

DEVELOPING A NSW RURAL PROPERTY INVESTMENT PERFORMANCE INDEX

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The following is a summary of the research carried out by Dr Chris Eves in his PhD thesis “Developing a NSW rural property investment performance index”, which was recently awarded the 2004 Peter Barrington Gold Medal

Introduction

The thesis was based on the analysis of all rural property sales transactions that occurred in NSW over the period 1990-2000 and is the first complete statewide analysis of a rural property market in Australia. Previous studies on rural land performance have been restricted in both limited time periods and limited location areas.

The importance of rural property, as an investment asset, has been recognised in the US and UK, with both these countries having a rural property investment performance index. These indices are similar in construction, quality and reliability as the commercial property, residential property and share market indices that are also available in these countries to analyse the performance of these investment assets.

Until the development of the rural property capital and total return indices in this thesis, there has never been a comprehensive and complete set of rural property investment performance indices available to assess the risk/return performance and investment portfolio benefits of rural property in Australia. The actual construction of the indices in this thesis have been based on similar construction methods as the current indices produced by the Property Council of Australia for office, retail, industrial and hotel property in Australia.

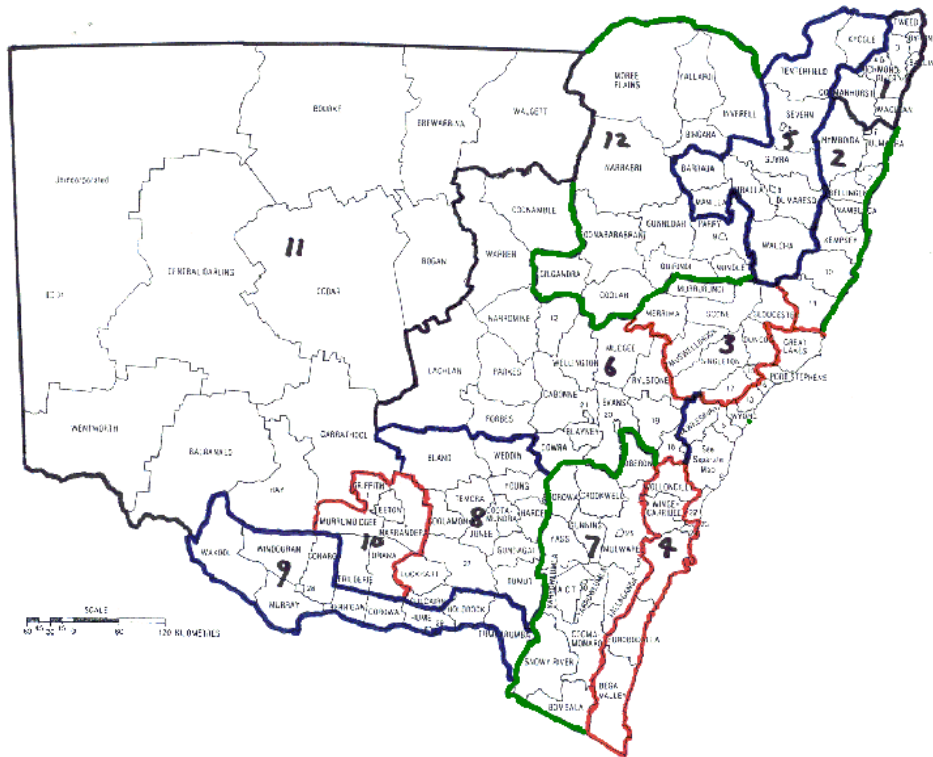
Research Objectives and Index Construction

A major objective of this research degree was the extensive analysis of the NSW rural property sector to allow the development of a comprehensive investment performance index, allowing the comparison of rural property on a geographic and land use basis to other investment assets.

The NSW rural property capital and total return indices developed and analysed in this thesis have provided the first complete transaction-based rural property investment performance analysis based on both geographic location and rural land use. Based on the work in this thesis, rural property investment performance can now be compared to all major investment assets available in Australia.

Figures 1 and 2 show the various geographic regions and land use classifications, based on Local Government Area boundaries, analysed in the study, with a summary of the sales transaction data and analysis shown in Tables 1 and 2.

Figure 1: NSW LGA Geographic Regions



- | | |
|-------------------------|------------------------------|
| 1 Far North Coast | 7 Southern tablelands |
| 2 North coast | 8 South west Slopes & Plains |
| 3 Hunter | 9 Murray |
| 4 South Coast | 10 Riverina |
| 5 Northern Tablelands | 11 Western Division |
| 6 Central West Slopes & | 12 North West Slopes and |

Although the indices developed in this thesis only cover the period 1990-2000, this research will be on-going to ensure that the performance of rural property will be available on a semi-annual basis for use by all institutions, companies and individuals with an interest in the investment potential of rural property in Australia.

SIGNIFICANT RESEARCH FINDINGS

Rural Property Capital Returns

Table 1: NSW Rural Region Capital Return Comparison: 1990-2000

Region	Average Annual Sales Transactions	Average Annual Nominal Capital Return (%)	Average Annual Real Capital Return (%)	Annual Volatility (%)
Far North Coast	238	7.40	4.90	27.20
North Coast	138	5.94	3.48	18.89
Hunter	232	9.82	7.20	38.38
Northern Tablelands	305	5.14	1.35	23.70
North West Slopes	212	13.12	10.32	20.11
Central West Slopes	371	5.63	3.16	25.51
Western Division	161	14.64	11.76	50.82
South West Slopes	360	2.60	0.22	13.46
Riverina	167	9.11	6.52	19.32
Murray	122	7.42	4.90	26.78
Southern Tablelands	328	7.20	4.68	13.09

South Coast	107	8.32	5.76	20.08
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Average annual capital returns for the 12 major rural regions in NSW have varied significantly over the period 1990-2000. During this period, the average annual capital return ranged from 2.60% to 14.64%. Higher average annual capital returns were recorded in rural regions along the coast of NSW, with the lower average annual capital returns being recorded in the Central West and the South West mixed farming areas.

Two geographic regions in NSW have recorded average annual capital returns greater than 10% (North West Slopes and Plains and Western Division) for the period 1990-2000, despite the rural crisis experienced by farmers in NSW from 1990-1994. During the study period, both the Central West and South West Slopes and Plains achieved relatively low average annual capital returns of 5.63% and 2.60% respectively. These two rural geographical regions were the most affected by the early 1990s rural crisis as the main commodities produced in these regions had record low prices in 1990-1993. However, both these regions are mixed farming regions, with this rural land use sector recording the highest average annual income returns for the 1990-2000 study period (Refer to Table 1).

There was no direct correlation between rural land use and rural geographical location, with differing capital returns in adjoining rural regions and with regions with similar rural land uses. For example, in the two regions where high rainfall grazing is the main rural land use the difference in average annual capital returns was 40% over the period 1990-2000. In the case of the two North West regions, although they adjoin the difference in average annual returns for the period 1990-2000 was 155%.

Just as there were significant variations in the capital returns and risk-adjusted performance for rural property based on geographical location, there were also significant variations in the risk/return performance of rural property capital returns on a land use basis. During the period 1990-2000, both coastal grazing and pastoral grazing rural property in NSW achieved average annual capital return greater than the NSW composite rural return. Both these rural land use sectors had a higher risk/return ratio than composite rural property. However, the Sharpe index value for pastoral rural property was equal to the composite Sharpe index, with coastal grazing having a higher risk/return adjusted performance than mixed farming and tableland grazing, but a lower adjusted risk/return performance to NSW composite rural property.

A correlation analysis of the average semi-annual capital returns for the twelve NSW rural property regions shows a greater correlation between the movement in land prices based on rural land use rather than location. This indicates that economic factors have a greater impact on the change in rural land prices than locational factors;

There were several significant negative correlations between the rural land price movement in several rural regions, as well as rural land use sectors. This indicates that rural property can offer both geographic and sector type diversification benefits.

Table 2: Average Annual Capital Return: Rural Land Use Classifications: 1990-2000

Rural Land Use Sector	Average Annual Capital Return (%)	Annual Volatility (%)	Risk-Return Ratio	Sharpe Index
Coastal Grazing	10.01	26.25	2.62	0.12
Tableland Grazing	7.16	12.94	1.81	0.00
Mixed Farming	6.69	12.33	1.84	-0.04
Pastoral Grazing/Marginal Farming	16.34	42.37	2.59	0.22
NSW Composite	9.50	10.62	1.12	0.22

Figure 2: NSW Rural Land Use Risk-Return Diagram: 1990-2000

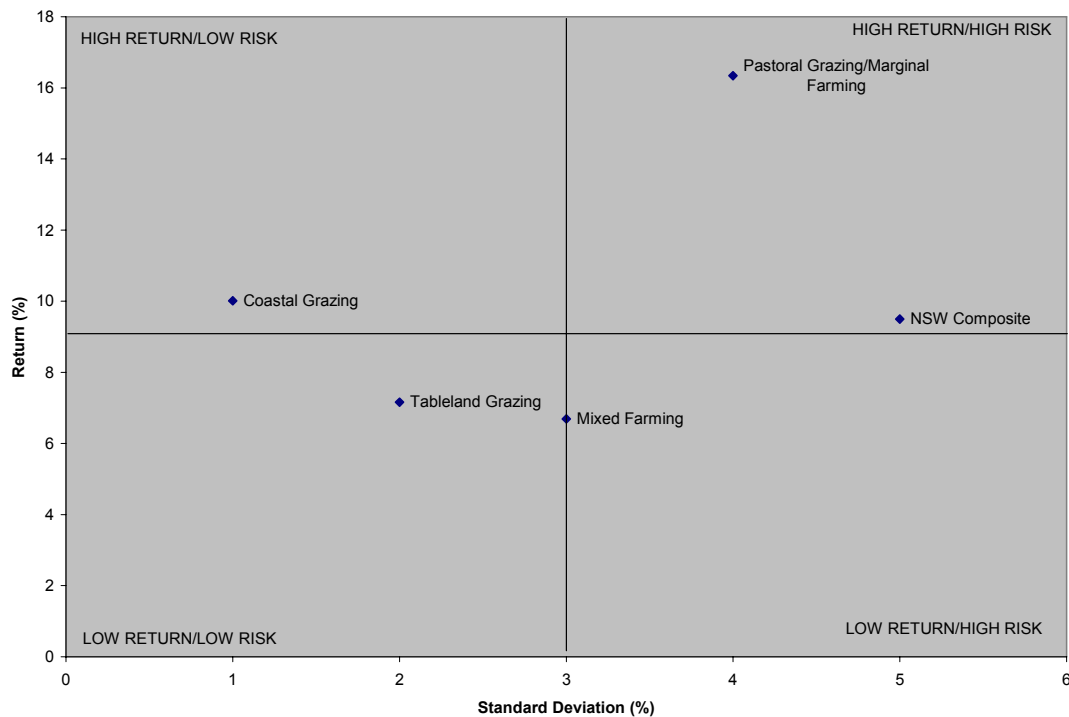


Figure 2 and Table 2 compares the various NSW rural land use classifications and the NSW composite capital returns on a risk/return basis. This figure shows that both the NSW composite and Pastoral grazing/marginal farming are high risk/high return assets. Mixed farming has been classified as a low return/high risk asset class, with Tableland grazing being low return/low risk. The only rural land use classification to fall into the low return/low risk category was Coastal grazing/horticulture

Most land use sectors, apart from Mixed farming, had a positive Sharpe Index value, which confirms that Coastal grazing, Tableland grazing and Pastoral grazing/marginal farming land use sectors had average annual capital returns in excess of the risk-free investment rate for the period 1990 to 2000. Based on average annual capital returns only, Mixed farming shows a negative Sharpe Index value of -0.04. The highest Sharpe Index value was recorded by the Pastoral grazing/marginal farming land use sector. However, the other two rural land use sectors, with a positive Sharpe Index values were considerably less than Pastoral grazing/marginal farming ranging from 0.00 to 0.12

The capital returns for average composite rural property in Australia for the period 1990-2000 was significantly greater than the capital return for institutional rural property in the US and UK. The annual volatility for rural property in Australia and the UK are very similar; however, the annual volatility for rural property in the US is significantly lower than both Australia and the UK. The risk/return ratio for rural property in the UK is significantly lower than the risk/return ratio for rural property in Australia and the US. Although the average annual capital returns for rural property in the US was not as high as the UK and Australia, the very low annual volatility for US rural property, over the period 1990-2000 has resulted in the US showing the best rural property risk/return ratio.

10.3 Rural Property Total Returns

Although composite rural property and all rural land use rural property sectors outperformed office, retail and industrial property on a capital return basis, this was not repeated when investment return performance was based on average annual total returns. On a total return basis, the average annual total return for composite rural property was significantly greater than the total returns for composite property, office property and slightly higher than industrial property. Over the period 1990-2000, composite rural property, mixed farming rural property, retail property, shares and bonds had similar average annual total returns. Although pastoral rural property achieved the highest average annual total return for the eleven-year period, this was still due to the large capital growth rather than substantial income returns (Refer to Table 3).

When the income return for the top 20% of farmers in NSW, as well as the top 20% of farmers in the main rural land use sectors were included in the analysis, there was a considerable impact on the total return performance for rural property. The inclusion of the better income returns resulted in composite rural property and all rural property land use sectors achieving higher average annual total returns than composite property, office and industrial property. Composite rural property, mixed farming and

pastoral rural sectors also outperformed all other assets in the analysis, based on total returns only (Refer to Table 3).

The additional annual income returns generated by the top 20% of farmers in NSW has not significantly reduced the annual volatility of total returns for these property sectors. As the volatility of average annual total returns has only reduced slightly, based on the top 20% of farmers, there was little impact on the risk-adjusted performance compared to average farmers. The only rural land use sector to improve risk-adjusted performance following the inclusion of income returns from the top 20% of farmers was the mixed farming sector, where there was an improvement of 97% in the risk/return ratio and 278% improvement in the Sharpe index value (Refer to Table 3).

Table 3: Risk-Return Comparison: NSW Average Farmer and NSW Top 20% Farmer: 1990-2000

Category	Average Annual Total Return (%)	Annual Volatility (%)	Risk-Return Ratio	Sharpe Index
NSW Average	10.75	11.38	1.06	0.37
<i>NSW Top 20%</i>	<i>13.04</i>	<i>10.49</i>	<i>0.80</i>	<i>0.56</i>
High Rainfall Average	5.56	10.67	1.92	-0.15
<i>High Rainfall Top 20%</i>	<i>7.21</i>	<i>10.55</i>	<i>1.46</i>	<i>0.01</i>
Mixed Farming Average	9.94	14.55	1.46	0.19
<i>Mixed Farming Top 20%</i>	<i>15.26</i>	<i>11.28</i>	<i>0.74</i>	<i>0.72</i>
Pastoral Average	15.35	50.62	3.30	0.16
<i>Pastoral Top 20%</i>	<i>16.51</i>	<i>50.55</i>	<i>3.06</i>	<i>0.18</i>

On a total return basis, there were no positive correlations between the changes in rural property returns for any rural property land use sector. All rural land use sectors showed a slight negative correlation over the period 1990-2000. Again, this indicates that rural property can offer diversification benefits in an investment portfolio. These results were also consistent when the average semi-annual total returns for the top 20% of farmers were compared.

When compared to composite property, shares and bonds, rural property only had a very slight positive correlation with composite property and a negative correlation with shares and bonds. There were no significant positive correlations between the three main rural land use sectors and composite property, shares and bonds. Pastoral rural property had a negative correlation with all other assets in the study. Composite rural property, as well as all the rural property land use sectors, did not have any significant correlations with the average semi-annual inflation rate over the study period, with two rural land use sectors having a negative correlation with inflation. This confirms that rural property is an effective investment inflation hedge.

Based on the total return for the average farmer in NSW, rural property in Australia has outperformed institutional rural property in both the US and UK. Although the risk-adjusted performance of rural property total return performance is not as good as the US rural property sector, it has a better risk-adjusted performance compared to the UK rural property sector. When the income return for the top 20% of farmers in NSW is included in the average annual total returns, rural property in NSW is 22% greater than the rural property total return in the UK and 71% greater than the total return for institutional rural property in the US (Refer to Table 4).

Table 4: Rural Land Total Return: International Comparison: NSW Average Farmer

Country/Index	Average Annual Total Return (%)	Annual Volatility (%)	Risk Return Ratio
NSW Rural Property Average	10.75	11.38	1.06
NSW Rural Property Top 20%	13.04	10.49	0.80
US NCREIF	7.61	1.27	0.17
UK IPD	10.69	9.70	0.91

10.4 Rural Property Investment Implications

The total return analysis carried out in the thesis, both on an average farm return basis and on the returns generated by the top 20% of farmers in NSW has provided the basis for developing comprehensive rural property total return investment

performance indices, which compliment the geographic region capital investment performance indices developed in thesis.

Prior to the research in this thesis being undertaken, there has been no detailed, comprehensive or complete rural investment performance index available to analyse the investment performance of composite rural property or the various rural property land use sectors.

Table 5: Risk-Return Comparison: Mixed-Assets & NSW Rural: 1990-2000

Asset	Average Annual Total Return (%)	Annual Volatility (%)	Risk-Return Ratio	Sharpe Index
PCA Composite Property	5.12	5.22	1.02	-0.39
Office	2.60	7.24	2.78	-0.63
Retail	10.36	1.82	0.18	1.76
Industrial	8.60	5.95	0.69	0.24
Shares	12.72	12.76	1.00	0.44
Bonds	10.36	7.41	0.72	0.43
NSW Composite Rural Property	10.75	11.38	1.06	0.37
High Rainfall Rural	5.56	10.67	1.92	-0.15
Mixed Farming Rural	9.94	14.55	1.46	0.19
Pastoral Rural	15.35	50.62	3.30	0.16

These indices have now allowed the portfolio investment potential of rural property to be compared to the traditional investment assets in Australia to determine if rural property has a potential role in constructing optimum mixed-asset and mixed-property investment portfolios.

The high returns, insignificant positive correlations and negative correlation of composite rural property to the composite property, office, retail and industrial property, as well as shares and bonds, provides significant investment portfolio benefits. This study shows that the inclusion of composite rural property in an

investment portfolio held over the period 1990-2000 would have lowered the overall risk of the portfolio due to these negative correlations. In addition, the high average annual total returns generated by rural property, when included in either mixed-asset or mixed-property investment portfolios, would have resulted in higher returns at all levels of risk.

At all but the lowest levels of risk, the allocation of composite rural property would have dominated the optimum investment mixed-asset or mixed-property investment portfolio. These results were further enhanced, when the optimum investment portfolio allocations were determined on the basis of the income returns generated by the top 20% of farmers in NSW.

On a rural land use sector basis (average farmer), only pastoral rural property had a major impact on the optimum investment portfolio allocations. Due to the high average annual total returns for pastoral property over the period 1990-2000, this investment asset dominated the optimum mixed-asset and mixed-property portfolios, at the medium to high-risk levels. The other rural land use sectors did not have the same impact on the optimum mixed-asset investment portfolio, as pastoral property. However, the mid-level total returns for high rainfall and mixed farming, combined with their extremely low positive and in some cases their negative correlation with all traditional investment assets, resulted in a change in the percentage allocation of shares in the optimum investment portfolios (Refer to Table 5).

In the mixed-property optimum investment portfolio, retail property dominated the portfolio at low levels of risk. When mixed farming rural property was included in the optimum investment portfolio, the percentage allocation of retail property decreased, with an increase in the allocation of industrial property and mixed farming in the portfolio, at all levels of risk.

Based on this research and portfolio allocation analysis, rural property in Australia can be seen to have the potential to play a significant role in the area of property investment, similar to the role that institutional rural property has played in the US and UK.

This thesis shows that based on the historical performance of rural land in NSW from 1990-2000, rural property can offer similar investment returns as shares and a higher total return than composite property and bonds.

The potential of rural land, as an alternative investment asset, is further enhanced by the low or negative correlation that all rural property sectors have with the traditional property assets of office, retail and industrial property. Due to the nature of rural property production in Australia, the actual location of a rural property can result in both geographic and land use diversification benefits that are not available to other property investments. This has been shown in the considerable variation in rural property capital and income returns across NSW on both a regional and land use basis. This analysis shows that even in periods of rural property recession, not all rural property markets are subject to the same levels of property price decline. This again has added potential for rural property in a portfolio to offset the boom and bust cycles in other asset classes.

The investment performance potential of the top 20% of farms in NSW, as well as the top 20% of farms in the three main rural land use classifications were compared to the investment performance of the best financial and property sectors. One limitation of the rural performance analysis was the use of average capital returns to determine the total return performance for the best farms in NSW. In fact, this inability to isolate the capital returns from the sale of only the top 20% of farms in NSW for the period 1990-2000 has most probably understated the historic performance of this rural property sector (Refer to Table 6).

Table 6: Risk/Return Comparison: Mixed-Assets & NSW Rural: Top 20%: 1990-2000

Asset	Average Annual Total Return (%)	Annual Volatility (%)	Risk-Return Ratio	Sharpe Index
PCA Composite Property	5.12	5.22	1.02	-0.39
Office	2.60	7.24	2.78	-0.63
Retail	10.36	1.82	0.18	1.76
Industrial	8.60	5.95	0.69	0.24
Shares	12.72	12.76	1.00	0.44
Bonds	10.36	7.41	0.72	0.43
NSW Composite Rural Property	13.04	10.49	0.80	0.56
High Rainfall Rural	7.21	10.55	1.46	0.01
Mixed Farming Rural	15.26	11.28	0.74	0.72
Pastoral Rural	16.51	50.55	3.06	0.18

There is no reason to assume that the best rural properties in NSW would not attract a premium in the property market compared to average or below average rural properties. As is the case with office, retail and industrial property, premium properties have a lower risk and greater saleability and higher price potential than average quality properties. On this basis, the actual total returns for rural property could actually exceed the levels stated in this thesis, further increasing the total return

performance and portfolio diversification benefits that are available through the investment in Australian rural property.

Further Research

The rural property investment performance indices developed in this thesis form the basis of an on-going project. Initially, the sales transactions that have occurred since December 2000 will be analysed, with this analyses data being added to the various rural land performance indices. Additional semi-annual capital and total return results will further improve the accuracy and reliability of the indices, as has been evidenced by the improvement in the accuracy and reliability of the IPD, NCREIF and PCA indices since their conception in the mid-1980s.

Currently, the indices developed in this thesis do not cover a full rural property investment performance cycle. The indices commence at the start of the early 1990s rural recession, which followed the NSW rural property boom of 1988. As the time period of the rural investment performance indices increases, the sales transaction data will begin to cover a complete rural property cycle, which will also provide a more accurate measure of the long-term investment potential of rural property in Australia.

Opportunity also exists to expand these indices to include data from other states in Australia. The inclusion of rural property sales from Queensland and Victoria would result in the expanded index covering over 70% of total Australian rural property numbers and rural property production and net farm turnover.

The addition of data from rural property sales in other states of Australia would also allow a comparison of rural property performance on a state-by-state basis, similar to the PCA office, retail and industrial property indices. This would allow a greater opportunity to analyse the geographic and sector diversification benefits of rural property, due to the limitation of seasonal and climatic condition risk.