# CROSS SECTIONAL ANALYSIS OF TIME ON MARKET INDICATORS FOR AN AUSTRALIAN CITY

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## ABSTRACT

*This paper reports on a cross sectional analysis of Time on Market (TOM) for the residential property market of an Australian City. The focus is an analysis of TOM across location and by dwelling type, rather than over time, during a period of relative market stability. The study examines TOM for a three month period from September to November 2010 for the city of Adelaide, Australia which is a geographically isolated but active market with over 20,000 residential transactions each year. The study reports on the factors which impact on TOM when examined by region using both descriptive analysis and statistical modelling. Data used in the study results from combining sale transaction records from the South Australian Government with details of property marketing collected from advertisements in newspapers and websites. The research investigates relationships between TOM and dwelling type (detached, semi-detached and home units), location (ten regions) and house size (main rooms). It also compares first to last advertised price across location and for each property type. The research shows that location and house size both have a significant impact on TOM. Therefore, an important finding of the study is that factors such as location and dwelling size need to be held constant in any analysis of TOM over time.*

**Keywords**: time on market, residential property, cross sectional

## INTRODUCTION

The length of time it takes a house to sell has interested vendors, agents and academics probably for as long as any formal market for housing exchange has existed. Vendors are anxious to know when they can begin to plan ahead in terms of another purchase or a change in tenure; agents, while protecting the interests of clients, are impatient for a sale; academics seek to understand the gap between theory and reality in terms of market outcomes. To date over the past two decades most of the literature on TOM (time on the market in days) has been from the US and most studies have focused on an analysis of TOM over time. In contrast there has been little examination of TOM from an Australian perspective or using a cross sectional approach. The study reports on a spatial analysis of TOM for a three month period from September to November 2010 for the city of Adelaide, Australia which is a geographically isolated but active market with over 20,000 residential transactions each year. The focus of this study is an analysis of TOM across location and by dwelling type and size, rather than over time, during a period of relative market stability. By implication, if location and dwelling characteristics can be shown to significantly influence TOM then any future analysis of TOM over time would require such factors to be held constant.

The paper is structured as follows. The next section provides a literature review on TOM drawing mainly upon US studies. The methodology and data sources used in this paper are discussed in the section thereafter. This is followed by a discussion and interpretation of both the descriptive analysis and the statistical results in the next section, followed by a conclusion in the final section.

## LITERATURE REVIEW

Formal TOM studies began in the US in the 1970s with Cubin (1974) considering the impact of housing quality on selling time, Belkin et al (1976) identifying differences between listing price and selling price and Miller (1978) considering the impact of time on selling price. These themes have continued to dominate the academic literature though sample sizes have increased (Anglin 2004), modelling has become more rigorous, to include single stage and two stage hedonic studies, linear programming, the application of equilibrium models and the use of hazard rates (Levin and Pryce 2009). In addition markets outside the US are now being included; the UK (McGreal et al 2009, Levin and Pryce 2007), Canada (Anglin 2004) and Europe (Bjorlkund et al 2004). For the purposes of this paper, the themes discussed are restricted to the impact of TOM on selling price and the factors which influence TOM including the impact of different market conditions.

Most writers agree that TOM does have an impact on selling price (McGreal et al 2009, Larsen and Park 1989). In theory, the longer a property is on the market, cēterīs paribus, the greater the probability that a buyer with a high reservation price will arrive therefore a longer TOM should produce a higher selling price (Taylor 1994). Early studies by Forgey et al (1996) in their two stage model agreed that higher selling prices were associated with longer expected selling periods while Asabare and Huffman (1993) also concluded that, the longer the marketing period, the higher the probability that a higher price can be achieved. Larsen and Park (1989), however, have concluded that, all things being equal, the longer a property is on the market the greater is the concession in terms of price. Sirmans et al (2005) also suggest that in many situations TOM has a negative influence on price. Taylor (1999) describes 'negative herding' on the part of buyers and suggests that a home which has been on the market for a long time may acquire a stigma with reduced pricing a result. Haurin (1988) has shown that atypicality in a property can produce a longer TOM. Jud et al (1996), Levin and Pryce (2009) and McGreal et al (2009) would all tend to suggest that there is an initial price increase associated with TOM but that at some point diminishing returns set in with increasing length of marketing time. Levin and Pryce (2009) identify that a sellers' decision to wait for an extra bid raises expected selling price as there are more potential buyers but that diminishing returns can set in by way of costs including financing and depreciation. They suggest the house seller maximizes gains (net of selling costs) by waiting to the point where any expected incremental gain in waiting is outweighed by the incremental loss in costs.

Studies of TOM under different market conditions have come to a number of conclusions. Miller (1978) proposed that TOM may act as an equilibrator lengthening and shortening according to buyer and seller reactions to different market conditions but also suggested that links between market conditions and individual sellers were imperfectly understood. Kramer (1999) suggests that when housing demand is high sellers do not in fact raise their prices to take full advantage rather they look for greater liquidity so as to complete the sale before the market 'turns on them'. Alternatively in periods when market demand is low, sellers do not drop their prices in order to achieve the same amount of liquidity as in the boom market. Rather Kramer suggests prices are sticky because sellers find it more advantageous to fish for a buyer as their opportunity costs of failure are low. Levin and Pryce (2009) also identify that a seller's optimal price and TOM combination varies with the state of the market. However they suggest that if the cost of waiting rises as the average waiting time per bid lengthens therefore, in a slump, the cost of waiting rises. Thus the seller stands to lose more by waiting as the optimal price, and the number of bids through which this might be achieved, is reduced.

A number of studies have sought to identify the factors which influence TOM. TOM has been explained by quantifiable factors such as property characteristics, including age, quality and size (Jud et al 1996, McGreal et al 2009, Taylor, 1999), market conditions such as interest rates, employment, exchange rates, and time of sale (Taylor 1999) as well as qualitative factors such as

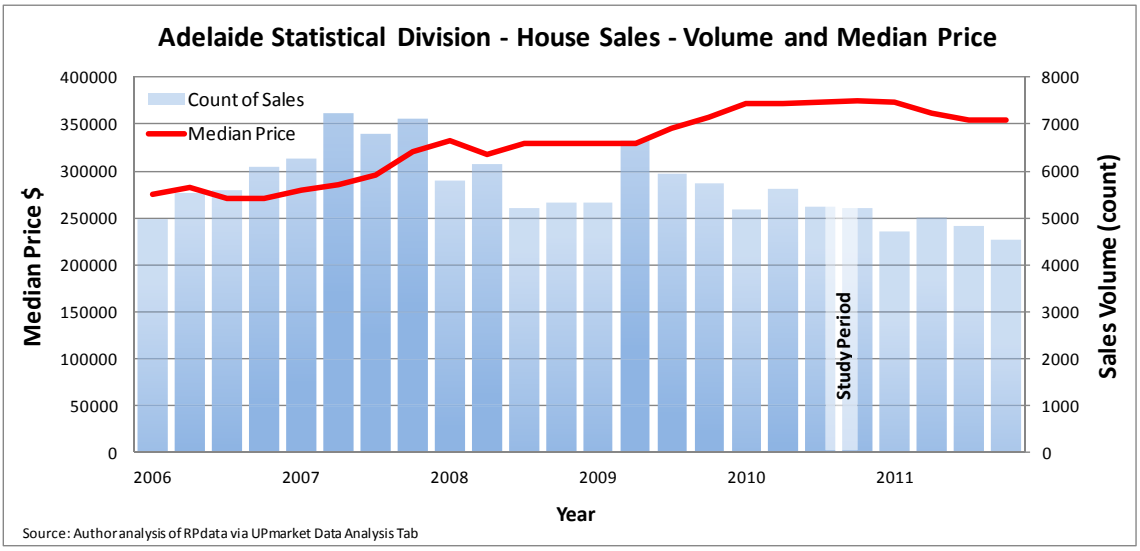
agency performance (Jud et al 1996), regulation and by the types of buyer operating in different market conditions. McGreal et al (2009) found that age of properties had an impact on TOM with the oldest properties taking longer to sell including those that had sold above list price and those which sold below. Kalra and Chan (1994) showed that TOM was a function of mortgage rate, employment and price concessions. With price concessions TOM was reduced; with total employment TOM was reduced and with higher interest rates TOM was increased. Jud et al (1996) identified TOM as a function of list price, changes in list price and home atypicality with higher list prices associated with longer TOM. This agrees with Haurin (1988) who identified that the TOM of an atypical house would be longer than that of a standard house.

This study is drawing on previous work that has been conducted into the factors which influence TOM such as dwelling type (Haurin, 1988) and other property characteristics including size (Jud et al 1996, McGreal et al 2009, Taylor 1999). To date, however, there has been little work conducted on the influence of location on TOM and in this context the paper makes an important contribution to the existing body of knowledge.

## METHODOLOGY

### Time Period

This cross-sectional study is based on an analysis of residential property transactions for the city of Adelaide, South Australia (SA) over a three month period from September 2010 to mid November 2010. This period has been selected as it represents a relatively stable market; median dwelling price changed by only 0.5% while the total number of transactions was approximately constant (change over the three month period of only 0.69%). This limited movement, in both median price and turnover is highlighted in Figure 1. Also during this period there were no significant changes in government policy or in macroeconomic factors such as mortgage rates.




**House Sales - Volume and Median Price**
**Source: Author Analysis**
**Figure 1**

### Spatial Units

The overall spatial unit used in the study is the Adelaide Statistical Division which contains over 300 suburbs and over 100 postcodes and to allow for this extensive geography a ten region break down has been adopted. These ten regions were established by the Centre for Land Economics and

Real Estate Research (CLEARER) in a previous study (Rossini et al 2005) and are used for indexing and other purposes. They are made up of contiguous postcodes and based on a combination of socio-economic and physical criteria (see Figure 12, appended).

**Data**

In Australia there are no providers of time on market data except on an individual property basis. A commercial company, RP Data, collects data against each advertised property either when it appears in the newspaper or once a week from RealEstate.com, a national real estate advertising website. From this RP Data provide limited, short-term outputs showing how long currently listed properties have been on the market. The data set used in this research is the result of individually interrogating this RP Data base for all properties that sold during the study period. Transaction records compiled by the SA government were then matched against the online RP data and weekly advertising history. To achieve this some 6000 probable residential transactions were individually examined and the list of advertised details used to establish four key variables: first and last advertised date and the first and last advertised price. Where the prices were in ranges, or approximate, a set of rigid rules were used to convert this to a price. Time on market (TOM) was then calculated as the number of days between the first and the last advertised date. The percentage difference between the first and last advertised price as well as the difference between the last indicated advertised price and the actual sale price were also calculated. In total some 5902 valid transactions were individually interrogated resulting in 4345 matched files which combined transaction and TOM data. This entry was then merged with the actual transaction data from the SA government land titles office to create the final record.

In the final data set vacant land sales were poorly represented with only 9.7 % of actual transactions being matched. There are several reasons for this poor match rate. Allotments in large greenfield sites are not advertised individually so no advertisement data is able to be captured; new sites are difficult to match since the address is not fixed until later and many vacant sites are not advertised in metropolitan wide newspapers or on the internet. As a result, vacant land was excluded from the analysis. The remaining 4244 valid observations represented three dwelling types; detached, semi-detached and attached home units.

**Analysis**

TOM and advertising price data were analysed using both descriptive analysis and statistical modelling. The descriptive analysis included: cross tabulating sample match rates across spatial regions and dwelling types; distribution analysis; cross tabulating the median TOM by region and dwelling type and by number of main rooms for improved properties; distribution analysis of the percentage difference between first and last advertised price and the first advertised price and the actual sale price and cross tabulating mean percentage change between first and last advertised price and first to actual sale price by region and dwelling type.

The statistical modelling took the form of a Cox proportional-hazard model which takes the general form:

$$h_i(t) = h_0(t)exp(\beta_1 X_{i1} + \beta_2 X_{i2} \dots\dots + \beta_n X_{in})$$

In this model $\exp(\beta_x)$ is a measure of the odds ratio of non-survival (death, demise, destruction) at time *t* when other X factors are held constant. In the context of TOM this can be used to measure the odds ratio of a property remaining on the market at time *t* compared to the sale "not surviving on the market" i.e. it has sold and is a completed transaction.

Odds ratios may be difficult to interpret and as a result it is common to convert odds ratios to probabilities that reflect the risk of survival after a period of time. Odds can be converted to risk using the simple formula:

$$risk = \frac{odds}{1+odds} \quad \text{similarly} \quad odds = \frac{risk}{1-risk}$$

This becomes the basis of the survivorship function (chart) which in the context of TOM indicates the proportion of properties still on the market at time *t*. Different curves can be plotted jointly showing how fixed effects (such as different regions) impact on the proportion of properties still on the market after a time period. For this study *t* is a measure of time or days on market and $X_i$ are an array of property characteristics that might cause a variation in the TOM. This cross sectional study seeks to test if TOM varies by location and by dwelling type and size. The advantage of the statistical modelling over the simple description is that it is possible to consider the impact of each variable holding the other constant and to test which of the variables produce statistically significant effects.

The $X_i$ variables are

| Variable | Description |
|---|---|
| Year Built | Year of construction of the building |
| Wall types | Dummy variables for Stone and Timber-framed walls with all other construction types as the indicator or default variable |
| Number of rooms | Dummy variables for 1-3 rooms, 5, 6 and 7 rooms and 8 or more rooms. 4 rooms is used as the indicator or default variable as this is well represented in all dwelling types |
| Dwelling type | Dummy variables for detached, semi-detached, home units are held out as the indicator or default variable to allow easy comparison between detached and semi-detached |
| Region | Dummy variables for Central, Western, Coast, South Western, South Eastern, Inner Northern, North Eastern, Northern, Hills and Southern as shown in Figure 12. The Hills region is used as the indicator or default value |

## RESULTS

### Descriptive Analysis

### Dwelling Type and Region

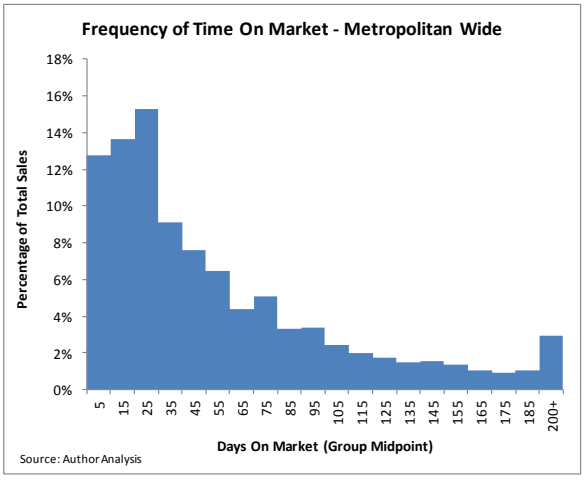
The descriptive analysis involved first breaking down the matched 4244 TOM sales by dwelling type and by region. The 4244 matched sales represents 74.0% of all sales transacted over the three month period and these total sales are represented by detached houses (89.1%), semi-detached (85.9%) and home units (80.5%). The distribution of the TOM sales by region varies widely (Table 1) with the strongest representation of TOM sales in the northern (19.4%) and southern regions (17.2%). As well, detached houses (77.3%) clearly dominate over the other two property types.

| Region | Dwelling Type | | | All Dwelling Types |
|---|---|---|---|---|
| | Detached House | Semi-Detached House | Home unit | |
| Central | 207 | 51 | 167 | 425 |
| Western | 300 | 26 | 121 | 447 |
| Coast | 236 | 29 | 133 | 398 |
| South Western | 221 | 37 | 89 | 347 |
| South Eastern | 180 | 11 | 34 | 225 |
| Inner Northern | 209 | 13 | 44 | 266 |
| North Eastern | 421 | 21 | 63 | 505 |
| Northern | 747 | 33 | 47 | 827 |
| Hills | 71 | 0 | 0 | 71 |
| Southern | 691 | 4 | 38 | 733 |
| All Regions | 3283 | 225 | 736 | 4244 |

**Volume of Matched Transactions by Location and Land Use**
**Source: Authors**
**Table 1**

**Time on Market in Days**

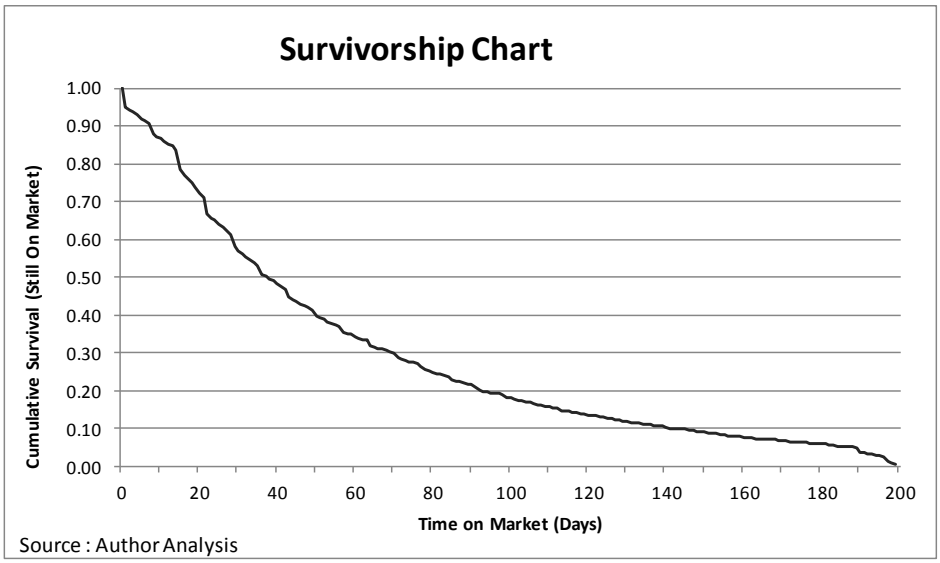
Summary statistics (Figure 2) show the distribution of TOM to be positively skewed (skewness =1.23) with a median TOM of 38 days and the mean 57.8 days. Some 10% of properties sell in eight days or less and 10% took over 148 days to sell. The distributional curve shows a small peak (kurtosis = 0.58).




| | |
|---|---|
| Mean | 57.8 |
| Std. Deviation | 53.6 |
| Skewness | 1.23 |
| Kurtosis | 0.58 |
| 5th Percentile | 1 |
| 10th Percentile | 8 |
| Median | 38 |
| 90th Percentile | 148 |
| 95th Percentile | 195 |

**Time on Market in Days Distribution and Summary Statistics**
**Source: Authors**
**Figure 2**

The distribution of time of market is also shown as a survivorship chart and table in Figure 3. This shows the proportion of properties "surviving" after progressive days on the market. The table summarises the cumulative probability in ten day intervals with 38 days highlighted. This corresponds to the median time on market (when the probability of it surviving on the market is 50%). The function shows properties remaining on the market decline quickly with 25% being sold (survival=.75) after 18 days and 50% after 38 days. The slope of the function gradually declines as longer periods are experienced for some sales, with 75% being sold after 80 days but it is not until 140 days that 90% are sold.




| Time On Market (Days) | Cumulative Survival |
|---|---|
| 0 | 1.00 |
| 10 | .87 |
| 20 | .72 |
| 30 | .57 |
| 38 | .50 |
| 40 | .49 |
| 50 | .40 |
| 60 | .34 |
| 70 | .30 |
| 80 | .25 |
| 90 | .22 |
| 100 | .18 |
| 110 | .16 |
| 120 | .14 |
| 130 | .12 |
| 140 | .10 |
| 150 | .09 |
| 160 | .08 |
| 170 | .07 |
| 180 | .06 |
| 190 | .04 |
| 200 | .00 |

**Survivorship Chart and Table Where TOM ≤ 199days**
**Source: Author**
**Figure 3**

**Time on Market, Dwelling Type and Location**

Figure 4 identifies the relationship between TOM, location and dwelling type. TOM for semi-detached dwellings is of shortest duration with a median selling period of 30 days. Home units took only slightly longer to sell with a median selling period of 32 days. Detached dwellings took the longest to sell at 40 days.

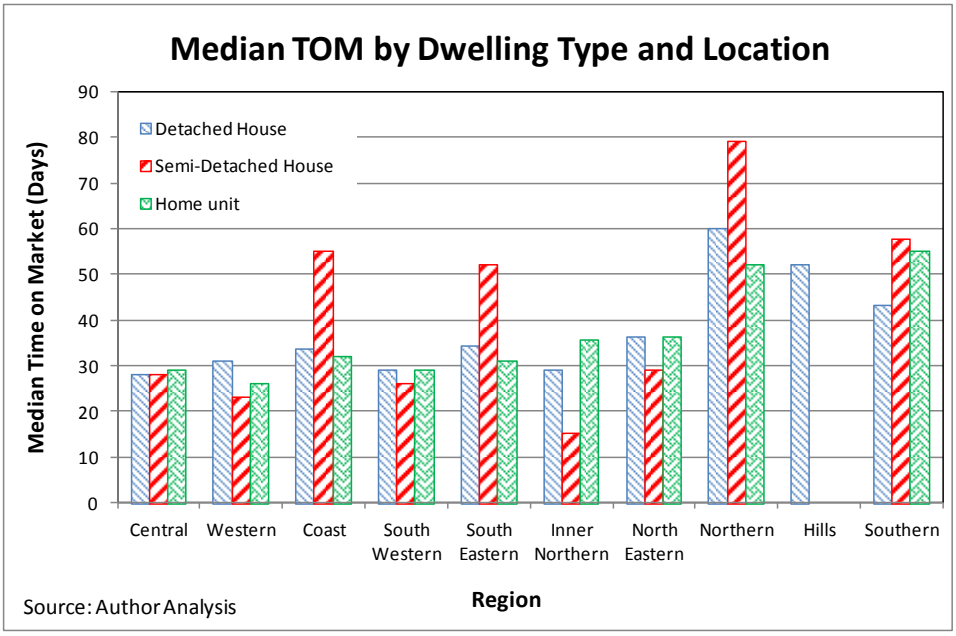
Within the detached dwelling market, TOM is greatest in areas further from the city, particularly in the newest areas of subdivision to the north (60 days) and south (43 days) as well as the established outer Adelaide hills region (52 days). For detached dwellings the central area of the city (28 days), adjacent south western (29 days) and inner northern (29 days) areas all have a shorter time on market. The length of time taken to sell semi-detached houses is the most variable with the median varying between 79 days in the outer north to only 15 days in the inner north which adjoins the city. Higher values for TOM for semi-detached dwellings are also apparent in regions further from the city including the southern, coastal and south eastern areas.

The home unit market is generally characterised by smaller, cheaper housing that has a shorter TOM with the shortest periods notable in the western (26 days), south western (29 days) and central city region (29 days). These areas have seen substantial renewal with more attached infill housing being made available. In the city, home units probably represent the only properties affordable to first home buyers and appear to be particularly sought-after given the short time on market results.

Overall, for all dwelling types, TOM on average is longest in regions furthest from the city, north and south, and shortest in the inner city centre and inner south western regions.

| Region | Dwelling Type | | | | | | All Dwelling Types | |
|---|---|---|---|---|---|---|---|---|
| | Detached | | Semi-detached | | Home units | | | |
| | Median | Count | Median | Count | Median | Count | Median | Count |
| Central | 28 | 207 | 28 | 51 | 29 | 167 | 28 | 425 |
| Western | 31 | 300 | 23 | 26 | 26 | 121 | 29 | 447 |
| Coast | 34 | 236 | 55 | 29 | 32 | 133 | 35 | 398 |
| South Western | 29 | 221 | 26 | 37 | 29 | 89 | 29 | 347 |
| South Eastern | 34 | 180 | 52 | 11 | 31 | 34 | 34 | 225 |
| Inner Northern | 29 | 209 | 15 | 13 | 36 | 44 | 29 | 266 |
| North Eastern | 36 | 421 | 29 | 21 | 36 | 63 | 36 | 505 |
| Northern | 60 | 747 | 79 | 33 | 52 | 47 | 59 | 827 |
| Hills | 52 | 71 | - | 0 | - | 0 | 52 | 71 |
| Southern | 43 | 691 | 58 | 4 | 55 | 38 | 44 | 733 |
| All Regions | 40 | 3283 | 30 | 225 | 32 | 736 | 38 | 4244 |

**Median Time on Market, Dwelling Type and Location**
**Source: Authors**
**Table 2**



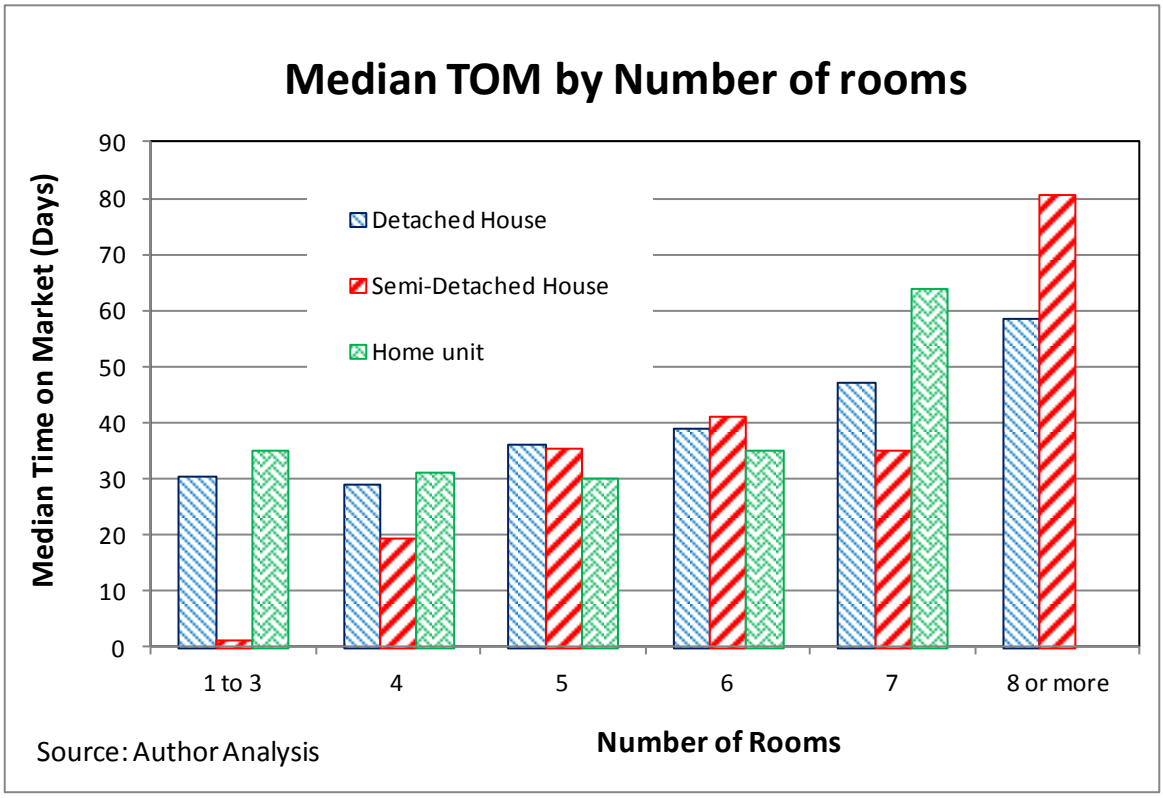

**Median Time on Market by Dwelling Type and Location**
**Source: Authors**
**Figure 4**

**Time on Market, Dwelling Type and Number of Main Rooms**

Table 3 and Figure 5 show an analysis of time on market by dwelling size based on number of habitable rooms.

| | General Land Use | | | | | | All Dwelling Types | |
|---|---|---|---|---|---|---|---|---|
| | Detached | | Semi-detached | | Home units | | | |
| **Main Rooms** | Median | Count | Median | Count | Median | Count | Median | Count |
| 1 to 3 | 31 | 12 | 1 | 4 | 35 | 151 | 32 | 167 |
| 4 | 29 | 219 | 20 | 44 | 31 | 402 | 29 | 665 |
| 5 | 36 | 1331 | 36 | 96 | 30 | 131 | 35 | 1558 |
| 6 | 39 | 798 | 41 | 50 | 35 | 29 | 39 | 877 |
| 7 | 47 | 432 | 35 | 17 | 64 | 6 | 47 | 455 |
| 8 or more | 59 | 420 | 81 | 4 | - | 0 | 59 | 424 |
| All Sizes | 39 | 3212 | 29 | 215 | 32 | 719 | 37 | 4146 |

**Median Time on Market, Dwelling Type and Number of Main Rooms**
**Source: Authors**
**Table 3**




**Median Time On Market by Dwelling Type and Number of Main Rooms**
**Source: Authors**
**Figure 5**

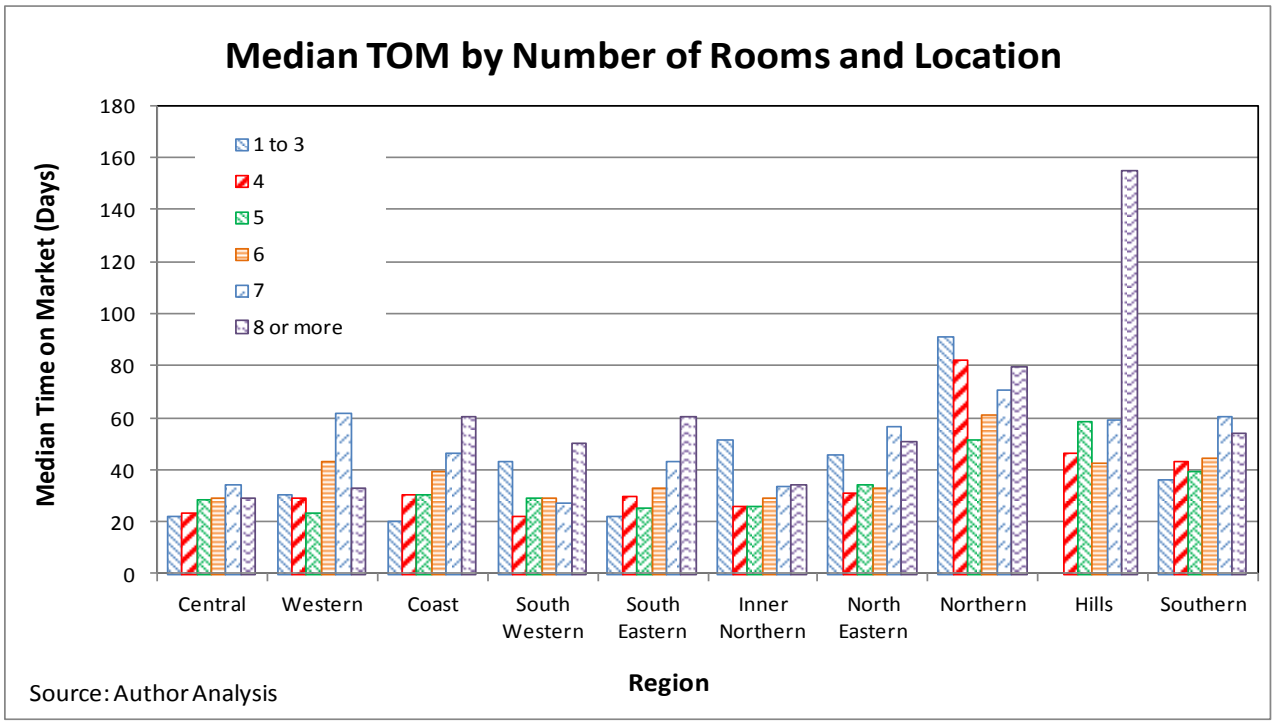
Median values indicate that generally smaller dwellings (five main rooms or less), whether detached, semi-detached or home units, sell more quickly; in 35 days or less, compared to 59 days for large properties of 8 main rooms or more. These smaller properties tend to be relatively

inexpensive and more readily purchased by first home buyers. Generally as houses become larger TOM increases; this is particularly noticeable for larger semi-detached (81 days) and detached houses (59 days) of more than eight rooms. Even home units of more than 7 rooms show a considerably longer TOM of 64 days.

Table 4 and Figure 6 indicate that when size of dwelling is broken down by location, smaller dwellings of 1 to 3 main rooms, whatever the dwelling type, either sell very quickly, for example, in central (22 days), coast (20 days) and inner south east (22 days), but take much longer in areas such as the south west (43 days), inner north (51 days) and especially the north (91 days). In the north, 4 room houses also seem to take an unusually long time to sell (82 days). This area is one of major subdivision accompanied by renewal in which private public partnership has resulted in many older, government built semi-detached dwellings on large blocks being replaced by larger detached dwellings on smaller blocks. The remaining smaller, older dwellings appear unpopular even when offered at subsidized prices. Large houses of over 8 rooms also show a marked range in median TOM which is very low in the centre (29 days), west (33 days) and inner north (34 days) but extremely high in the hills (155 days). The inner city areas contain some of Adelaide's most prestigious, older homes which are often sold relatively quickly through the auction process. In the hills most dwellings are detached, large and often coupled with rural lifestyles. As such they are often associated with large land parcels; this makes them more unique but can also delay the selling process.

| **Region** | **Number of Main Rooms** | | | | | | All Dwelling Sizes |
|---|---|---|---|---|---|---|---|
| | 1 to 3 | 4 | 5 | 6 | 7 | 8 or more | |
| Central | 22 | 23 | 29 | 29 | 34 | 29 | 28 |
| Western | 30 | 29 | 23 | 43 | 62 | 33 | 29 |
| Coast | 20 | 30 | 30 | 39 | 46 | 60 | 35 |
| South Western | 43 | 22 | 29 | 29 | 27 | 50 | 29 |
| South Eastern | 22 | 30 | 25 | 33 | 43 | 60 | 34 |
| Inner Northern | 51 | 26 | 26 | 29 | 34 | 34 | 29 |
| North Eastern | 46 | 31 | 34 | 33 | 57 | 51 | 36 |
| Northern | 91 | 82 | 51 | 61 | 71 | 80 | 59 |
| Hills | | 46 | 58 | 43 | 59 | 155 | 52 |
| Southern | 36 | 43 | 39 | 44 | 60 | 54 | 44 |
| All Regions | 32 | 29 | 35 | 39 | 47 | 59 | 38 |

**Median Time on Market, Location and Number of Main Rooms**
**Source: Author**
**Table 4**

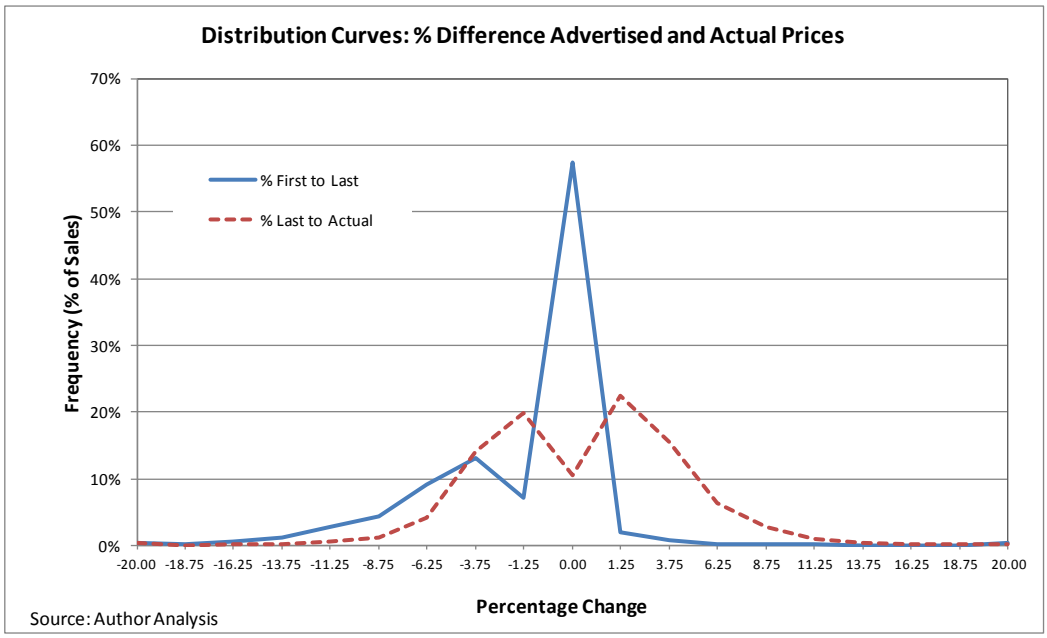



**Median Time on Market, Location and Number of Main Rooms**
**Source: Author**
**Figure 6**

**Percentage change First Advertised Price to Last Advertised Price and Last Advertised Price to Final Sale Price**

The next step in the analysis considered the changes that occurred to advertised prices over the marketing period. Two measures are used; first the difference between the first to last advertised prices and second the difference between the last advertised price and the final sale price. Thus the analysis considers how the advertised prices change over the marketing period and how close the advertised price is to the actual sale price. The distribution of the percentage difference in these two measures is shown in Figure 7. The distribution is based on groupings of outcomes in 2.5% bands plotted at the group midpoints but with 0% shown as a specific group. The chart shows that 57% of properties had no change between the first and last advertised price over the marketing period. Only a very small number of properties (3.8%) had a final advertised price higher than the first advertised price, while 38.8% had the price lowered after the first advertisement with most of these (20.2%) seeing a reduction in advertised price of 5%; some 5% of properties had a 10% or more reduction.

The final sale price was equal to the last advertised price 10.5% of the time, with 48.6% being above the indicated marketing price and 40.8% below. Most of this will be due to the use of price ranges in the advertising. Agents are permitted to advertise within a 10% price range and for the purposes of this research the midpoint of the range is used as the indicative advertised price. On this basis most properties that sell within plus or minus 5% of the advertised price will have sold within the price range. In total, 82.4% of sale prices were within plus or minus 5% of the last advertised price; 6.8% sold for less than 5% below the last advertised price and 10.8% sold for more than 5% above the last advertised price.




**Distribution Curve: Differences between Advertised Prices and Final Sale Price**
**Source: Authors**
**Figure 7**

The mean percentage change in first to last advertised price by dwelling type and location is shown in Table 5.

| Region | Dwelling Type | | | All Dwelling Types |
|---|---|---|---|---|
| | Detached | Semi-detached | Home units | |
| Central | -1.80 | -3.43 | -1.33 | -1.82 |
| Western | -2.37 | -1.55 | -1.91 | -2.16 |
| Coast | -2.00 | -2.10 | -1.09 | -1.64 |
| South Western | -1.69 | -1.13 | -1.35 | -1.52 |
| South Eastern | -1.79 | -0.87 | 3.86 | -1.01 |
| Inner Northern | -0.62 | -2.20 | -1.89 | -0.94 |
| North Eastern | -2.08 | -2.62 | -1.98 | -2.08 |
| Northern | -2.82 | -2.75 | -2.18 | -2.78 |
| Hills | -2.78 | | | -2.78 |
| Southern | -1.80 | -1.05 | -1.52 | -1.79 |
| All regions | -2.09 | -2.18 | -1.40 | -1.98 |

**Mean Percentage Change in First to Last Advertised Price, Dwelling Type and Location**
**Source: Authors**
**Table 5**

For the three month period of this study the difference between first and last advertised price for most dwelling types is less than 3% (Table 5). Home units, overall, show the smallest mean

(-1.40%) difference with semi-detached the largest (-2.18%). Across most locations and for each dwelling type, there is a universal decrease, albeit sometimes very small, between first and last advertised price. However one location does stand out. In the south east, the final advertised price for home units has increased by almost 4.0%. On the other hand, the greatest discounting in advertising has taken place for detached dwellings in the more remote northern area (-2.82%), the somewhat atypical hills region (-2.78%) and for relatively expensive semi-detached dwellings in the city centre (-3.48%).

**Percentage change Last Advertised Price to Final Sale Price, Dwelling Type and Location**

Overall final sale prices show the greatest difference to last advertised price for semi-detached dwellings, -0.43% compared to detached which sell for 0.33% more (Table 6). Even across individual locations, the final sale price for detached dwellings is never more than 1.6% above last advertised price. Differences are particularly small on the coast, the inner north and the hills region. Semi-detached dwellings show greater variation with final sale price being discounted most along the coast; up to -4.5% lower than last advertised price. This is consistent with the drop between first and last advertised price for this dwelling type. Overall home units sell very close to advertised price with a difference of only 0.14%. However, some locations show a larger difference, such as the high status south east, which shows a higher final sale price of 2.34%, and the north which shows a lower final sale price of -2.02%. In the south east, south west and central areas, final sale price is higher than advertised price for every dwelling type. Alternatively in the north, an area of major subdivision and government subsidized renewal areas, and along the coast, where price expectations tend to be high, final sale price is lower for every dwelling type.

| **Region** | **Dwelling Type** | | | All Dwelling Types |
|---|---|---|---|---|
| | Detached | Semi-detached | Home units | |
| Central | 1.41 | 1.30 | 1.24 | 1.33 |
| Western | 0.28 | 0.93 | -0.59 | 0.06 |
| Coast | -0.14 | -4.51 | -0.23 | -0.52 |
| South Western | 1.55 | 0.41 | 1.09 | 1.29 |
| South Eastern | 1.44 | 1.73 | 2.34 | 1.56 |
| Inner Northern | 0.10 | 0.09 | -1.25 | -0.12 |
| North Eastern | 0.62 | -.49 | 0.85 | 0.61 |
| Northern | -0.99 | -1.81 | -2.02 | -1.08 |
| Hills | 0.12 | | | 0.12 |
| Southern | 1.03 | -0.43 | 0.27 | 0.98 |
| All Regions | 0.33 | -0.43 | 0.14 | 0.26 |

**Mean Percentage Change in Last Advertised to Final Sale Price, Dwelling Type and Location**
**Source: Authors**
**Table 6**

**Statistical Analysis**

The final stage of the analysis was to test the relationship between time on market in days, location, dwelling type and dwelling size. For this a Cox proportional hazard regression was used (McGreal et al 2009). In the model, TOM is the dependent variable with independent variables being year of

construction, two types of wall construction (as dummies), six categories of number of main rooms (as dummies), 10 regions (as dummies) and three dwelling types (as dummies). Following McGreal et al (2009) a time constraint of 199 days was imposed. The statistical analysis involved testing for a significant difference between TOM for the three dwelling types based on the descriptive analysis which showed that home units had both the smallest first to last advertised price difference (Table 5) and the smallest last advertised to final sale price difference (Table 6). Table 7 shows the results of the regression using separate dummy variables as described above.

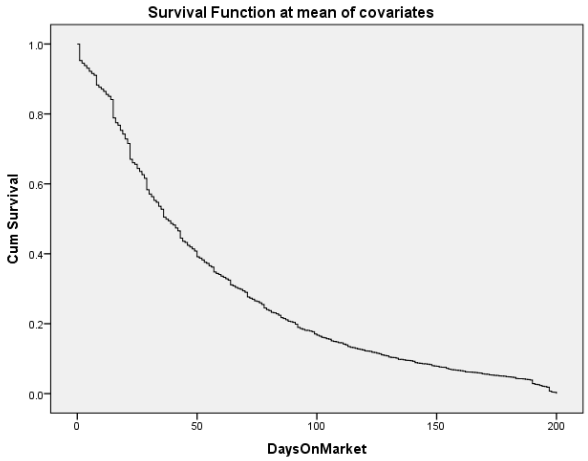
| **Variables in the Equation** | | | | |
|---|---|---|---|---|
| | B | Wald | Sig. | Exp(B) |
| Yearbuilt | -0.004 | 32.83 | 0 | 0.996 |
| Stone Wall | 0.091 | 2.385 | 0.123 | 1.095 |
| Timber Framed Wall | 0.219 | 0.687 | 0.407 | 1.245 |
| Rooms 1 to 3 | -0.075 | 0.724 | 0.395 | 0.927 |
| Rooms 4 | | 51.769 | 0.000 | |
| Rooms 5 | -0.081 | 2.049 | 0.152 | 0.922 |
| Rooms 6 | -0.165 | 6.870 | 0.009 | 0.848 |
| Rooms 7 | -0.300 | 17.295 | 0.000 | 0.741 |
| Rooms 8 or more | -0.433 | 33.817 | 0.000 | 0.649 |
| Hills Region | | 99.680 | 0.000 | |
| Central Region | 0.526 | 16.022 | 0.000 | 1.692 |
| Western Region | 0.382 | 8.768 | 0.003 | 1.465 |
| Coastal Region | 0.383 | 8.580 | 0.003 | 1.467 |
| South Western Region | 0.565 | 18.400 | 0.000 | 1.759 |
| South Eastern Region | 0.461 | 11.314 | 0.001 | 1.586 |
| Inner Northern Region | 0.566 | 17.697 | 0.000 | 1.761 |
| North Eastern Region | 0.422 | 10.951 | 0.001 | 1.525 |
| Northern Region | 0.085 | 0.463 | 0.496 | 1.088 |
| Southern Region | 0.302 | 5.822 | 0.016 | 1.352 |
| Home Units | | 0.185 | 0.912 | |
| Detached | 0.026 | 0.179 | 0.672 | 1.026 |
| Semi-Detached | 0.025 | 0.085 | 0.771 | 1.025 |

Dependent Variable is TOM restricted to 199 days
Chi-square = 278.48 – Sig .000
2 Log likelihood = 60690.4

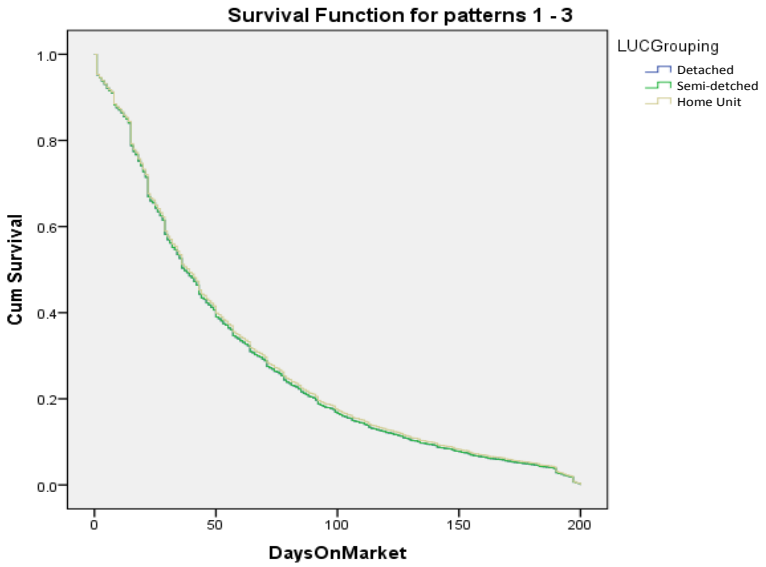
**Hazard Model**
**Source: Authors**
**Table 7**

The hazard model shows a statistically significant result showing that the various factors impact on the probability of properties being sold (not surviving) at various periods. When considering the various independent variables, the year of construction (year built) has a negative effect on the odds ratio, suggesting that newer buildings have on average a higher TOM although the effect is small. Dwellings types have no statistically significant variation (neither detached nor semi-detached houses show a significant deference to home units) when holding other variables constant. However there are large and significant variations in TOM due to variation in dwelling size. Compared to a dwelling of four rooms (indicator variable Rooms 4), dwellings of up to three rooms or of five rooms have a small negative coefficient suggesting a small increase in TOM (lower probability of survival at any given value of time) but this is not significantly different from four

room houses. However dwellings of 6 rooms or more all show negative coefficients that are significantly different to four room houses. Therefore holding other variables constant, dwellings of 4 rooms have the lowest TOM with dwellings of up to 3, or 5 rooms, slightly higher. Those of more than 5 rooms, however, have a progressively lower probability of survival at any given value of time. This suggests that the earlier cross-tabulation analysis, using single factors, is in fact showing relationships which are masked by other factors, most likely dwelling size and location.




**Cumulative Survival Function where TOM ≤ 199days**
**Source: Authors**
**Figure 8**



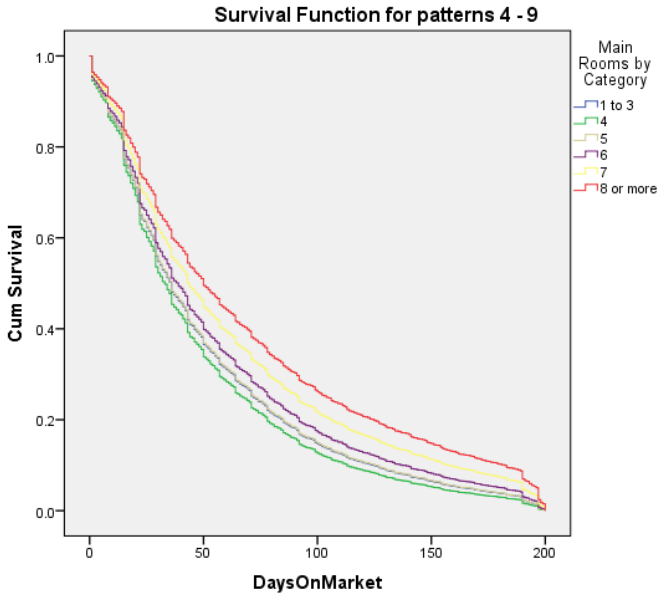

**Survival Function by Dwelling Type where TOM ≤ 199days**
**Source: Authors**
**Figure 9**

The survival function (Figure 8) relates TOM (DaysOnMarket) to the cumulative probability of survival by converting the predicted odds ratio to a risk factor at the mean point of the covariates. Unlike the survival chart shown previously, this chart is based on the predictions from the models and holds the covariates constant. The survival pattern is also plotted where single categorical

variables (converted to dummy variables sets in the model) are allowed to vary holding other variables constant.

Figure 9 shows the variation in the survival function for different dwelling types holding other variables constant. The three dwelling types; detached, semi-detached and home units have negligible variation in the survival function when other variables are held constant and the plot appears to overlap. By comparison Figure 10 shows the variation in survival function for different building areas based on number of rooms.

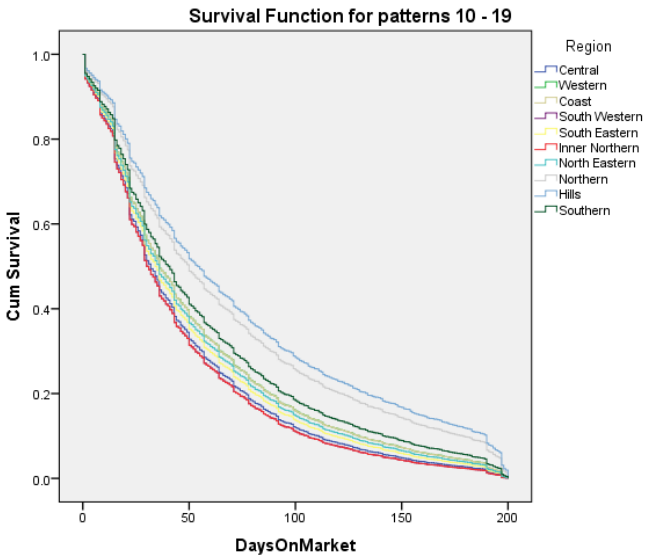
The steepest survival function is for 4 roomed houses suggesting that, on average and holding other variables constant, these properties will have the lowest survival at any number of days on market. Around 50% sell (.5 cum survival) in 30 days. Dwellings of 1 to 3 or 5 rooms approximate the same survival curve and this is marginally flatter. The survival curve become flatter as room size increases with dwellings of 8 or more rooms taking over 50 days to reach the .5 cumulative survival probability. The variation is highlighted at around 100 days where dwellings of 4 rooms have a cumulative survival of .13 (87% have sold) while only 73% of dwellings of 8 rooms or more had been sold (.27 cum survival).




**Survival Function by Number of Main Rooms Where TOM ≤ 199days**
**Source: Authors**
**Figure 10**

The survival chart in Figure 11 indicates the variation in survival rates in the various regions. The steepest curves belong to regions closest to the city centre, the inner region being the steepest followed by south western and inner northern regions only marginally flatter curves. The flattest curve is for the hills region which is only slightly flatter then the northern region. Notably the hills, northern and southern regions, all which are located furthest from the city centre, have the flattest curves. These differences result in dramatic changes in estimated survival and the number of properties expected to sell after a number of days on market. Approximately half of the dwellings in the inner region will have sold after 30 days compared to nearly 60 days in the hills region. The

analysis clearly indicates that after 100 days on the market some 90% of properties in the inner region would have sold compared to just over 70% in the hills.




**Survival Function by Region Where TOM ≤ 199days**
**Source: Authors**
**Figure 11**

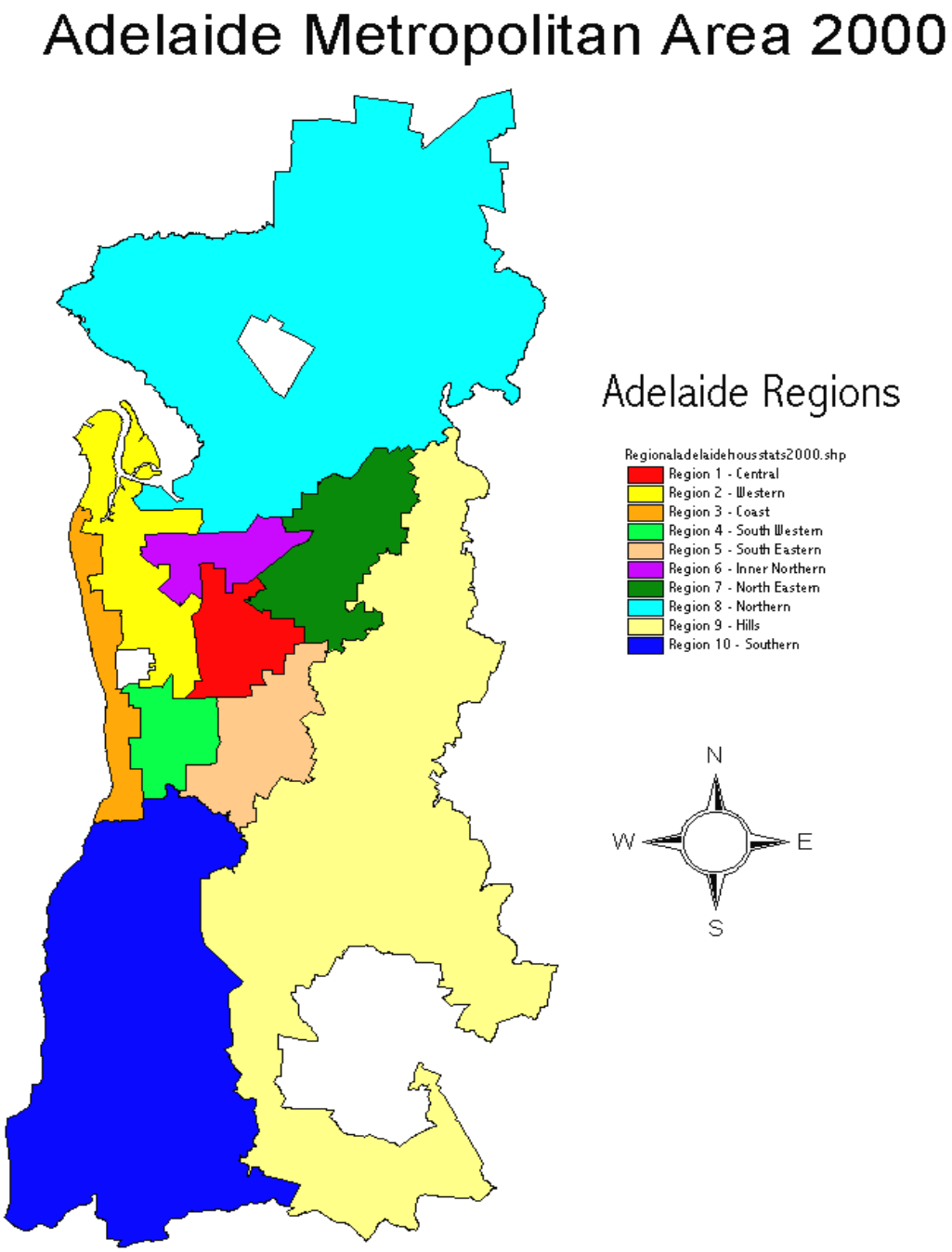
## CONCLUSION

This paper presents important results from the analysis of time on the market, changes between first and last advertised prices, and between last advertised prices and actual sale prices for residential property in Adelaide over a three month period. This paper makes a contribution to the understanding of TOM in that it is one of the few studies conducted in Australia and also one of the few examining the impact of location on TOM.

The hazard models which have been used support the proposition that, holding other variables constant, dwelling size together with location are major factors in determining the time on market. Generally, smaller houses located close to the city centre will have the shortest time on market while larger properties, particularly those in the hills, will have the longest time on market. Many of these hills properties will be highly unique and this trend for more unusual properties to have longer time on the market is supported by the literature (Haurin 1988, Jud et al 1996, McGreal et al 2009, Taylor 1999).

While the descriptive analysis appeared to support a relationship between dwelling type and time on market, the hazard model shows this to be superficial. In the hazard models, TOM appears to be fundamentally related to size of property and to location, whatever the dwelling type. If location and dwelling size are held constant, there is very little variation in TOM due to dwelling type. This is an important finding and suggests that factors, such as location and dwelling size, need to be held constant in any analysis of TOM over time.

**Adelaide Regions**
**Source: Authors**
**Figure 12**



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