state of AUSTRALIAN CITIES
national conference >03

Carlton Hotel, Parramatta
3-5 December 2003

Investigating the relationship between property values and employment trends

Authored by:

Dr Christopher Pettit
Dr Richard Reed

RMIT University
University of Melbourne

chris.pettit@rmit.edu.au

ABSTRACT

In a global economy where the dominant paradigm is economic rationalism, land property values exert substantial influence upon both our built and natural landscape. Subsequently, to undertake better planning for our cities it is important to understand the dynamics between property values and socio-economic indicators, such as employment patterns. This paper presents the results from some preliminary research, which investigates the links between residential property values and industry sector employment (by residency). The approach is developed and tested for the State of Victoria at the local government level of analysis. Property data used for this analysis has been acquired from the Victorian Government's Valuer General's Office and the industry sector employment data used is based on the time-series acquired through the Australian Bureau of Statistic's 1991 and 2001 census.

The approach uses Haynes and Dinc's (1997) shift-share analysis technique to formulate State share, industry mix, and regional shift components in order to examine the extent of employment growth and decline for all local government areas in Victoria. Next, the median property values are calculated for each local government area. The final stage applies regression analysis to investigate the relationships between property value and employment datasets. The results from our analysis include a spatial representation of the three shift-share components and property values in Victoria using a geographical information system (GIS), and the statistical relationships between the change in average residential property values and industry sector employment. The relationships between the residential property values and employment figures have ramifications for both the urban economy and social conditions of local government areas in Victoria.

Keywords: residential property values, industry sector employment, GIS, shift-share analysis

1. 0 INTRODUCTION

In Australia our cities are experiencing rapid growth, which has fundamental socio-economic impacts upon both our built and natural environments. To better plan for future urban growth there is a need to understand the dynamics between socio-economic factors. This papers aims to address this need through exploratory research and endeavours to quantifiably investigate the relationship between employment trends and property prices. A case study approach is used focussing on data acquired for Victoria's local government authorities between 1991 and 2001.

The level of house prices in an area has an affect on wider society, commencing with affordability for new households. If a region has higher property values, this may act as a disincentive to relocate there due to the perceived higher costs that are associated. This is further complicated by the lack of difference between wage rates in most areas, so a cheaper house may provide additional surplus in the weekly budget and perhaps a better quality of life. On the other hand, if house prices continue to rise then households on low incomes may not be able to afford suitable housing and place additional pressure on the government system or be forced into homelessness.

It has been established in the literature that there are links between housing affordability and residential property values. In the USA it has been shown that changes in the labour market were prime drivers behind variations in the property market (Knight & Eakin (1997) as cited by Hargreaves (2002). The cost of housing, whether purchasing via a mortgage or renting, must be met by a series of regular payments that represents either mortgage repayments or rent payments. With the exception of homeowners that have freehold ownership and therefore no ongoing commitment to payments, a large proportion of the Australian housing market falls within this bracket (Reed & Greenhalgh, 2002). Hence, the ability to meet this regular monetary commitment would normally be possible through employment that produces a regular income, and accordingly employment becomes a priority issue when attempting to understand the housing market. Furthermore, many workers will live within transit distance to their place of employment. On this basis, breaking down the employment type will highlight the labour markets that are associated with variations in property values.

The research presented in this paper will introduce a methodology for testing the relationship between employment trends and property trends in Victoria. The results of the shift-share analysis and property prices will be examined. Finally, the paper will outline future directions for our research program.

2.0 METHODOLOGY

The research was undertaken to identify and examine the relationship between industry sector employment trends and median property values. An integrated approach to analysing these relationships has been applied, as shown in Figure 1. The primary data inputs are industry sector employment and property price data for 1991 and 2001. In order to test whether or not any of the 3 shift-share components better describe the relationship (correlation) between median property values, than the correlation between employment growth (decline) change and property values this involved:

1) A regression of change in total change employment growth (decline) between 1991 – 2001 with change in median property values

2) A regression with each of the three shift-share components between 1991-2001 with change in median property values

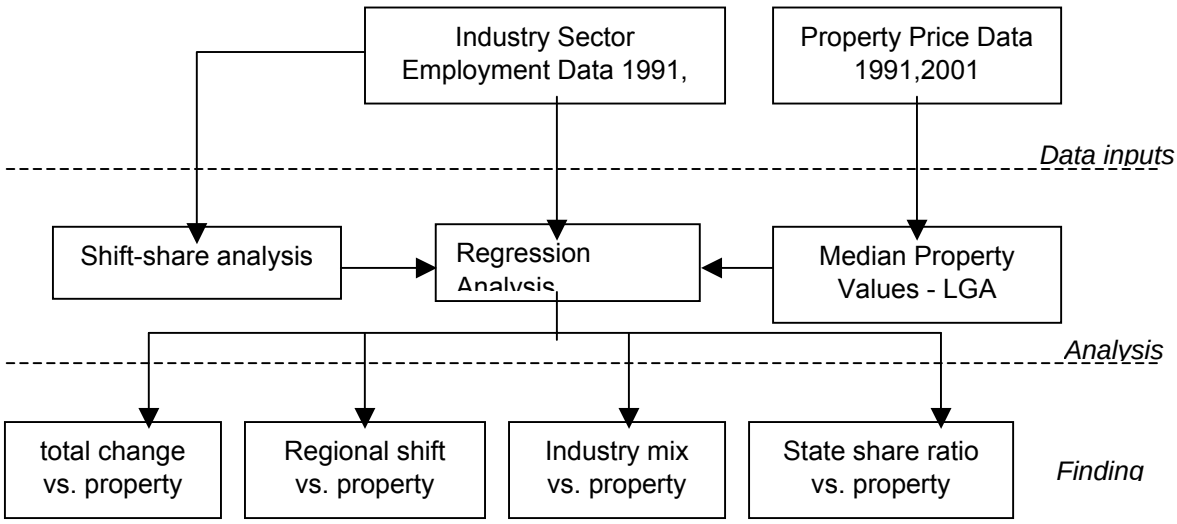

Figure 1: Integrated Approach to understanding dynamics between industry sector employment and property value trends

THUS, WE CAN DETERMINE IF ONE OR MORE COMPONENTS OF THE SHIFT-SHARE ANALYSIS ACCOUNT FOR THE CHANGES IN PROPERTY VALUES. BY UNDERTAKING A REGRESSION ANALYSIS WE CAN ALSO INVESTIGATE THE RELATIONSHIP BETWEEN INDIVIDUAL INDUSTRY SECTORS AND THE CHANGE IN PROPERTY VALUES. THE NEXT SECTION PROVIDES BACKGROUND INFORMATION ON THE SHIFT-SHARE PROCESS AND OUTLINES THE ANALYSIS USED TO EXAMINE THE RELATIONSHIPS BETWEEN THE TOTAL CHANGE, REGIONAL SHIFT, INDUSTRY MIX AND STATE SHARE COMPONENTS EMPLOYMENT TRENDS AND CHANGES IN PROPERTY VALUES.

2.1 Shift-share approach

(Dunn 1960) developed the classical shift-share methodology. Shift-share analysis is a useful means of examining regional differences in employment growth and decline (Haynes & Dinc 1997). Regional economists, geographers, regional scientists, and regional development analysts use shift-share analysis for modelling economic change in a region (Haynes & Dinc 1997). The two key factors that shift-share analysis is based upon are labour and capital. According to the shift-share technique there are three components for each region:

1. *State share*: indicates what the employment growth in a local government area (LGA) for each industry would have been if it had grown at the same total employment growth rate for all industries for all of the State.

2. *Industry mix*: indicates what the employment growth in a LGA for an industry would have been if it had grown at the employment growth rate for each individual industry for all of the State.

3. *Regional shift*: indicates the employment growth (or decline) for each industry attributable to the LGAs own natural advantages or disadvantages.

Equation 1 has been used to calculate the total change in employment. In the research the total change is used as a benchmark in which to compare the state share, industry mix and regional shift components. The underlying equations for the three shift-share components are shown in equations 2,3 & 4.

Though it has been stated that shift-share analysis is a powerful and useful technique for analysing changes in the structure of the local economy in reference to the state or nation (Blakely 1994), there has been some valid criticism of the technique. (Knudsen & Barff 1991) focus their criticism of the technique on such issues as temporal, spatial, and industrial aggregation, theoretical content, and predictive capabilities. It is noted by both (Stimson & Davis 1999) and (Haynes & Dinc 1997) that traditional shift-share analysis does not consider other influential variables, such as labour force participation, demographic change and most importantly productivity in the analysis of a region’s employment change.

Total Change	$TC = Et_{ir} - E_{ir}$	Equation 1
State Share:	$NS = E_{ir} g_n$	Equation 2
Industry Mix:	$IM = E_{ir}(g_{in} - g_n)$	Equation 3
Regional Shift:	$RS = E_{ir}(g_{ir} - g_{in})$	Equation 4

Where E_{ir} is the observed employment in industrial sector i in region r for the initial time (1991), Et_{ir} is the observed employment in industrial sector i in region r for the current time (2001), g_{ir} is the growth (decline) in the employment sector i in region r, g_n is the growth rate for all industry of reference area n, and g_{in} presents the growth or decline for the reference area n.

In order to address these criticisms there have been a number of extensions made to the traditional shift-share approach. Building on the productivity extension to the shift-share model developed by (Rigby & Anderson 1993), Haynes and Dinc (1997) put forward a model that separates labour and capital as well as utilising the dynamic shift-share modification proposed by (Barff & Knight 1988). It has been noted by (Stimson & Davis 1999) that this approach represents a major advance from previous shift-share approaches but requires considerable data, which generally is difficult to obtain. As this additional data is not readily available for the State of Victoria, the shift-share analysis carried out is based upon the traditional methods as developed by (Dunn 1960). An example of the results from such an approach is published in the form of the on-line Wide Bay Burnett Regional information system Pettit et al. (2002). The results of the baseline total employment change and three shift-share components can be represented using a GIS to determine spatial employment effects. Results can also be tabulated, which enables us to perform a regression analysis with the temporal property values dataset.

2.2 Regression Analysis Approach

It has been argued that the analysis of property markets can lack factual information and decisions can be based on opinion and judgement, where divergent opinions can vary (Abboud, 1985). Only recently are statistical approaches such as multiple regression analysis (MRA) are now being increasingly used to organise and interpret large volumes of property-related data (Antwi, 1997). In this process the ordinary least squares (OLS) regression technique has remained the most widely used statistical technique. This approach has repeatedly proven its ability to reliably assess the relationship between a dependant variable and multiple independent

variables in the broad field of social research, within which property markets are positioned (Fox, 1989). During the MRA analysis it was critical for each model to conform to the assumptions of MRA as expanded in standard econometric theory (Gujarati, 1995). Thus, if a MRA model failed to comply with a number of assumptions the results would be rendered ineffective and unreliable and inferences relating to the significance of regression parameters invalid (Tabachnick et al., 2001). The analysis was conducted using a two-stage approach, where the first model included change in all variables over the corresponding period. Then stepwise regression was used to identify variables that had a significant overall contribution.

3.0 RESULTS

3.1 Total Change in Employment

THE RESULTS FROM THE BASELINE EMPLOYMENT CHANGE DATA (1991 – 2001) REVEAL THAT MOST OF THE EMPLOYMENT GROWTH HAS OCCURRED IN AND AROUND GREATER METROPOLITAN MELBOURNE. LOCAL GOVERNMENT AUTHORITIES (LGAS) THAT EXPERIENCED THE GREATEST EMPLOYMENT GROWTH INCLUDED CASEY, MORNINGTON PENINSULA, KNOX, MELBOURNE, BRIMBANK, HUME AND WYNDAM, AND PORT PHILLIP. IN TOTAL 15 SHIRES, ALL LOCATED IN RURAL VICTORIA EXPERIENCE SOME LEVEL OF TOTAL EMPLOYMENT GROWTH, WITH THE WORST OF THESE BEING THE LGAS OF GREATER DANDENONG AND LATROBE. THE SPATIAL DISTRIBUTION OF THESE PATTERNS OF EMPLOYMENT GROWTH AND DECLINE ARE SHOWN IN FIGURE 2.

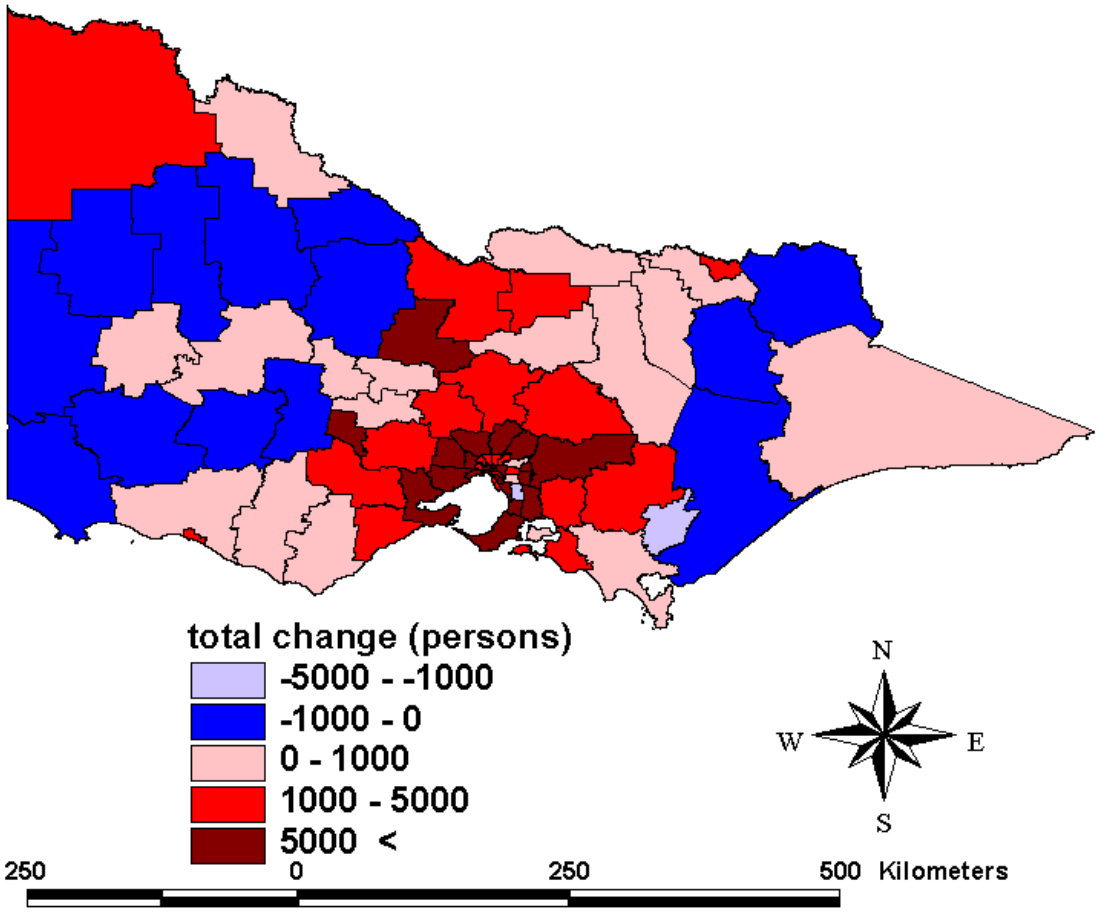

Figure 2: Total Change in Employment 1991-2001

3.2 Shift-share Components

A shift-share analysis technique has been used to establish the performance of various industry sectors on a LGA basis using the State of Victoria as the total share. The three main components used for analysing each of the industry sectors for each of 77 LGAs in Victoria include:

1) state share ratio;
2) proportionality shift (industry mix); and
3) differential (regional) shift.

According to (Deming 1996) the best way to examine the natural growth component of the shift-share analysis is by comparing it to actual employment growth, as shown in equation 5.

$$SSR = {}^{TS}\!/_{SS} \qquad \text{Equation 5}$$

Where: SSR is the State share ratio, TS is the total shift, and SS is the State share.

The State share ratio is based on the national share ratio developed by (Stimson & Davis 1999) for analysing socio-economic change in Queensland LGAs, based upon work carried out by (Haynes & Dinc 1997) and is applied in this paper to the State of Victoria using 1991 and 2001 census data. The State share ratio, as is in this instance, provides an identification of the growth of employment in the industry sector if it had grown at the rate of the Victorian economy. With this ratio any values greater than 1 indicates that the employment grew at a greater rate than the State average and factors other than the State-wide employment growth need to be examined to explain the area's employment growth. LGAs with a ratio less than 1 have not had employment growth at the State average.

The results from the State share ratio component reveal that most of the LGAs that have a State share ratio less than 1 are situated in the outer eastern and western regions of the State. However, there is a small band of LGAs within the Greater Metropolitan Melbourne region which experience growth less than the State average, these include Moonee Valley, Moreland, Darebin, Banyule, Manningham, Whitehorse, Monash and Greater Dandenong. Most of the LGAs that experience employment growth above the State average are located in and around Greater Metropolitan Melbourne with the best performing LGAs being Melbourne, Casey, Melton, Wyndham, and Surf Coast.

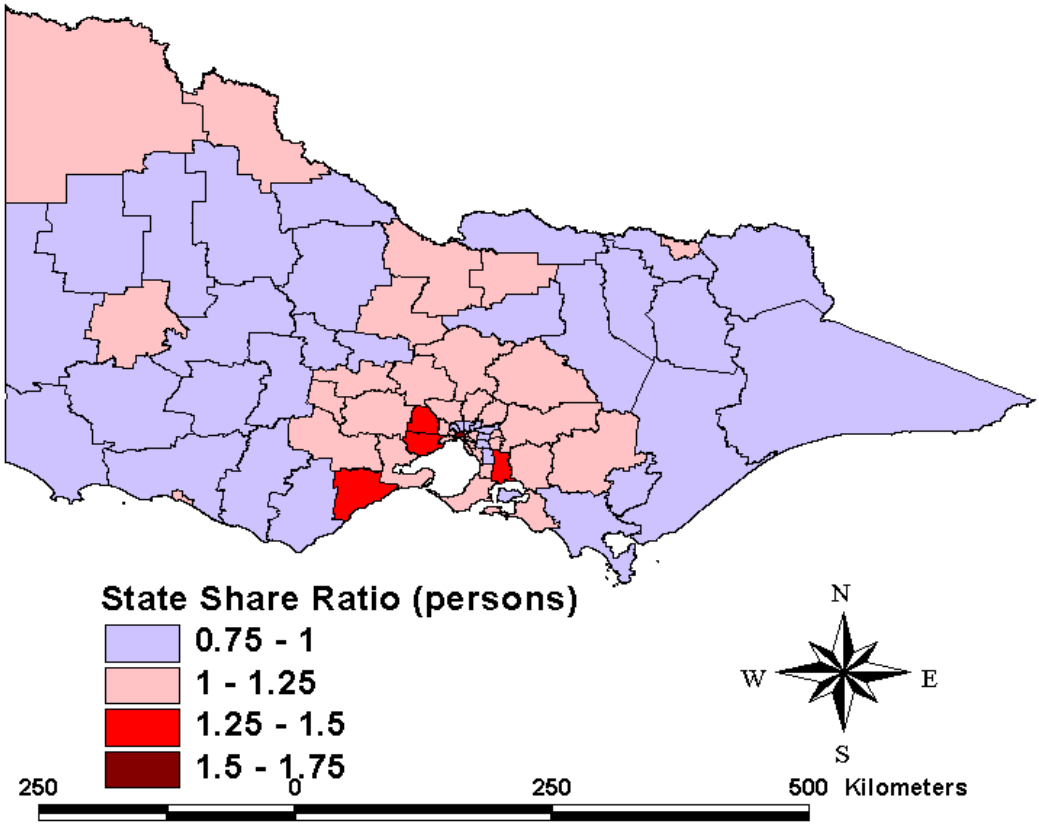

Figure 3: State share ratio for LGAs in Victoria 1991 –2001

The industry mix effect for the LGAs comprising Victoria shows the number of jobs that can be attributed to the industry structure of an area. Those LGAs which have an extremely poor industry mix in Victoria are Latrobe, Mitchell and Wodonga. The results of the industry mix shown spatially in Figure 4 show that there is a cluster of LGAs situated in the outer north-west and far south-east and south-west parts of the State experience a poor industry mix. Those LGAs situated in around Greater Metropolitan Melbourne experience a positive industry mix, especially those LGAs comprising the inner south-east of the State including Whitehorse, Manningham, Monash, Stonnington, and Booroondara.

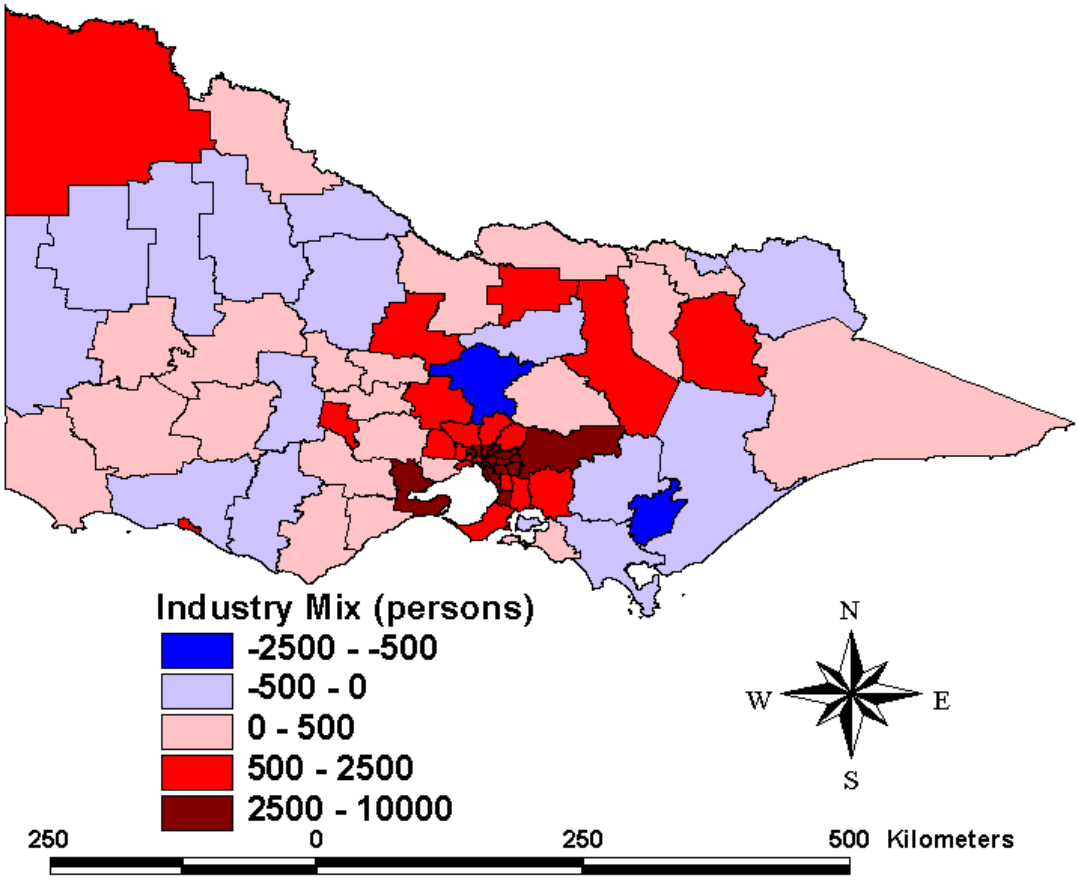

Figure 4: Industry mix component for LGAs in Victoria 1991 –2001

The regional effect represents the number of jobs explained by an area's own advantages or disadvantages and is a good indicator of endogenous growth. The spatial distribution of LGAs as shown in Figure 5, reveals that like the results of the total change of employment, those located outside the Greater Metropolitan Melbourne area experience a decline. However, there is a spatial cluster of LGAs contained with the south and south-east section of Greater Metropolitan Melbourne that experience the greatest number of job loss contributed to the regional effect; these include Monash, Manningham, Greater Dandenong, Whitehorse, Banyule, Booroonda, Moreland, and Moonee Valley. Those LGAs who are experience strong employment growth from there area's own advantages include Whitlesea, Brimbank, Hume, Mornington Peninsula, Melton, Wyndham, Melbourne and Casey.

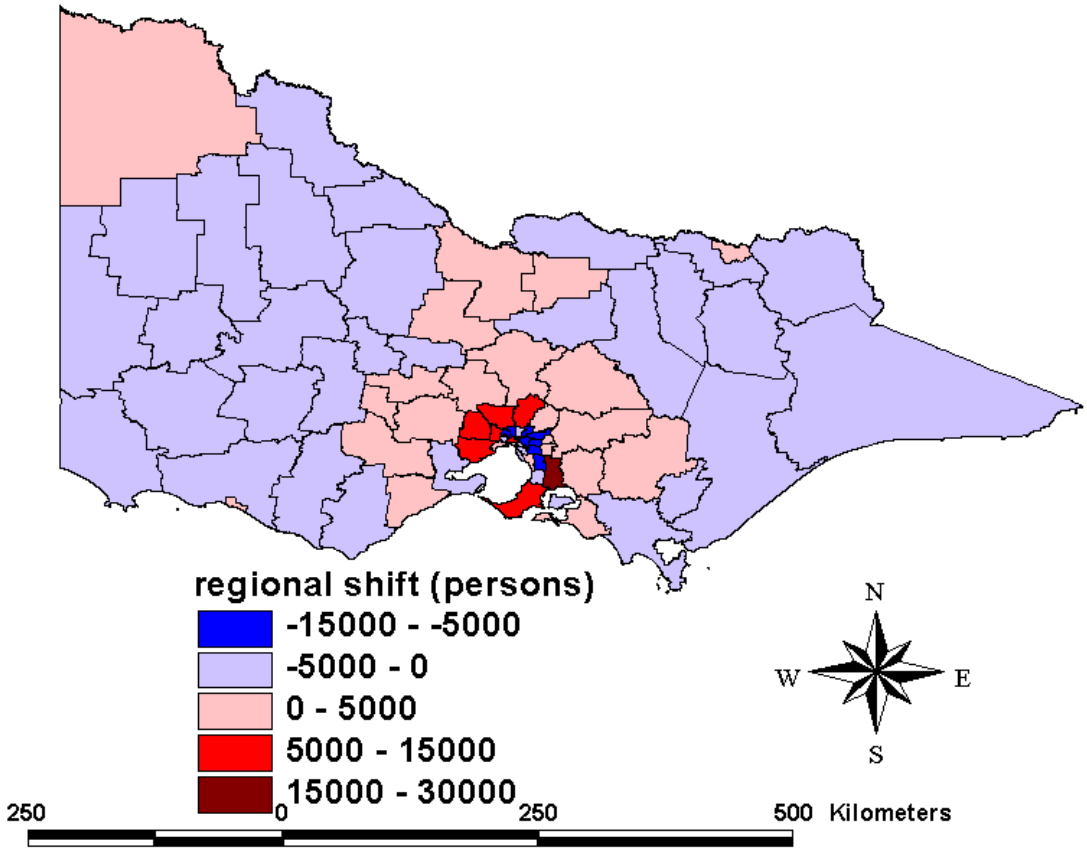

Figure 5: Regional Shift component for LGAs in Victoria 1991 –2001

3.3 Property Values

The property valuation information was sourced from the Valuer General of Victoria, which is the statutory body responsible for collecting and recording property related data. The data was restricted to the median value of established detached residential housing in each LGA in Victoria, and this was undertaken using the relevant land use codes. It was considered that established housing was reliable indicator of property values, whereas newly constructed housing may be subject to bias due to the lack of homogeneity and the attached premium for a new house. In addition, using only detached housing allowed a reasonably even comparison between LGAs, especially those with little medium or high density residential accommodation. To remove the influence of long term inflation, the house prices for each LGA were deflated using house price indexes (ABS, 2003).

3.4 Regression of Employment Trends and Property Values

The analysis commenced with an examination of the relationship between Total Change and median property values over the period between 1991 and 2001, with the results listed in Table 1. Although the model produced an adjusted R^2 of 0.692, a large number of the variables proved to be relatively unreliable. To improve the

model, the analysis was rerun using backward stepwise regression, which then produced the model listed in Table 2.

Table 1 - Total Change and Median Property Values

Variable	Co-efficient	Std Error	Beta	t Statistic	P Level
Ag Fish	0.00011	0.000	0.046	0.555	0.581
Mining	0.00033	0.000	0.095	1.210	0.231
Manufacturing	0.00006	0.000	0.030	0.156	0.877
Elec.	0.00001	0.000	0.020	0.249	0.804
Construction	0.00022	0.000	0.602	2.113	0.039
Wholesale	-0.00026	0.000	-0.355	-1.825	0.073
Retail	-0.00026	0.000	-1.096	-3.106	0.003
Accommodation	0.00018	0.000	0.271	1.278	0.206
Transport	0.00019	0.000	0.223	1.369	0.176
Commerce	0.000033	0.000	0.024	0.135	0.893
Financial	0.00019	0.000	0.246	1.499	0.139
Property	0.00003	0.000	0.203	0.743	0.460
Government	0.00021	0.000	0.346	2.869	0.006
Education	0.00002	0.000	0.023	0.110	0.913
Health	-0.00006	0.000	-0.154	-0.637	0.526
Cultural	0.00061	0.000	0.769	2.526	0.014
Personnel	0.00011	0.000	0.090	0.414	0.680
Intercept	1.143	0.029		39.058	0.000
N	77				
R^2	0.761				
Adjusted R^2	**0.692**				
Std. Error	0.1386				

Whilst the adjusted R^2 has only improved slightly to 0.709, the remaining variables have a higher level of reliability in the interpretation. Initially it appears that labour types that are associated with a relatively low wage rate, such as Retail and Wholesale, are more likely to be linked to lower priced regions. For example, a Retail worker has limited financial resources and is severely restricted in the ability to pay regular rent or mortgage payments after meeting other financial demands. On the other hand, occupations with comparatively higher remuneration, such as Mining and Construction, appear to be associated with more expensive house prices in the same regions. Overall the model in Table 2 provided a useful and simplistic insight into changes that are occurring in the labour and property markets, and confirmed that labour markets have a distinct relationship with property values at the LGA level in Victoria.

Table 2 - Total Change and Median Property Values

Variable	Co-efficient	Std Error	Beta	t Statistic	P Level
Mining	0.00040	0.000	0.113	1.722	0.090
Construction	0.00020	0.000	0.529	2.259	0.027
Wholesale	-0.00024	0.000	-0.330	-2.267	0.027
Retail	-0.00015	0.000	-0.654	-2.265	0.009
Financial	0.00028	0.000	0.361	2.959	0.004
Government	0.00015	0.000	0.240	2.384	0.020
Cultural	0.00068	0.000	0.860	5.828	0.000
Intercept	1.145	0.024		48.383	0.000
N	77				
R^2	0.736				
Adjusted R^2	**0.709**				
Std. Error	0.1348				

The regression model in Table 3 was based on State share and produced an adjusted R^2 of 0.632. A large number of the variables proved to be unreliable, with the model rerun using stepwise regression. The improved model is listed in Table 4 with an adjusted R^2 of 0.663. In a similar manner to Total Change, the model in Table 4 highlighted a negative relationship between change in Retail employment and house prices. On the other hand, areas with an increasing proportion of Financial workers were linked to higher house prices, followed by the Construction and Accommodation sectors. It appears that if a region could increase these labour markets (in contrast with the State average), then there would most likely be an increase in median residential property values as well.

Table 3 - State Share and Median Property Values

Variable	Co-efficient	Std Error	Beta	t Statistic	P Level
Ag Fish	0.077	0.086	0.114	0.888	0.378
Mining	0.022	0.031	0.057	0.716	0.477
Manufacturing	-0.160	0.101	-0.163	-1.576	0.120
Elec.	0.083	0.102	0.076	0.811	0.421
Construction	0.466	0.137	0.470	3.394	0.001
Wholesale	-0.081	0.125	-0.076	-0.647	0.520
Retail	-0.850	0.221	-0.685	-3.843	0.000
Accommodation	0.114	0.083	0.157	1.382	0.172
Transport	-0.008	0.163	-0.006	-0.048	0.962
Commerce	0.018	0.130	0.023	0.142	0.888
Financial	0.531	0.182	0.533	2.912	0.005
Property	0.005	0.086	0.006	0.055	0.956
Government	0.020	0.187	0.001	0.011	0.992
Education	0.198	0.217	0.149	0.916	0.363
Health	-0.024	0.153	-0.019	-0.160	0.873
Cultural	-0.001	0.059	-0.002	-0.021	0.984
Personnel	-0.311	0.151	-0.221	-2.056	0.044
Intercept	1.316	0.196		6.712	0.000
N	77				
R^2	0.714				
Adjusted R^2	**0.632**				
Std. Error	0.152				

Table 4 - State Change and Median Property Values

Variable	Co-efficient	Std Error	Beta	t Statistic	P Level
Ag – Fish	0.123	0.060	0.183	2.046	0.045
Construction	0.431	0.113	0.435	3.822	0.000
Retail	-0.893	0.165	-0.720	-5.430	0.000
Accommodation	0.172	0.063	0.235	2.704	0.009
Financial	0.647	0.098	0.649	6.590	0.000
Personal	-0.325	0.115	-0.231	-2.231	0.006
Intercept	1.221	0.132		9.264	0.000
N	77				
R^2	0.690				
Adjusted R^2	**0.663**				
Std. Error	0.145				

The model in Table 5 focussed on Industry Changes and produced an adjusted R^2 of 0.578. Once again there were a large number of unreliable variables, although this was improved in Table 6 after undertaking stepwise regression with an adjusted R^2 of 0.608 produced. However, the contribution of the individual variables in Table 6 again highlights the negative correlation between Retail and property values. The remainder of the variables were positively linked to higher house prices, and this was especially apparent with the Financial, Property and Commerce labour markets. Mining and Cultural appeared to have a negligible overall contribution, although slightly positive.

Table 5 - Industry Change and Median Property Values

Variable	Co-efficient	Std Error	Beta	t Statistic	P Level
Ag Fish	0.00034	0.000	0.148	1.411	0.163
Mining	0.00120	0.001	0.191	1.825	0.073
Manufacturing	0.00026	0.001	0.223	0.497	0.621
Elec.	-0.00003	0.000	-0.054	-0.494	0.623
Construction	-0.00027	0.000	-0.328	-0.756	0.453
Wholesale	-0.00070	0.001	-0.475	-0.681	0.499
Retail	-0.00077	0.001	-1.088	-1.514	0.135
Accommodation	0.00297	0.000	0.281	0.883	0.381
Transport	-0.00054	0.001	-0.204	-0.950	0.346
Commerce	0.00898	0.005	1.063	1.904	0.062
Financial	0.00208	0.001	1.843	2.219	0.030
Property	0.00220	0.000	1.232	1.730	0.089
Government	0.00041	0.000	0.085	0.471	0.639
Education	0.00114	0.002	0.336	0.650	0.518
Health	-0.00340	0.000	-0.406	-0.995	0.324
Cultural	0.00298	0.000	0.298	0.710	0.481
Personnel	0.00247	0.003	0.622	0.761	0.450
Intercept	1.174	0.046		25.420	0.000
N	77				
R^2	0.672				
Adjusted R^2	**0.578**				
Std. Error	0.1623				

Table 6 - Industry Change and Median Property Values

Variable	Co-efficient	Std Error	Beta	t Statistic	P Level
Mining	0.00136	0.000	0.217	2.800	0.007
Retail	-0.00062	0.000	-0.873	-3.271	0.002
Commerce	0.01077	0.003	1.275	3.814	0.000
Financial	0.00203	0.001	1.802	2.977	0.004
Property	0.00027	0.000	1.513	2.886	0.005
Cultural	0.00056	0.000	0.555	1.992	0.050
Intercept	1.135	0.029		39.457	0.000
N	77				
R^2	0.639				
Adjusted R^2	**0.608**				
Std. Error	0.156				

Based on the Regional Shift, the model in Table 7 produced an adjusted R^2 of 0.587, although many of the variables again proved to be unreliable. The subsequent stepwise regression analysis produced a better model in Table 8 with an adjusted R^2 of 0.618, which then allowed an interpretation of the results. With the exception of Wholesale, Retail and Personal, all of the employment types were positively associated with change in median property values. The largest contribution was from Financial, which was followed by the Construction, Accommodation and Health sectors.

Table 7 - Regional Shift and Median Property Values

Variable	Co-efficient	Std Error	Beta	t Statistic	P Level
Ag Fish	0.00032	0.000	0.149	1.723	0.090
Mining	0.00044	0.000	0.092	1.028	0.308
Manufacturing	-0.00001	0.000	-0.054	-0.248	0.805
Elec.	-0.00067	0.000	-0.035	-0.389	0.669
Construction	0.00019	0.000	0.349	1.382	0.172
Wholesale	-0.00042	0.000	-0.593	-2.476	0.016
Retail	-0.00014	0.000	-0.463	-1.391	0.170
Accommodation	0.00028	0.000	0.260	1.800	0.077
Transport	0.00004	0.000	0.005	0.023	0.981
Commerce	0.00022	0.000	0.117	0.824	0.413
Financial	0.00055	0.000	0.680	3.434	0.001
Property	0.00004	0.000	0.011	0.071	0.943
Government	0.00027	0.000	0.171	1.904	0.062
Education	0.00009	0.000	0.103	0.654	0.516
Health	0.00012	0.000	0.256	1.501	0.139
Cultural	-0.00002	0.000	-0.014	-0.096	0.924
Personnel	0.00036	0.003	0.622	0.761	0.450
Intercept	1.123	0.018		67.206	0.000
N	77				
R^2	0.680				
Adjusted R^2	**0.587**				
Std. Error	0.1605				

Table 8 - Regional Shift and Median Property Values

Variable	Co-efficient	Std Error	Beta	t Statistic	P Level
Ag. Fish	0.00035	0.000	0.163	2.004	0.049
Construction	0.00023	0.000	0.415	2.107	0.039
Wholesale	-0.00039	0.000	-0.554	-2.871	0.005
Retail	-0.00016	0.000	-0.541	-2.095	0.040
Accommodation	-0.00033	0.000	0.306	3.056	0.003
Financial	0.00066	0.000	0.833	7.635	0.000
Government	0.00029	0.000	0.182	2.231	0.029
Health	0.00014	0.000	0.301	2.248	0.028
Personal	-0.00042	0.000	-0.314	-1.962	0.054
Intercept	1.123	0.018		69.875	0.000
N	77				
R^2	0.663				
Adjusted R^2	**0.618**				
Std. Error	0.154				

CONCLUSION

This research has presented an insight into changing relationship between employment sectors and property values, and importantly incorporated the added dimension of change over time between 1991 and 2001. The analysis has been somewhat successful in identifying the strengths of the varying relationships between labour types and property values. It appears that lower paid occupations such as Retail and Wholesale are associated less expensive areas as would be expected, and accordingly higher paid workers such as Financial and Construction workers live in more expensive areas.

However, this analysis was limited to employment types and there may be differences between regions depending on other factors. For example, if there is close proximity to factors, such as scenic amenities (for example, coastal areas) there may be a higher proportion of the population who are not in the workforce i.e. retired. Still, it remains that a large proportion of the population are employed in the workforce and due to the links between housing affordability and employment, this analysis is useful and should be developed further.

Future Directions

Clearly there is more work needed in developing the research further. Consideration should be given to using different influencing factors, such as employment rates and remuneration levels, which would provide an insight into the links between labour and property markets. In addition, it would be worthwhile to examine the data at Statistical Local Area (SLA) level or at an even more detailed level. Such analysis should

examine employment and housing prices in relation to transportation networks, social infrastructure, regional commercial centres, and existing land uses.

REFERENCES

Australian Bureau of Statistics. 2003. 6416.0 House Price Indexes, Canberra.

Abboud, S. 1985, 'The real estate appraiser serving the public: a specialised real estate counselor,' The Canadian Appraiser, 29, pp.19-23.Antwi, A. 1997, 'Multiple Regression in Property Analysis', Readings in Property Economics, Australian Institute of Valuers and Land Economists, pp.177-182.

Barff, R. A. & Knight, P. L. 1988. Dynamic shift-share analysis. Growth and Change 19: 1-10.

Blakely, E. J. 1994. Planning Local Economic Development: Theory and Practice Ed. Newbury Park, California, Sage.

Deming, W. G. 1996. A Decade of Economic Change and Population Shifts in U.S. Regions. Monthly Labor Review November: 3-14.

Dunn, E. S. 1960. A statistical and analytical technique for regional analysis. Papers of the Regional Science Association 6: 97-112.

Hargreaves, R. (2002), 'To rent or buy: that is the question' in New Zealand Property Journal, March, pp.21-26.

Haynes, K. E. & Dinc, M. 1997. Productivity Change in Manufacturing Regions: A Multifactor/Shift-Share Approach. Growth and Change 28: 201-221.

Fox, J. 1989. Regression Diagnostics, Sage Publications, London.

Gujarati, D.N. 1995. Basic Econometrics, 4th edn. McGraw-Hill, New York.

Knudsen, D. C. & Barff, R. 1991. Shift-share analysis as a linear model. Environment and Planning A 23: 421-431.

Pettit, C. Shyy, T. & Stimson, R. 2002. An On-line Planning Support System to Evaluate Urban and Regional Planning Scenarios. In Planning Support Systems in Practice. (ed.) Geertman, S. & Stillwell, J. London, Springer-Verlag: 331-348.

Reed, R. G. & Greenhalgh, E.S. 2002. Factors influencing the rent vs. buy decision – implications for housing markets. Papers of the Australia and New Zealand Regional Science International Association 29/9 – 2/10/02.

Rigby, D. L. & Anderson, W. P. 1993. Employment change, growth and productivity in Canadian manufacturing: An extension and application of shift-share analysis. Canadian Journal of Regional Science XVI: 69-88.

Stimson, R. J. & Davis, R. 1999. Social and Economic Change in Queensland Local Government Areas over the Decade 1986-1996.In Western Regional Science Association, 38th Annual Meeting, 21-24 February, Ojai California.

Tabachnick, B.G. and Fidell, L.S. (2001), Using Multivariate Statistics, Allyn and Bacon, Boston.

STATE OF AUSTRALIAN CITIES NATIONAL CONFERENCE

SYDNEY, 2003

SPONSORS

University of Western Sydney

Australian National University

The University of New South Wales

Griffith University

The University of Melbourne

Victorian Department of Sustainability and Environment

NSW Department of Infrastructure, Planning and Natural Resources

ACT Planning and Land Authority

▶ ▶ ▶ **For all enquiries, please contact:-**

University of Western Sydney

Urban Frontiers Program

Building 22, Campbelltown Campus

Locked Bag 1797, Penrith South DC NSW 1797

Phone +61 2 4620 3443

Fax +61 2 4620 3447

Email urbanfrontiers@uws.edu.au

Web www.urbanfrontiers.uws.edu.au