an individual property level but is logical at an aggregate level.

$$\text{Growth Adjusted Gross Yield}_A = \left[\left(1+\overline{\text{Gross Yield}_s}\right)*(1+g)\right]-1$$

Where

$\text{Growth Adjusted Gross Yield}_A$ = the Aggregated gross yield adjusted for capital growth

$\overline{\text{Gross Yield}_s}$ = the mean of a sample of Gross Yields

g = estimated capital growth rate based on constant rates for regions, housing types and price ranges

Methodology

The data for this paper is based on three separate data sets. The basis for rental information is the SA Rental Bond Data (held by S.A. Residential Tenancies Tribunal). This contains a record of all current and new residential bonds paid through the residential tribunal since the early 1990's. Only a small subset of the data was released for research and this did not include a robust property indicator. Because the data base is client rather than property based, details of the property involved are not of primary consideration and details are not consistent. The same property may occur multiple times (each time it is re-rented) but with a different version of the address being entered. An accurate postcode is entered for all properties and there is some indication as the type of property involved. In order to use this file efficiently it was necessary to obtain more reliable indicators of location and property details. To do this the file was matched with the S.A. Valuation list. A direct match is not possible because of the lack of a suitable indicator on the bond file. Notwithstanding this, after considerable manipulation of the bond file address fields 115,628 records were matched between the bond and valuation file to provide a residential rental data base of rentals occurring between January 1, 1994 and December 31, 2000, within the Adelaide metropolitan area. The second data base, the S.A. Sales History File, contains information on all property transactions and was the source used to extract probable market transactions for all properties that were detached, semi- detached and home units in the Adelaide metropolitan area for the same period (sales to or from government agencies were not included). The third data set is the matched file of property transactions and market rentals. The matching of these files was based on the following process.

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

1. A subset of the bond file to valuation list match file was created where all properties rented after 1993 and showing a sale recorded between 1994 and 2000 (the valuation list indicates the date of the last sale) were extracted.

2. All residential sales from 1994 to 2000 were compared to this bond file extract to establish matches, i.e. where a property had been sold and rented during the period.

3. The matched records were then accepted as probable investment properties if the property was rented within 12 months either side of the sale. It is accepted that in some cases the property may have been purchased for private ownership and that the lease may have ceased soon after sale or that the resulting rental of the property may have resulted from accidental rather than intentional circumstances. However for the purposes of yield analysis the match of a market rental and market sale should give good evidence of yields.

4. Probable non-market rentals were removed. Typically these involved rentals from private companies.

5. Sales from deceased estates were removed where it appeared to be a non-market transaction.

6. Sales that appeared to include substantial rural, industrial or commercial interests were removed. This included several house-workshops, house-surgeries and several small rural holdings.

7. The details of the sales and bond file were then compared in terms of dwelling characteristics to remove circumstances where only a *part* of the property was rented. Examples included several house-workshops, house-surgeries and several small rural holdings as well as a large number of houses with granny flat or separate rooms. In each case it was not clear if the whole property was rented or only a part of the property.

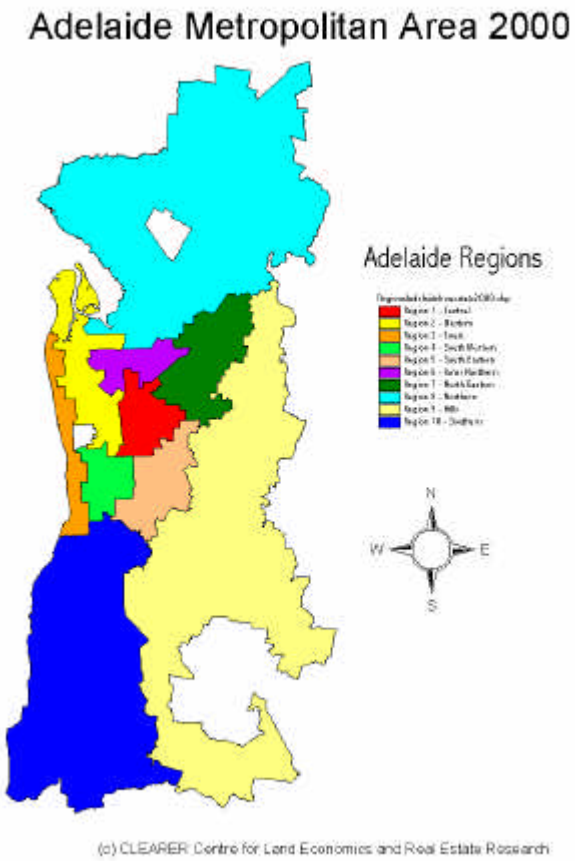
The resulting data set contained 1,966 transactions.

Properties in the three files were then classified into strata based on location, dwelling type and number of main rooms. This allowed consistency of comparison and would also allow for segmentation of results to allow for quality variations. The basis of this classification was as follows.

1. Each property was classified within one of ten regions. These regions were based on amalgams of postcodes based on those used by CLEARER (2001). The regions are indicated on Map 1.

2. Each property was classified as a detached house, semi-detached house or home unit depending upon the classification attached in the valuation list. A second classification was created where detached and semi detached houses were consolidated

3. Each property was then classified on a dwelling type-number of rooms basis. This resulted in five categories. House with up to 5 main rooms, houses with 6 or more main rooms, home units with less than 4 main rooms, home units with 4 main rooms and home units with more than 4 main rooms. These classifications were consistent with those used by Rossini(2001) and were necessary to match with constant quality house price indices.



Map 1

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

The main basis for this paper is the matched sales rental file. However, the individual rental bond and sales files are used also for amalgamated results and as a basis for rental adjustment. The gross yield (Gross $Yield_S$) was calculated for each property in the sales- rental file. However since the rental could have occurred as much as 12 months before or after the sale it was necessary to make minor adjustments to the rents to allow for this. The basis of this adjustment was a simple median rental index calculated for each region. This index is shown as Table 4 in the appendix. The gross yield was then calculated on the basis of the adjusted weekly rental and the actual sale price. Descriptive statistics were also calculated for the yields based on each stratification.

The final stage in the methodology was to calculate the growth adjusted gross yield using the yield calculations and capital growth estimates based on constant quality price indices published by Rossini (2001). The growth adjusted yields were calculated for house properties stratified by region and house size. The yields uses were based on sales across the whole time period (1994 to 2000) and the capital growth estimate was the average annual growth over the same period.

Results

The calculated gross yields for houses and units are approximately normally distributed with mean and median yields in the range of 8% to 10 % per annum. The distribution of results is indicated in Figure 2. This shows that the yields from home units are remarkably consistent with over 60% falling in the 8% to 10% range with 95% falling into the 6% to 12% range. The distribution of unit yields appears to be non-skewed. The distribution of yields for houses is flatter and slightly skewed. Houses show a much wider range of possible yields with 95% of yields falling into the 4% to 14% ranges.

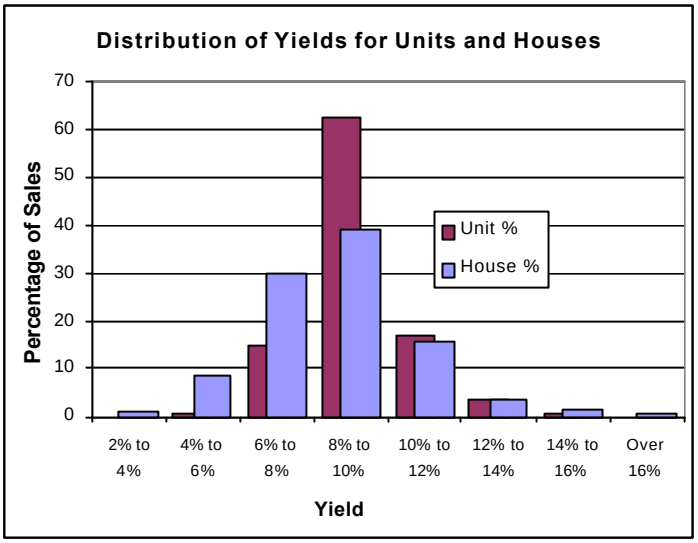


Figure 2 - Distribution of Gross Yields using all data 1994 to 2000

Table 1 compares yields calculated from individual yield estimates with those from aggregated data. The mean of the gross yields (Gross $Yield_S$) is compared to two gross yields based on aggregated data (Gross $Yield_A$). The first of these is calculated from the aggregated sample data with the second calculated form data aggregated from the population of rents and the population of sales. The yields are based on sales from 1994 to 2000 and are calculated for detached, semi-detached and home units properties. This table clearly indicates the previously described problem with using aggregate data. The aggregating of the data produces a poor estimate of the gross yield even when based on the same data and the use of population data suggests significantly lower yield estimates that the mean yield produced though individual sales analysis. The reasons for this phenomenom are partly mathematical but primarily caused by the type of properties that are purchased as residential investment properties. Comparison of the mean sale price and rental between the sample of known residential investment properties and all residential sales shows that for detached and semi-detached house the properties being purchase are at the cheap end of the spectrum with the rents being correspondingly low. However this is not a ratio relationship. The *population* of semidetached house sales has a mean price almost 100% larger than the *sample* while the rents are only about 33% larger. Clearly the residential investment market for detached and semi-detached houses is made up primarily of properties at the cheaper end. The investment market for home units seems to approximate the population of sales. Both the mean price and rent are very similar. However even in this case the aggregated yield estimate is significantly lower than the mean of the individual sale yields.

The results from Table 1 provide clear support for the development of a yield index based on individual property transactions. Even at a gross yield level the wide difference between the estimate based on individual transactions and that based on the aggregated population statistics is dramatic. It is reasonable to conclude that policy makers should take yield estimates based on aggregated data with a considerable degree of

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

scepticism especially in markets where a large proportion of the investment properties are at the lower end of the price range.

Table 1 - Yield estimates by building type for aggregated and non-aggregated data (All sales 1994 – 2000)

	Mean Gross Yield (sample)	Sample Mean Rent	Sample Mean Price	Aggregated Gross Yield (sample data)	Population Mean Rent	Population Mean Price	Aggregated Gross Yield (population data)
Detached Houses	8.54%	$ 137	$ 87,964	8.09%	$ 169	$ 139,821	6.29%
Semi Detached Houses	9.62%	$ 123	$ 80,455	7.97%	$ 174	$ 160,532	5.64%
Home Units	7.15%	$ 131	$ 98,600	6.91%	$ 126	$ 104,673	6.28%
All	8.53%	$ 136	$ 88,063	8.01%	$ 150	$ 133,638	5.85%
Observations (n)	1966	1966	1966		115628	146662	

Yields from house sales have been further examined at sub-market level. Table 2 shows the mean yield for each region for each of the 7 years. There are two significant issues from these results. Overall average yields have increased. Across all regions from 7.8% in 1994 to 9.5% in 2000. This is largely the result of movements in regions 8 and 10. These are the northern and southern regions and make up nearly 50 % of all of the transactions. There is also significant variation across the regions. The data for all years has been plotted on Map 4 alongside plots of the median sale prices and rentals. The northern and southern regions stand out as area of low prices, low rentals and with high yields. Adelaide's prestigious central, south eastern and coastal areas are marked by higher prices, higher rents but lower yields. Clearly the high rents in these locations do not offset the much higher prices.

Table 2 - Yield estimates for houses by region and year of sale

Year	REGION										
	1	2	3	4	5	6	7	8	9	10	All regions
1994	6.2%	6.7%	6.2%	7.0%	6.4%	7.8%	7.2%	9.1%	7.2%	8.4%	7.8%
1995	6.5%	8.1%	7.4%	7.1%	4.4%	7.3%	7.5%	9.2%	N/A	8.1%	8.0%
1996	6.6%	8.0%	7.2%	7.5%	6.5%	7.8%	8.2%	10.0%	7.8%	9.2%	8.6%
1997	6.4%	8.3%	6.6%	7.4%	7.4%	7.7%	8.0%	10.3%	8.3%	9.6%	8.8%
1998	5.1%	7.7%	7.3%	7.2%	7.0%	8.8%	7.9%	10.1%	7.7%	9.0%	8.8%
1999	6.5%	8.5%	6.3%	7.9%	5.7%	8.2%	8.4%	11.4%	8.7%	9.4%	9.5%
2000	5.7%	6.5%	6.1%	7.3%	7.4%	8.6%	8.5%	11.0%	N/A	9.5%	9.5%
All Years	6.3%	7.8%	6.8%	7.3%	6.5%	8.0%	7.8%	10.2%	7.9%	9.1%	8.5%

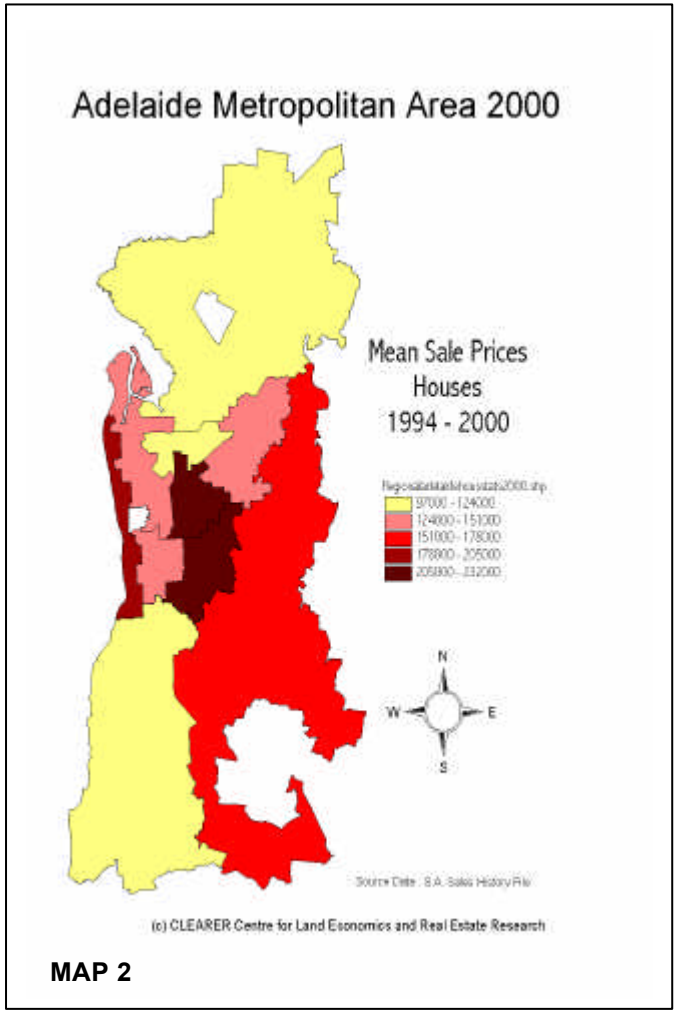
This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

If investors are rational, then they may offset the return from rental with capital growth. This is usually hypothesised as the reason for the yield differences. If this is the case then the growth adjusted gross yield would have less variation than the yields in Table 2. The results in Table 3 indicate that the expected return from houses (there were insufficient observations for home units) is reasonable consistent across the various regions when the yields are adjusted for probable capital growth. This is true across the regions and also when comparing larger and smaller properties. The table also reveals that larger (normally higher priced) properties generally show lower gross and adjusted gross yields than the smaller, less expensive properties. The notable exceptions to this are the yields for larger properties in regions 5 and 7. These are the prestigious eastern suburbs of Adelaide. While smaller houses in these locations show similar growth adjusted yields to other regions, the yields on larger home i are noticeably lower. This may reflect a smaller number of very large homes. This finding warrants further investigation.

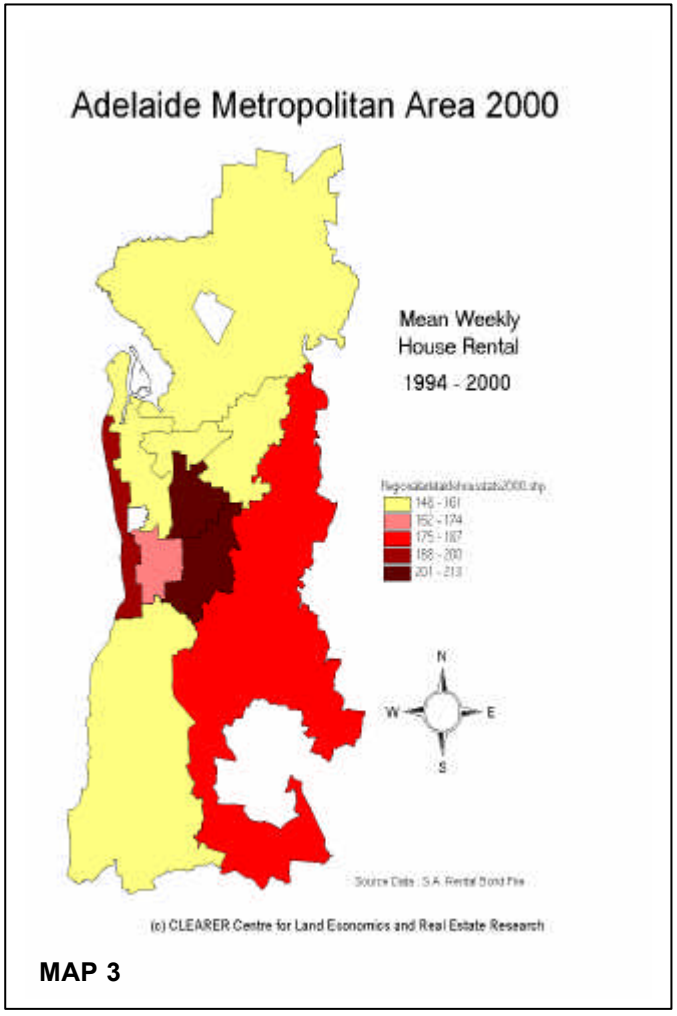
Table 3 - Growth adjusted gross yields stratified by large and small houses

Region	1	2	3	4	5	6	7	8	9	10
Houses with 5 main rooms or fewer										
Gross Yield	6.43%	8.03%	7.08%	7.43%	6.78%	8.05%	8.01%	10.38%	7.91%	9.28%
Capital Growth	4.97%	3.15%	4.69%	3.60%	4.01%	2.29%	2.64%	1.36%	3.35%	2.42%
Growth Adjusted Gross Yield	11.72%	11.43%	12.11%	11.29%	11.05%	10.52%	10.86%	11.89%	11.53%	11.93%
Houses with more than 5 rooms										
Gross Yield	5.15%	6.38%	5.71%	6.52%	4.86%	7.60%	7.06%	9.47%	N/A	8.24%
Capital Growth	5.26%	3.42%	4.78%	3.47%	3.73%	2.90%	2.51%	2.22%	N/A	2.52%
Growth Adjusted Gross Yield	10.68%	10.01%	10.77%	10.22%	8.78%	10.72%	9.75%	11.90%	N/A	10.98%

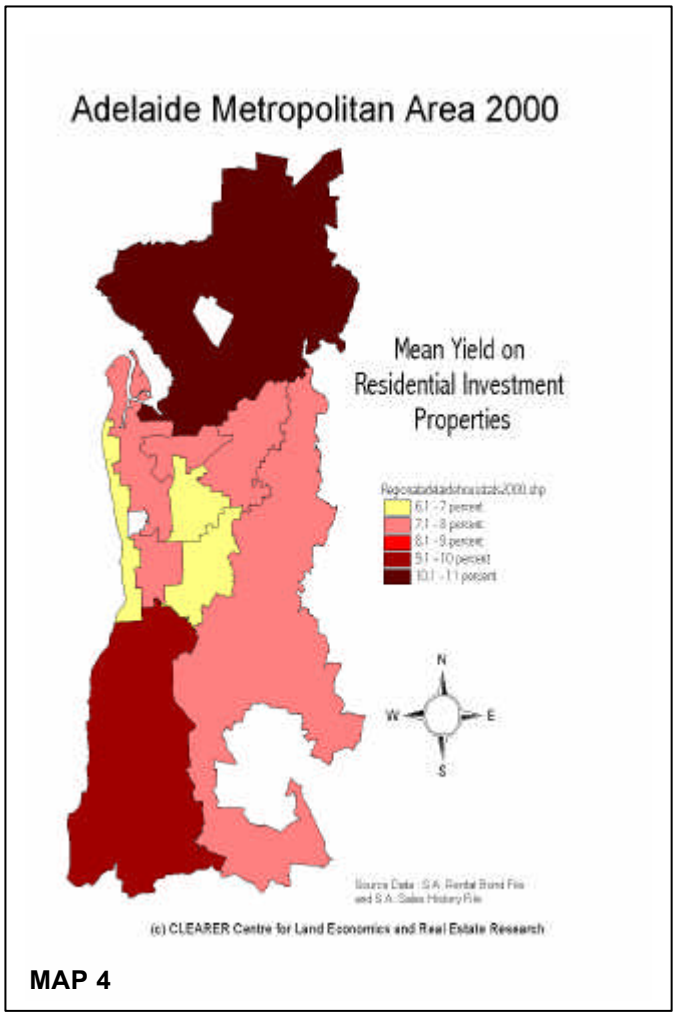
This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services



MAP 2



MAP 3



MAP 4

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

Conclusions

This paper presents some preliminary results into research aimed at producing an improved set of yield estimates for the Adelaide metropolitan area. While the results are preliminary there are several significant conclusions that can be drawn at this stage.

Yield estimates based on aggregate data are inaccurate and will provide misleading information to policy makers and investors. Since the private rental market is inevitably skewed towards lower end value properties, it is likely that it will suggest much lower average returns than are actually being achieved.

Gross yields vary significantly across regions, dwelling types and dwelling sizes. However, on average lower gross yields from rental properties are offset by higher capital gain expectations and vice versa.

Yields from lower value properties in outer reaches of the metropolitan areas seem to be increasing.

The paper raises many questions about yields. However it is anticipated that further analysis, which also incorporates accurate costs, will provide further insights into the opportunity for returns provided by the residential property sector.

---

*Contact Author
Peter Rossini, Lecturer - University of South Australia
School of International Business
North Terrace, Adelaide, Australia, 5000
Phone (61-8) 83020649
Fax (61-8) 83020512
Mobile 041 210 5583
E-mail peter.rossini@unisa.edu.au

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

References

AHURI (1997) Australia's Private Rental Housing Market: Processes and Policies AHURI

Berry M & Dalton T (2000) Home Ownership into the New Millennium: A view from the Margin, *Urban Policy and Research* vol 18, no 4 pp 435-454.

Crook ADH & Kemp P (1999) *Financial Institutions and private rented housing* Joseph Rowntree Foundation YPS York

Collett A, (2000) Prospects for investment in the private rented sector, *Journal of Property Investment and Finance,* Vol 18 No 4, pp. 507-516

CLEARER (2001) The Adelaide Housing Atlas 2001.

Hendershot, P & Turner B. (1999) Estimating constant-quality capitalization rates and capitalization effects of below market financing *Journal of Property Research,* 16(2) 109 122

Hughes J (1999) Happy returns: the individual investor as a source of new capital for rented housing in a time of changing social welfare structure *Housing Studies* 14 4: 507-524

Rossini, P.A. (2002) Calculating stratified residential property indices to test for differences in trend, seasonality and cycle, submitted for presentation at the 8th Pacific-Rim Real Estate Society Conference, Christchurch, New Zealand, 21-23 January, 2002

Wood G, Watson R & Yates J 1998 *Transaction Cost, Taxation and Gross Rental Yields in Private Rental Housing* Economics Dept. Murdoch University Working Paper 172

Wulff M & Maher C 1998 Long Term renters in the Housing Market *Housing Studies* 13

Yates J & Wood G 1996 *Supply side incentives for private rental housing* Paper presented to the ENHR/SBI Housing Research conference Helsinor Denmark 26-31 August

Yates J 1996 Towards a Reassessment of the Private Rental Market *Housing Studies* 11: 1

Yates J 1999 *Decomposing Australia Home ownership Trends 1975 – 1994* Paper presented at Dept. of Family & Community Services Seminar "Australia Housing Choices Stability or Change?" February

Yates J. & Wulff M. (1999) Recent Developments in the Analysis of Australia's Private Rental Market in O'Connor K (ed) *Houses & Jobs in Cities and Regions, Research in Honour of Chris Maher*, Chapter 6, pp 123 to133, Uni of Queensland Press

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

Appendix 1 - Median Rental Index by Region

Table 4 - Median Rental Index by Region (Appendix)

	Region									
Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1994	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1995	107.1	105.2	105.8	104.5	103.7	104.9	103.8	103.0	105.2	103.5
1996	114.7	109.5	114.3	108.7	110.4	109.3	111.8	106.9	112.2	107.5
1997	114.7	113.9	114.3	112.9	113.8	113.7	111.8	110.9	115.7	111.5
1998	123.1	118.3	122.8	117.0	113.8	122.4	115.8	110.9	119.2	111.5
1999	133.8	122.7	127.0	121.2	123.8	122.4	119.8	114.9	119.2	119.4
2000	137.7	131.4	139.7	125.4	127.2	131.2	127.8	118.8	126.2	123.4
2001	145.3	135.8	143.9	133.8	130.5	139.9	131.8	118.8	138.5	131.4

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

Appendix 2 - A Mathematical Proof that Arithmetic Operations on the Means of Aggregate Data produce inaccurate estimates

Let x = annual rent

Let y = 1/capital value

Then Return = x times y

Prove that

$$\sum_{i=1}^{n} \frac{x_i \times y_i}{n} \neq \sum_{i=1}^{n} \frac{x_i}{n} \times \sum_{i=1}^{n} \frac{y_i}{n}$$

When expanded $\sum_{i=1}^{n} \frac{x_i \times y_i}{n}$ becomes

Equation 1

$$= \frac{1}{n}\left(x_1 y_1 + x_2 y_2 + x_3 y_3 + \cdots + x_n y_n\right)$$

whereas $\sum_{i=1}^{n} \frac{x_i}{n} \times \sum_{i=1}^{n} \frac{y_i}{n}$ becomes

Equation 2

$$= \frac{1}{n}\left(x_1 + x_2 + x_3 + \cdots + x_n\right) \times \frac{1}{n}\left(y_1 + y_2 + y_3 + \cdots + y_n\right)$$

$$= \frac{x_1}{n^2}\left(y_1 + y_2 + \cdots + y_n\right) + \frac{x_2}{n^2}\left(y_1 + y_2 + \cdots + y_n\right) +$$

$$\cdots \frac{x_n}{n^2}\left(y_1 + y_2 + \cdots + y_n\right)$$

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services

If we subtract Equation 1 from Equation 2 and equate to zero we obtain

$$0 = \frac{1-n}{n^2}\left(x_1y_1 + x_2y_2 + x_3y_3 + \cdots + x_ny_n\right) + \frac{1}{n^2}\sum_{i,j=1}^{n,i\neq j} x_iy_j$$

or after simplification

$$(n-1)\left(x_1y_1 + x_2y_2 + x_3y_3 + \cdots + x_ny_n\right) = \sum_{i,j=1}^{n,i\neq j} x_iy_j$$

If and only if $x_1 = x_2 = x_3 = \cdots = x_n$ then

$$(n-1)\left(x_1y_1 + x_2y_2 + x_3y_3 + \cdots + x_ny_n\right) = x(n-1)\sum_{i=1}^{n} y_i$$

and

$$\sum_{i,j=1}^{n,i\neq j} x_iy_j = x(n-1)\sum_{i=1}^{n} y_i$$

if x and/or y are not scalar quantities then equality is not guaranteed.

This paper results from an Australian Research Council (ARC), Strategic Partnerships with Industry - Research and Training Scheme (SPIRT) grant in cooperation with the S.A. Department of Human Services, Shelter SA and UPmarket Software Services