

## ***“Housing Market Segmentation and Housing Careers: A Discriminant Analysis of Brisbane”***

### **Authors**

Simon Huston  
Phd Research Student  
School Of Geography, Architecture And Planning  
Cr-Surf, Rm 805, Building 69  
University Of Queensland, St Lucia  
Qld 4072  
Ph: +61 7 33656069

Jung Hoon Han  
Post Doctorial Research Assistant  
Australian Housing And Urban Research Institute (Uq Centre)  
Room 419, Gp North No.39a  
University Of Queensland, St Lucia  
Qld 4072  
Ph: +61 7 3346 9689

### **Abstract**

*The aim of this paper is to examine the relationship between housing market segmentation and housing careers in Brisbane, Australia using discriminant analysis. This paper first investigates the significant changes in socio-economic and demographic factors impinging on the housing market fragmentation and then systematically analyses nine housing market areas within Brisbane. Changes in performance of housing markets and individual socio-economic and demographic characteristics are considered. This paper demonstrates the existence of housing market segmentation in Brisbane and identifies key characteristics of housing submarkets. In particular the method highlights the distinct characteristics of the Western outer suburban and beside areas in Brisbane which have reinforced their established prestige submarket character as a location for upward housing career movement. The attraction of the Western suburbs is their combination of access, a privileged environmental setting and a spacious, frequently recently constructed, housing stock. Other distinct housing market segments are more suited to populations at earlier stages in their housing careers and include suburbs such as Taringa and St Lucia with a strong university rental component and inner city revitalising suburbs such as West End. Overall we confirm in Brisbane the well established disaggregation of housing market choice.*

### **Keywords**

*Housing sub-markets, neighbourhood, revitalisation, housing careers, discriminant analysis*

### **Introduction**

Australia has undergone significant socio-economic and demographic changes in recent years which have had geographical manifestations in terms

of social polarisation and consequent location advantage and disadvantage in housing markets. In particular the recent property boom (2000-2004) has tended to reinforce segregation of individual housing and location choices in Australian metropolitan areas as some neighbourhoods prosper while others stagnate in relative terms. This paper focuses on the relationship between location decisions, mediated by individual housing careers, and collective spatial impact on housing market segmentation. Academic scrutiny of the relationship between housing careers and housing market segmentation is limited. Moreover the impact of the recent property boom on housing market segmentation in Australia has not been examined although the issue of location disadvantage has been argued by a number of scholars (Caulfield and Wanna, 1995).

### **Housing submarkets and neighbourhoods**

It is well known that inter-metropolitan housing markets are driven by the complex interaction of a number of economic drivers which, conventionally, are categorised as either supply or demand based. Within a city demand plays out spatially in sub-market location choice. Although path dependent (Troy, 2004) on the historical urban template, factors such as housing career changes and re-vitalisation can reinforce housing market segmentation. Individuals move within a metropolitan area in line with changes in employment and life course events such as marriage and divorce. The resultant intra-urban migration causes neighbourhood changes in occupancy, income and tenure. However speculation can complicate the resulting pattern of housing sub-markets (Knaap, 1998). Many scholars are keen to model housing choice behaviour and the location decision process (Kendig 1984; Lu 1998; Holmes et al. 2002). Households move to maximise their place utility (Wolpert, 1965) subject to their financial constraints. In particular the housing consumption behaviour of higher-income groups is regarded as an important for housing market fragmentation (Kauko et al. 2002).

(Straszheim, 1975) first pointed out the significance of submarkets for housing market analysis. Since then, diverse studies have confirmed the importance of housing market disaggregation or submarkets (Bourassa et al., 1999; Glaster, 1987; Hourihan, 1984) Submarkets can be structurally or spatially defined, although more recent statistical approaches tend to combine both dimensions. For a submarket to be useful analytically it needs to be reasonable stable. According to (Watkins et al., 2003, p1316) "submarkets exist where the price of a standardised dwelling differs from that in another part of the market. Prices for equivalent housing will however be the same within submarkets".

Following this definition, different cities or regions can be conceptualised as submarkets. It is also well known that housing markets of capital cities in Australia have different dynamics (Yong, 2000). In this study we concern ourselves with intra-metropolitan submarkets which Goodman and Thibodeau,

(2003) confirm can be segmented geographically using various spatial scales such as suburb or school district . While some, including Costello and Elkins (2000) found suburbs are often inadequate for analysis of submarkets due to the heterogeneity of building stock within their boundaries; others, such as Bourassa et al.(2003) favour the suburb as the most practical analytical unit for submarket analysis.

To understand more about the processes driving submarket formation, the supply and demand approach is often used. Early on Grigsby (1963) argued that the housing market segmentation is dynamically shaped by shifts in supply and demand. The factors which drive changes in housing demand include income, family structure, employment, accessibility, newly constructed dwellings and population. Within housing markets, sub-markets or segments exist. Geographical segments are more easily identified when the housing stock in a neighbourhood comprises dwellings which are more or less perfect substitutes (Rapkin et al, 1953). Indeed this is one possible definition of a neighbourhood.

According to Adair et al.(2000), the main reason for price differences between intra-metropolitan housing submarkets is accessibility. He found that a lack of connectivity had a relatively more pronounced impact in poorer or more socially deprived suburbs because of residents in these locations were more dependent on public transport.

Consequently, apart from access, another key segmenting criteria for housing markets is social structure in a neighbourhood. Many scholars have used the concept of social segregation to investigate social inequality such as social polarisation and location disadvantages (Teeland, 1988; Kauko et al., 2002). For instance recent research in Australia points to sharp increases in spatial income inequality between the 1986 and 1996 censuses, despite no increase in overall national income inequality (Lloyed et al. 2000). Baum et al (1999) identified wide disparities and divides in socio-economic performance both within metro and within non-metro areas in Australia. Tony (2004) focused on the distribution of social disadvantage in Victoria and New South Wales and Holmes et al. (2002) also studied location disadvantages in the Cessnock District of New South Wales.

Neighbourhood is a multidimensional concept and limiting the definition to one dimension is often misleading. Neighbourhood ambience or peoples' subjective perceptions of the neighbourhood "scene" is not limited to the natural and built environmental but emerges through the interaction of cultural and social norms mediated through the political and economic institutions (Lefebvre, 1991). Neighbourhoods can also be defined by having similar housing and social characteristics or sharing a cohesive sense of identity or simply by small areal units (Megbolugbe et al., 1996).

While town plans, architectural analysis and factorial social ecology give insights to a neighbourhood's current morphology, history shows that

neighbourhoods change. Grigsby (1987) drew attention to the various exogenous and endogenous factors causing neighbourhood change. Factors include demographic change, government interventions, developer activity, housing stock obsolescence or physical deterioration and crime. Institutional expectations about house prices are considered endogenous since they reinforce trends. "Changes in social and economic variables cause households acting directly or through a system of housing suppliers and market intermediaries to make different decisions regarding level of maintenance, upgrading, conversion, whether to move, new construction, boarding up and demolition producing changes in dwelling and neighborhood characteristics" (Grigsby et al., 1987, p33)

(Beckhoven and Van Kempen, 2003, p870; Kearns and Parkes, 2003) downplay the relevance of neighbourhood, stating that the "majority of all residents, both old and new, undertake most of activities outside their own neighbourhood". In terms of spatial decision making neighbourhood is nested within the action and the local component of activity spaces. As a person's action space evolves over time, the conceptualisation of their neighbourhood is also likely to change but not necessarily aligned to the underlying objective geography of opportunities (Horton and Reynolds, 1971).

Neighbourhood decline is an absolute negative change in an area's physical or social quality (Grigsby et al., 1987, p41). At the other end of the spectrum, there have been many attempts to characterise the diverse elements driving neighbourhood attractiveness and presumably prices. (Newton, 1977) grouped the components of a neighbourhood's pull into a vehicle for social advancement "agent in social achievement" or as an established symbol of social status or because of utilitarian features such as access to shopping facilities. More recent conceptualisations refer to the different types of urban amenities but these are still grouped around three basic dimensions of urban form comprising built and natural amenities, labour markets, access to public services, exposure to environmental risks, social influences, status signals and crime (Briggs, 2003; Newton, 1977).

#### **Housing careers and relocation**

Family life cycle and the way in which it conditions the residential decision choice process can be viewed as a more or less continuous progression through a number of stages. The potential for relocation is different at each life cycle stage and transitions from one stage to another in the life cycle create pressure that may induce mobility. In addition, each stage of the life cycle will impart certain requirements with regard to access to services and activities, general neighbourhood characteristics and dwelling size and space requirements, which will affect the eventual residential decision. Beside transitions through demographic phases, households will also experience changes in social and economic circumstances that will influence their residential decisions (McCarthy 1976). The most significant changes may be considered to be progressions through an occupational career and corresponding changes in income.

Corresponding tenure changes can also be expected to occur through the family life cycle. In the early stage of life course, the housing career is portrayed as beginning with a move from the parent's house into rental accommodation. Those in the initial stages of the life cycle- young singles- typically occupy small rental units or flats. This is considered to be due to a number of factors, including low incomes and the transitory nature of employment. Once the middle of the life stage is reached some adjustment has been made by consuming either larger rental accommodation or moving into ownership. The need for extra space is a primary reason, but income level and occupational and family stability may be related to home purchase at this stage. For instance, Kawauchi (Kawaguchi, 1997) traced the household relocation process with reference to the life cycle of each household. The frequency of moves increased twice at the child-bearing stage and it overlapped with the first time homeownership. He regarded the household stage of pre-homeownership as a robust factor constraining the location of the houses of initial acquisition and hence the locus of initial acquisition constrains the relocation process of household residential behaviour after that stage (Kawauchi, 1997). After the peak of the life cycle, when family size reduces, there may be a move to a smaller dwelling. Intervening between the final two stages may be a move to consume more housing. In this case households are moving to upgrade their residential environments.

Not all households move up the housing career towards ownership, while some, as a result of changing circumstances, can move down due to changes in life circumstances (Dieleman et al., 1995; Dieleman and Schouw, 1989; Khoo, 1991; Murie et al., 1991). The decision to make a housing career move is dependent on the costs and benefits of the move together with the resources needed to make the move. In the case of a move from rental to owning, a move will be made when the balance between benefits and costs of owning outweigh those of renting (Baum and Wulff, 2001).

There may be at least two variations on these themes of housing careers. One relates to divorce or separation. When a household unit dissolves through divorce or separation at least one of the parties usually returns to rental accommodation. In this sense, the party returning to rental can be considered as beginning their housing careers again. The other variation to the traditional housing career refers to public renters. For these households, who are considered to be in a minority tenure group, the chances of moving through the traditional housing career are limited. These households might be expected to remain in public housing (Kendig 1984).

The position of different tenures (especially owning and private rental) is therefore fundamentally different. Ownership, as has already been well documented is the goal of most households and generally it has been considered that a large proportion of a household's life cycle will be spent either paying off a home or living mortgage free (Baum and Wulff, 2001).

The private rental sector in contrast is usually considered in terms of a transitional tenure. While there are households who stay in rental for long periods of time, often because they are unable to move into home ownership (Wulff and Maher, 1998), private rental generally has been considered a stepping stone between leaving the parents home and entering into home ownership.

### **Objectives, Data and Method**

In order to characterising the Brisbane housing markets the paper utilised a multiple discriminant analysis. The aim of this discriminant modelling is to analyse segmentation of housing submarkets as dynamically linked residential segregation in Brisbane. The groups of sub-housing markets used in this analysis are determined by nine local housing markets based on the Statistical Local Areas (SLAs) justified by Australia Bureau of Statistics (ABS). Stimson et al. (1999) defined these nine local areas and investigated changes in socioeconomic and demographic characteristics in the South East Queensland Region. Table 2 shows some of the variables selected with their justification.

## **Table 1 Selected Local Housing Markets by SLAs**

Using the residential segregation conceptual framework outlined above, we first analyse urban structure to identify “dress circle” suburbs using a discriminant analysis. Second we identify locations which underwent significant structural change between 1991 -2001.

### **Variable Selection**

Submarkets are defined through and evolve by changes in housing stock, access to amenities, social structure and economic vibrancy. Revitalisation or gentrification offers a useful conceptual framework to categorise submarkets. Following (Smith, 1987, p.3) revitalisation “is this combination of social, physical and economic change that distinguishes gentrification as an identifiable process or set of processes”. In this paper we select variables from the social, physical and economic domains (see Table 2).

#### *Social submarket structure*

Symbolic analysts are basically well educated people with good jobs which involving analysing information and making decisions. For (Reich, 1991, pp 270, 278) “Symbolic analysts live in areas of the city that if not beautiful are at least aesthetically tolerable” and “have a near-obsessive concern over maintaining or upgrading property values”. If this is true, the percentage of symbolic analysts living in a suburb will be a good indicator of up market housing segments. While ABS categories might not exactly correspond to Reich’s definition, we used the categories of Managers, Administrators and Professionals. The percentage of renters is a way of capturing the social structure of an entirely different housing tenure submarket.

#### *Physical submarket structure*

The quality of the dwelling stock and accessibility to various urban amenities and work locations are the key drivers of physical structure in submarkets. When using aggregate data, the former cannot be easily captured, nevertheless the relative importance of rented dwellings in a suburb gives a strong indication of overall submarket dwelling quality. Accessibility is a complex concept which cannot be summarized reliably by a single number. However, in contrast with American conurbations (Clark, 2000), Brisbane is still relatively mono-centric in structure so one can reasonably classify accessibility using the categories of core, inner and fringe suburb location. The impact of river crossing bottlenecks, the attractiveness of Bayside, coastal amenities, large shopping and work place nodes such as Garden City complicate modeling access in the Brisbane metropolitan area. For reasons of parsimony we have ignored them for this project.

#### *Economic submarket structure*

(Shevky and Bell, 1955) highlighted the importance of the changing organization of productive activity to understand city structure although it is difficult to disentangle economic and social interactions (Gibbons, 2003). Recent research in Brisbane by (Reed, 2003; Stimson et al., 2000) confirmed

the importance of economic activity for submarket identification. (Cheshire and Sheppard, 1998) pointed out that richer people tend to spend more on higher priced housing and consequently housing markets can be segmented using indicators derived from data on residents income and house prices themselves. A dynamic local economy should feed through to housing investment so we included a variable on building approvals. At the other end of the scale we identified less "vibrant submarkets using an indicator based on residents living in the suburb for over five years.

**Table 2 Variables and their justification used to determine current neighbourhood quality or urban structure**

To differentiate the selected local housing markets we used a multivariate statistical technique, Multiple Discriminant Analysis. The key outcome of this analysis is a set of (n-1) discriminant functions which are uncorrelated linear combinations of a set of dependent variables. Each function has a unique solution so that differences between groups based on a discriminate score can easily be identified. The following notation shows discriminant Z score as a linear combination:

$$Z_{jk} = a + W_1X_{1k} + W_2X_{2k} + \dots + W_nX_{nk}$$

Where

$Z_{jk}$  = discriminant Z score of discriminant function  $j$  for object  $k$

$a$  = intercept

$W_i$  = discriminant coefficient for independent variable  $i$

$X_{ik}$  = independent variable  $i$  for object  $k$

The above notation involves deriving a variate, the linear combination of several independent variables that discriminate best between a priori defined SLAs. Each independent variable is multiplied by its corresponding weight and these products are added together, plus a constant. The result is a single composite discriminant Z score for each individual in the analysis. By averaging the discriminant scores for all the SLAs within a particular housing market a centroid can be obtained. These yield the biggest mean differences between the housing submarkets. The results of the analysis are elaborated by the following section.

**Differentiating Local Housing Markets: A Result of Discriminant Analysis**

The discriminant analysis resulted in eight discriminant functions with the first two accounting for the majority of the variance. The overall relationship between the predictors and housing markets is significant,  $\chi^2 (72) = 354.898, p < .001$ . Each of the eight estimated discriminant functions is examined to determine if they are significant. Three functions can adequately explain between market differences. After the first function is extracted, the chi-square is recalculated. There is still a significant relationship between the predictors and the housing markets,  $\chi^2 (56) = 155.719, p < .001$ . However,



after the removal of the second function the significant relationship decreases to in the third function  $\chi^2(42) = 60.253, p < .05$ . and is not significant in the fourth function ( $\chi^2(30) = 28.714$ ).

The strength of the overall relationship between the dependent and independent variables is provided by the canonical correlation (see Table 3). In this analysis, the paper focuses on the two most important functions the squared canonical correlations reveal that the first function accounted for 68.6 percent of between group variance while the second function accounted for 21.3 percent of the remaining between group variance.

### **Table 3 Canonical discriminant functions**

Given the fact that function one and two are most statistically significant, we now examines the two functions to determine the relative importance of each independent variable in discriminating between the Brisbane local housing markets. Structure coefficients are used to examine the relative importance of the different predictors to each of the two functions previously pointed out. Table 4 shows the simple linear correlation between each independent variable and two discriminant functions. Variables that correlate highly with a function define that function for labelling purposes. In this analysis only structure coefficients greater than 0.45 (Sig at  $p < .001$ ) are used to interpret the two functions. Using this criteria RENT\_DWL ( $r = .54$ ) and PRICE ( $r = .45$ ) greatly represent the label function one while SYMBOLIC ( $r = .64$ ) and INCOME ( $r = .61$ ) were mainly used to the label function two.

Those two factors would be important determinants for distinguishing amongst the housing markets in the Brisbane metropolitan and the RENT\_DWL and SYMBOLIC are the most important variables in discriminating between the market groups (see Table 4). The two variables- RENT\_DWL and PRICE in the function one are initiated as relating to the macro-structural perspective of housing market. For example the number of dwelling are important for the early stage of housing careers and the average of housing price is also associated with the nature of market constraints (e.g. rental vacancy and prices). On the other hand the two variables in the function two are interpreted as relating to the micro-behavioural perspective of housing market. Both the type of job and the household income are likely to affect individual housing choices and moving behaviour.

### **Table 4 Importance of the predictors in explaining between group variance: Structure Matrix**

## **5. Housing Market Segmentation**

Figure 1 below shows the group centroids of nine housing markets in Brisbane. Four major groups of housing markets are clustered. The first group of housing market is Brisbane Core area (labelled 1) and the second group include Eastern, Northern, Southern and Western Middle Inner area (labelled 2, 3, 4 and 5). The Western outer area formed a unique housing submarket in Brisbane (labelled 9). Finally the outer suburban areas

including Northern, Southern and Eastern outer area are grouped together at the bottom left of the figure (labelled 6, 7 and 8).

### **Figure 1 Market segmentation by the discriminant function one and two**

#### **Group1 (Core housing markets)**

In a light of housing careers those single person or student is likely to be located in core (group 1) and inner city areas (group 2) where is easy to access to work and social activities (non-home centred activities). Income is likely to be a limiting factor in location decisions at this stage. Following classical trade-off theory (Alonso, 1964), space is unlikely to be a key factor in their residential choice and the typical occupier is renting a unit.

Figure 2 illustrates the geographical differentiation using the discriminant score measured by the function one (rented) However, established "dress circle" owner-occupier enclaves such as Ascot and Hamilton and recently gentrified Newsted and Bulimba complicate broad aggregate data clustering. In addition, the impact of the University of Queensland distorts this high rental group segment geographically pulling it Westwards from the city centre to include the suburbs of Taringa, Toowong and St. Lucia.

#### **Group 2 (Middle City housing markets)**

The picture revealed by our analysis needs to be interpreted in the light of knowledge about Brisbane's urban structure. The middle inner suburbs group a spectrum of typologies. Mainly residential inner suburbs such as the Kangaroo Point, Norman Park, and Ashgrove share many of living amenities and entertainments of CBD including "trendy" cafés, restaurants and pubs, albeit in a less dense setting. However, Kelvin Grove has a high renter population attracted by its university campus and closeness to the CBD. A significant group of residents are likely to be single or young couples who accessibility is an important determinant of location choice.

#### **Group 3 (Western outer housing markets)**

The next significant stage will occur when a couple decides to begin a family. At this stage the importance of space versus access will begin to change, with slightly more importance being placed on home-centered activities, but still maintaining strong links with outside activities.

Figure 3 shows the housing market segregation based on the discriminant function two (income and symbolic). The Western Suburbs such as Chapel Hill, Kenmore, Fig Tree Pocket, Anstead and Seventeen Miles Rock contribute unique housing market characteristics sharing large environmental amenities. As the couple raises a family, and the children reach school age, access to neighborhood facilities centered on children will also be important. During these stages of the life cycle the career patterns of individuals will be reaching their peak and may be considered stable. In the case of a pre- child couple, earnings may be high, but may fall with the arrival of children. This

loss of earnings may be eventually regained when children enter school and both parents are in the workforce.

Contrasting with these child-centered stages of the life cycle, the post child stage may flag a reduction in space needs and child-oriented activities. At this stage households may become more interested in quality and status of the dwelling. Individuals may be nearing retirement, and occupation and income will have reached their peak.

### **Figure 3 Housing market segmentation by the function two**

#### **Group 4 (Other outer suburban housing markets)**

At any stage, dissolution of the family may occur due to separation or divorce, or through the unexpected death of a spouse. This may then trigger another set of factors affecting residential choice and is likely to be associated with involuntary mobility. In addition, it is important to note that not every stage will be entered into, and some stages may be skipped. These limitations and variations must be considered in the above schema. What is important however is that, at any stage, households will have different circumstances, needs and preferences, which will influence the residential choice process and hence alter the paths taken in terms of the basic place utility model. In addition (Gregory and Sheehan, (1998) refer to the 'collapse of full employment'. This 'down' moves has occurred alongside the drop in full time employment positions, increase in part-time and casual positions and rise in unemployment. Figure 2 shows those SLAs including Darra, Inala, Rocklea and Durack for Southern outer and Boondall, Banyo and Deagon for Northern outer, and Chandler, Hemmant-Lytton and Wynnum West for Eastern outer. Considering many households take a long-term financial commitment to purchase house, people with insecure or casual jobs and with personal problems are likely to move down in their housing careers. Some households living in the outer suburbs are likely to move upwards and move to those suburbs such as Bridgeman-Downs (northern outer), Belmont-Mackenze (eastern outer) and Calamvale (southern outer).

#### **Conclusion: fragmentation and complexity**

The paper found that there housing markets in Brisbane are geographically segmented. Adequate segmentation requires not only statistical grouping techniques, such as discriminant analysis which we employed, but also an understanding of the causal processes driving urban change. In this paper we used gentrification theory as a framework for variable selection. The analysis and interpretation of our results is underpinned by an understanding of the various life stage processes driving segmentation. Life cycle choices are made in spatial setting where, not only are accessibility and dwelling size traded, but also social structure and economic vibrancy create complex neighbourhood amenity trade-off choices. For example one parent families are unlikely to afford to buy into the Western suburbs where dwelling size, environmental quality and accessibility all push up prices. Relatively new infrastructure such as the Pacific Motorway has also tended to drive them out of the South Eastern corridor into more deprived and industrially blighted South West of the metropolis. Here suburbs bordering Ipswich such as Darra, and Inala require well-funded, intelligently planned and environmentally sensitive infrastructure if they are to attract the investment needed to underpin sustainable growth of Brisbane. Our results appear to confirm that, to date, development policies such as they are in Brisbane, continue to "channel significant public resources to the wealthier communities that are able to capture them" (Gleeson, 2002, p5).

While geographical housing market segmentation is path dependent on the physical and historical setting of a city, we argue that housing and location choice behaviours, including responses to life stage events in the housing career maintain and reinforce housing market segmentation within a metropolitan area. In line with other research, we found evidence for the polarisation of neighbourhoods by income and an ongoing reinforcement of high socio economic status through capital refurbishment and continued in-migration of symbolic analysts into selected North Western and Bay side suburbs. In the current political and economic climate this process has led to a geographical cleavage of metropolitan Brisbane. The progressive clearing of bushland on the city's South West and its replacement by cheaply-built dormitory suburbs (Burnley et al., 1997) or the clutter of urban blight has created a "tragedy of the commons" at the urban fringe and a "feeding frenzy of gentrification" (Badcock and Beer, 2000, p51) in inner city suburbs such as Newstead and West End. As they move through the housing career ladder, symbolic analysts who seek to reinforce their status expand their living space and consolidate their home ownership tenure, move outwards from "vibrant" rental accommodation in the city centre. Eventually, if successful, they tend to cocoon themselves in the privileged North Western suburbs hugging the remaining fragments of green space such as Mount Cootha and the Brisbane Forest Park or settle in suburbs with Bay side amenities. Higher and relatively secure incomes enable these players in the housing market to buy the environmental quality and access which, ironically, their economic activity may have directly or indirectly eroded. Wealth also enables them to finance larger houses more suited to their child bearing and rearing life stages. Subsequently in their housing career they may purchase speculative investment properties in Brisbane's inner city. This process is the driving force behind the spectacular annualised capital gains seen during the recent property boom from 1998 – 2004 in selected residential and inner city investment submarkets corresponding to our Function 1 and Function 2 discriminant functions. In Function 1 high rental and symbolic analyst core suburbs such as Newstead and West End, property prices increased annually by 15.16% and 13.51% respectively over the period. In Function 2 high income and symbolic analyst outer Western suburbs such as Pullenvale and Anstead annualised capital gains were even more spectacular during this period with gains of 23.29% and 21.36% respectively.

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**Table 1 Selected Local Housing Markets by SLAs.**

<b>Brisbane Core (n=18)</b>	<b>Eastern Inner (n=13)</b>	<b>Northern Inner (n=19)</b>	<b>Southern Inner (n=9)</b>	<b>Western Inner (n=8)</b>
Bowen Hills City - Inner City - Remainder Dutton Park Fortitude Valley - Inner Fortitude Valley - Remainder Herston Highgate Hill Kelvin Grove Milton New Farm Newstead Paddington Red Hill South Brisbane Spring Hill West End (Brisbane) Woolloongabba	Kangaroo Point Balmoral Bulimba Camp Hill Cannon Hill Carindale Carina Carina Heights Coorparoo East Brisbane Hawthorne Morningside Norman Park	Albion Alderley Ascot Ashgrove Bardon Clayfield Grange Hamilton Hendra Kedron Lutwyche Newmarket Nundah Stafford Stafford Heights Wilston Windsor Wooloowin Enoggera	Annerley Fairfield Greenslopes Holland Park Holland Park West Moorooka Tarragindi Yeerongpilly Yeronga	Chelmer Corinda Graceville Indooroopilly St Lucia Sherwood Taringa Toowong
<b>Northern Outer (n=28)</b>	<b>Southern Outer (n=31)</b>	<b>Eastern Outer (n=16)</b>	<b>Western Outer (n=21)</b>	

McDowall	Pallara-	Moreton	Brookfield	
Nudgee Beach	Heathwood-	Island	(incl. Mt	
Banyo	Larapinta	Belmont-	C'tha)	
Carseldine	Rochedale	Mackenzie	Chapel Hill	
Chermside	Willawong	Chandler	Fig Tree	
Chermside West	Archerfield	Hemmant-	Pocket	
Keperra	Calamvale	Lytton	Jamboree	
Mitchelton	MacGregor	Murarrie	Heights	
Northgate	Mansfield	Tingalpa	Jindalee	
Nudgee	Mount	Burbank	Kenmore	
Pinkenba-Eagle	Gravatt	Capalaba	Kenmore	
Farm	Mount	West	Hills	
The Gap (incl.	Gravatt East	Gumdale	Middle Park	
Enoggera Res.)	Nathan	Lota	Moggill	
Wavell Heights	Oxley	Manly	Mount	
Aspley	Rocklea	Manly West	Ommaney	
Bald Hills	Salisbury	Ransome	Anstead	
Boondall	Stretton-	Wakerley	Bellbowrie	
Bracken Ridge	Karawatha	Wynnum	Doolandella-	
Bridgeman	Upper Mount	Wynnum	Forest Lake	
Downs	Gravatt	West	Durack	
Brighton	Wishart		Ellen Grove	
Deagon	Acacia Ridge		Pinjarra	
Everton Park	Algester		Hills	
Ferny Grove	Coopers		Pullenvale	
Geebung	Plains		Riverhills	
Sandgate	Darra-		Seventeen	
Taigum-	Sumner		Mile Rocks	
Fitzgibbon	Eight Mile		Upper	
Upper Kedron	Plains		Brookfield	
Virginia	Inala		Westlake	
Zillmere	Karana			
	Downs-Lake			
	Manchester			
	Kuraby			
	Parkinson-			
	Drewvale			
	Richlands			
	Robertson			
	Runcorn			
	Sunnybank			
	Sunnybank			
	Hills			
	Wacol			

**Table 2 Variables and their justification used to determine current neighbourhood quality or urban structure**

Domain	Variable	Explanation for selection or data limitations
urban form	% rented dwelling % rented household	Increase in rented accommodation, either in terms of dwellings or people signals increased popularity of the neighbourhood among the young upwardly-mobile employed. Alternatively it can signal disinvestment.
	SLAs core, inner, middle or fringe suburb	These variables capture accessibility, although the relative complexity of satellite employment and retail centres as well as topography and transport bottlenecks is ignored.
social structure	% of symbolic analysts	Symbolic analysts include managers and professionals – essentially problem solvers well documented as drivers of neighbourhood change.
economic vibrancy	% of high income	Income data reflects economic activity but only 2001 data available.
	% >5years	Where residents stay on average five years or more, the neighbourhood is less dynamic
	% of dwelling approvals	Refurbishment is a proxy for economic activity.
	suburb median housing price	The initial data was derived from publicised REIQ data.

**Table 3 Canonical discriminant functions**

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	3.248	68.6	68.6	.874
2	1.007	21.3	89.9	.708
3	.259	5.5	95.3	.453
4	.139	2.9	98.3	.349
5	.058	1.2	99.5	.234
6	.023	.5	100.0	.149
7	.000	.0	100.0	.021
8	.000	.0	100.0	.017

**Table 4 Importance of the predictors in explaining between group variance: Structure Matrix**

<b>Variables</b>	<b>Function1</b>	<b>Function2</b>
RENT_DWL	.544	-.270
SYMBOLIC	.436	.648
INCOME	.066	.619
PRICE	.451	.156
DWL91-01	.066	.083
APPROVALS97-01	.098	.004
SYMBOLIC91-01	-.009	.095
RENTPE91-01	-.020	.201
RENTDW91-01	.010	.188
RENTED	.215	-.283

**Figure 1 Market segmentation by the discriminant function one and two**

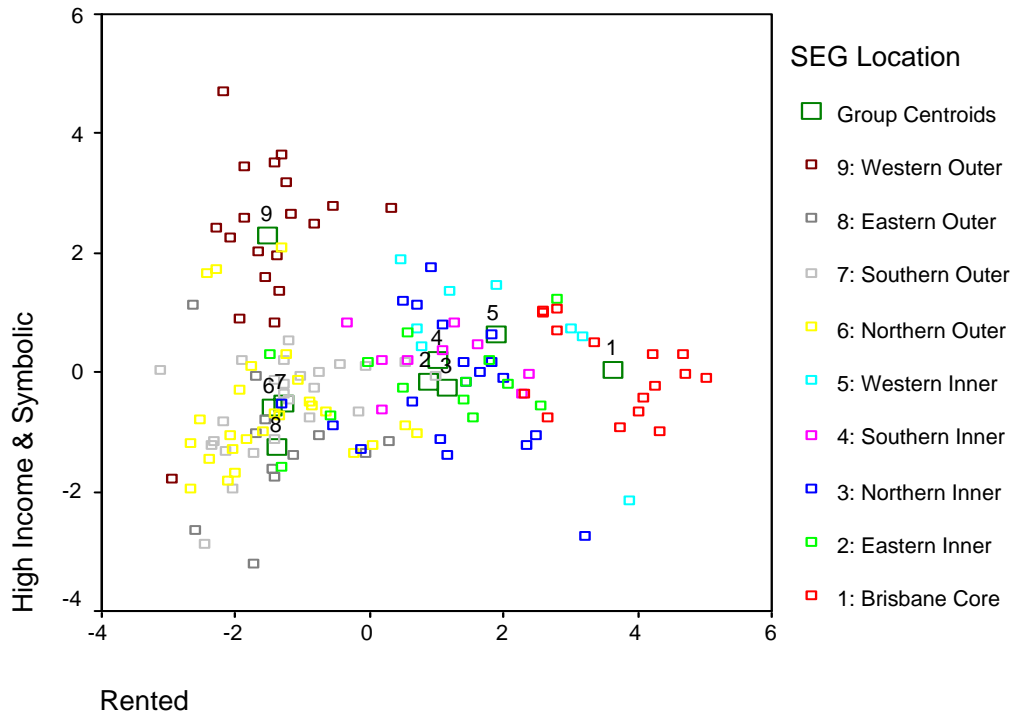
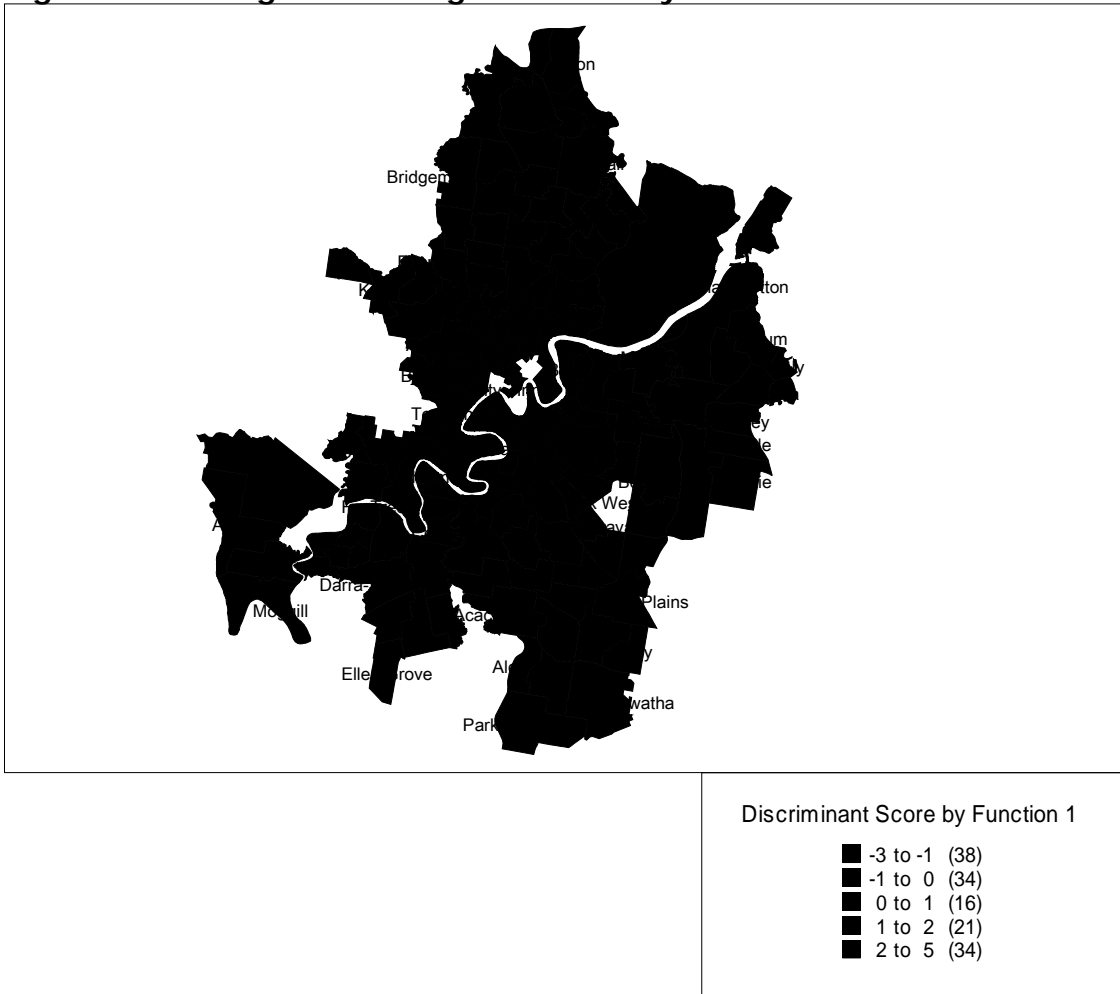


Figure 2 Housing market segmentation by the function one



**Figure 3 Housing market segmentation by the function two**

