

# **Impact of location on grocery prices and availability in regional Australia**

**(A submission to the ACCC grocery inquiry by the Bureau of Infrastructure, Transport and Regional Economics)**

## **Executive summary**

This paper draws on the Bureau of Infrastructure, Transport and Regional Economics' (BITRE) ongoing research into the spatial variation in the costs of living from the capital cities to very remote areas. BITRE's upcoming comprehensive publication will provide a more detailed analysis of the factors that impact on the full range of living costs across Australia. This submission includes some preliminary conclusions from the analysis of data on grocery prices collected for the main study.

The study confirms the view that grocery store prices vary widely across locations. It also finds the presence of a major chain in a town is a practical indicator of the price level of groceries in non-metropolitan centres. The major chain stores are more prevalent in larger population centres.

Although differences were apparent in specific locations, the overall price of groceries is very similar when the Coles and Woolworths samples are taken as a whole. Other (independent) stores appear to compete with the major chains on price in some locations, but more often appear to compete on service, variety and other service related factors.

Distance from substantive retail centres and the size of the local population are significant factors that impact upon price and availability of groceries in areas where there is no major chain store. Availability of supermarket items also varies with location and population size.

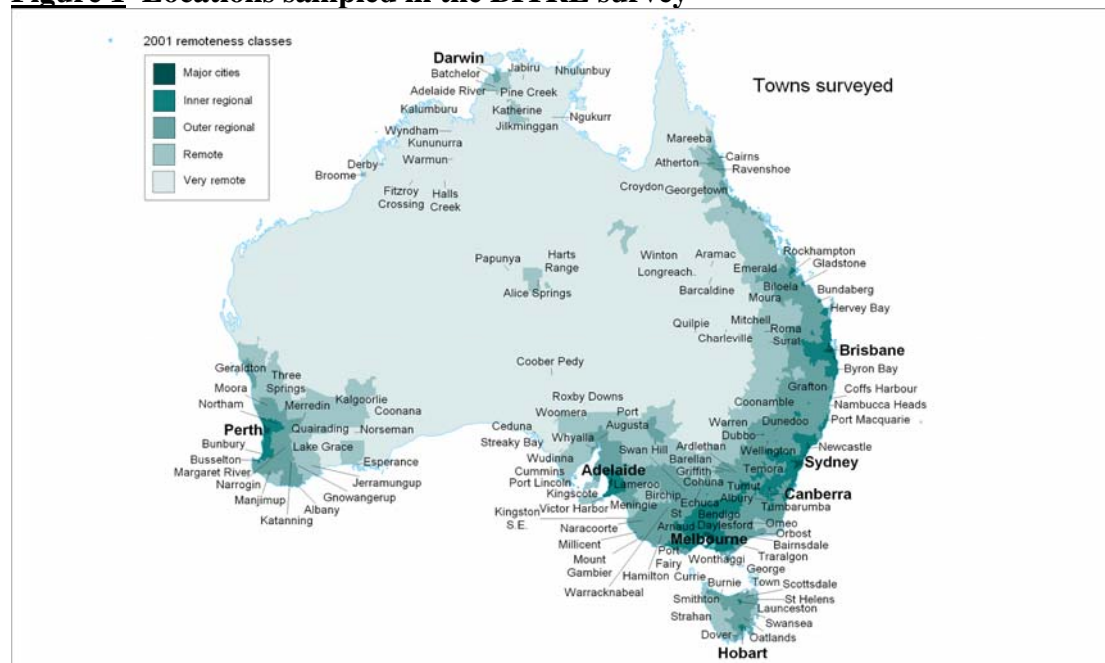
The highest prices and lowest availability of goods occur in Indigenous communities in Western Australia and the Northern Territory.

## Introduction

This paper provides a short overview of the patterns of grocery prices and availability of groceries in different locations across Australia. It provides a preview of the more comprehensive spatial analysis of the cost of living being undertaken by the Bureau of Infrastructure, Transport and Regional Economics (BITRE).<sup>1</sup>

For this paper, BITRE has constructed price and availability indices of food and non-food supermarket products from data directly recorded in 236 supermarkets in 132 locations across Australia (see [Figure 1](#)). Prices were collected throughout 2005 and 2006 and standardised to reflect prices in June 2006. The collection list for supermarkets contained over 200 food items and over 50 non-food grocery items, mostly personal care and cleaning products. Additionally, prices of items found in grocery stores such as stationery were collected, but have not been analysed here.

**Figure 1** Locations sampled in the BITRE survey



Source: BITRE, 2008. ABS, 2001 Census of Population and Housing.

The goods used in this analysis are items typically bought in supermarkets and represent approximately 16 per cent of total household expenditure.<sup>2</sup> The non-food groceries category includes tobacco products (predominantly cigarettes), household cleaning products, medical items such as bandaids and paracetamol and personal care

<sup>1</sup> This paper draws on data collected by BITRE for its cost of remoteness project and represents an initial analysis of the data with a focus on supermarkets. It examines an important subset of the overall cost of living. The full study will take a more holistic approach to the comparative cost of living in metropolitan and non-metropolitan, rural, regional and remote areas of Australia. The analysis tests a number of commonly held assumptions about regional prices, such as the widely held belief that prices are directly related to transport costs and/or competition or that retail prices in regions are balanced by cheaper costs for other items, such as housing. BITRE's full analysis of these issues will be released in the second half of 2008.

<sup>2</sup> Based on the ABS 2003-04 Household Expenditure Survey.

items such as soap and toothpaste. Alcohol has been excluded due to restrictions on supermarket sales in some areas.

BITRE calculated an overall supermarket index using prices of the food items (75 per cent of the index) and non-food grocery items (25 per cent of the index). Separate price indices for the two sub-categories were also calculated. Average household expenditure figures from the Australian Bureau of Statistics' (ABS) 2003-04 Household Expenditure Survey (HES) were used to weight the items. The base index (100) was set on the basis of the mean price of items from all store types in all capital cities.

BITRE chose its survey locations to ensure a wide coverage of variables such as population, industry, income, distance from the capital city and distance from large regional centres.

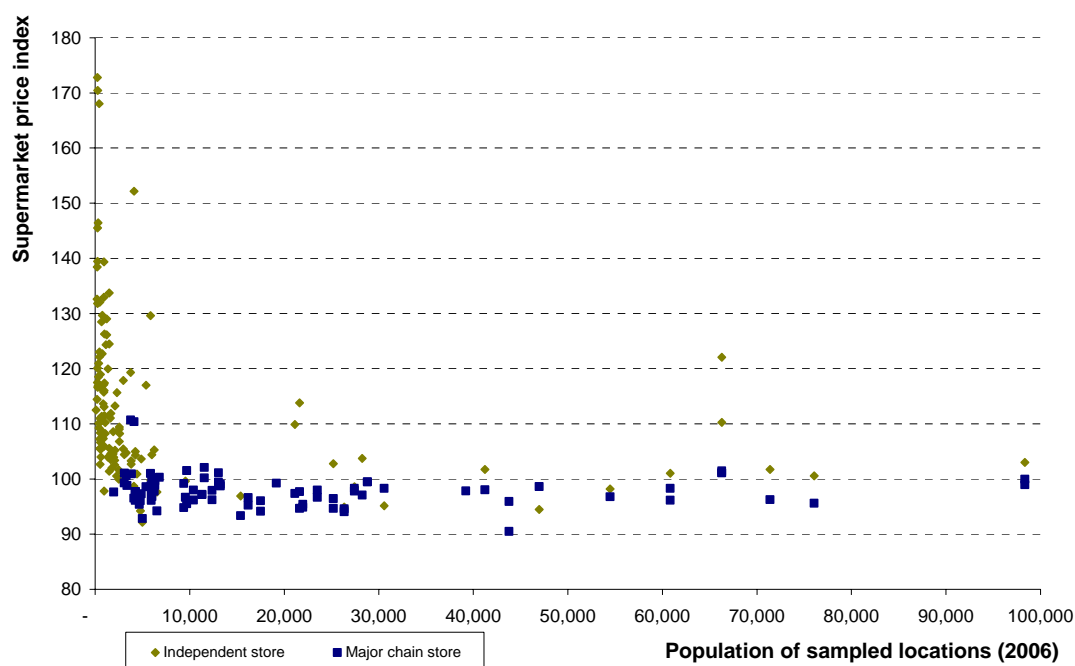
### **Overview of population and remoteness as drivers of price**

BITRE initially applied broad statistical significance tests to the supermarket data to estimate the importance of location, type of store and the type of grocery on the value of supermarket indices. These indicated that values of supermarket indices were largely dependent upon the location of supermarkets and types of expenditure. It was found that location is the overwhelmingly important factor in determining price. The following analyses attempt to tease out some of the factors associated with location.

It is commonly held that the population of a town or city and/or the distance from the major cities are key location-related factors determining price. In particular the importance of remoteness and associated transport costs are quoted as reasons for higher prices in small, distant locations.

Figure 2 illustrates the relationship between the supermarket index and the location's population as measured at the 2006 census in all the sampled grocery stores. The price indexes of the major chain supermarkets and independent stores have been identified separately.

**Figure 2: Grocery stores by supermarket index and population, locations under 100 000 (2006)**



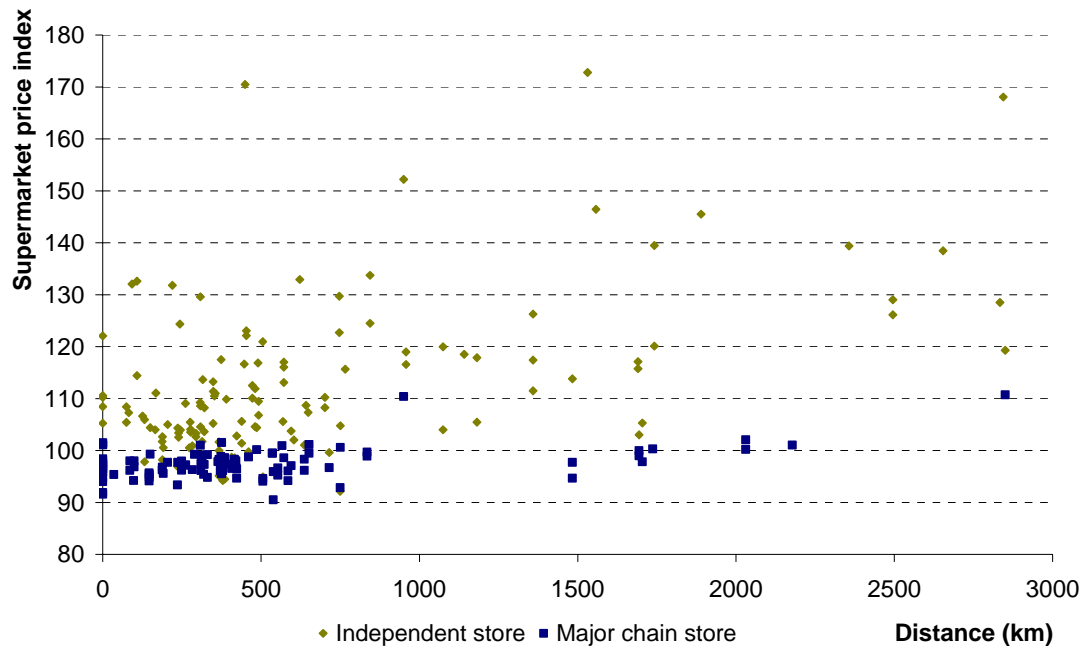
Note: The index base of 100 corresponds to the simple average of prices recorded in all stores in all capital cities. Source: BITRE, 2008; ABS, 2006 Census of Population and Housing.

It is clear from this graph that there is a distinct relationship between price levels and population size. However, with three or four exceptions, higher index values are almost all confined to locations with less than 5000 people. The supermarket index tends to stabilise in locations with populations above 3 000 to 4 000. This suggests that there may be a particular population threshold below which prices are higher rather than a consistent arithmetic relationship between price levels and the size of the local population. All but one of the major chain stores sampled was in a town with a population of more than 3 000 people. However in 2008, 35 major chain stores were located in an urban centre with populations between 1 500 and 3 000. This is 15 per cent of towns in this population range.

Even when there are stores with higher prices in more populated areas, there is often a store with lower prices in the same location. This suggests that there may be competition in these locations that is based on aspects of service rather than price.

Figure 3 examines the distribution of the supermarket price index with respect to the distance of the store from the capital city of the state in which it is located. Those stores that are associated with a major chain (that is, Woolworths or Coles) have been identified separately from independent grocery stores.

**Figure 3: Grocery stores by supermarket index and distance from capital cities**



Source: BITRE, 2008.

The distribution in this case is much less clear cut. Whilst there seems to be some positive relationship between distance and price it is much less distinct, with many stores relatively close to capitals having relatively high prices whilst others that are quite distant having relatively low prices. In general the major chains have a reduced range of prices compared to the independent stores.

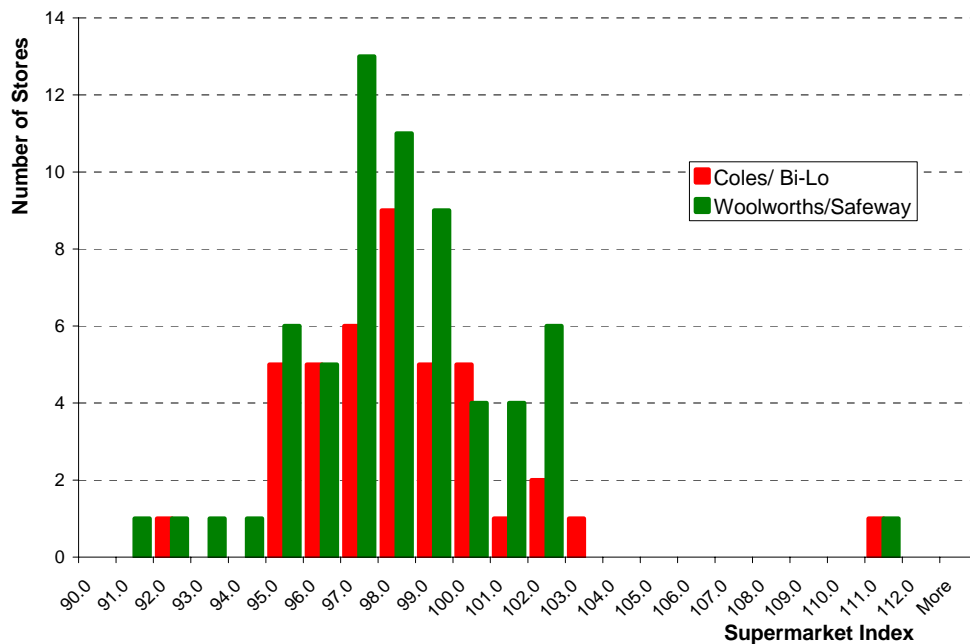
As illustrated in [Figures 2 & 3](#), price variability results from a range of determinants. The next sections seek to explore some of the factors, including population, ownership/affiliation, distance from other centres and competition in more detail.

### **Comparison of major retail chains**

BITRE's aggregated supermarket price index enables the comparison of individual stores. [Figure 4](#) illustrates the frequency distribution of the index for all Coles/Bilo and Woolworths/Safeway supermarkets sampled across the country – noting that only one of each type of store was sampled in each centre – even in the capital cities.

Sixty three Woolworths (of the 777 Woolworths stores in Australia in 2008) and forty one Coles/Bi-Lo stores (of 758 stores) were sampled by BITRE. Based on this sample, the mean value of the supermarket index for Woolworths chain stores was 97.5 and the mean of the Coles stores sampled was 97.7. The two chain mean prices are not significantly different at the 0.95 level of confidence.

**Figure 4 Supermarket index values for Coles/Bi-Lo & Woolworths stores**



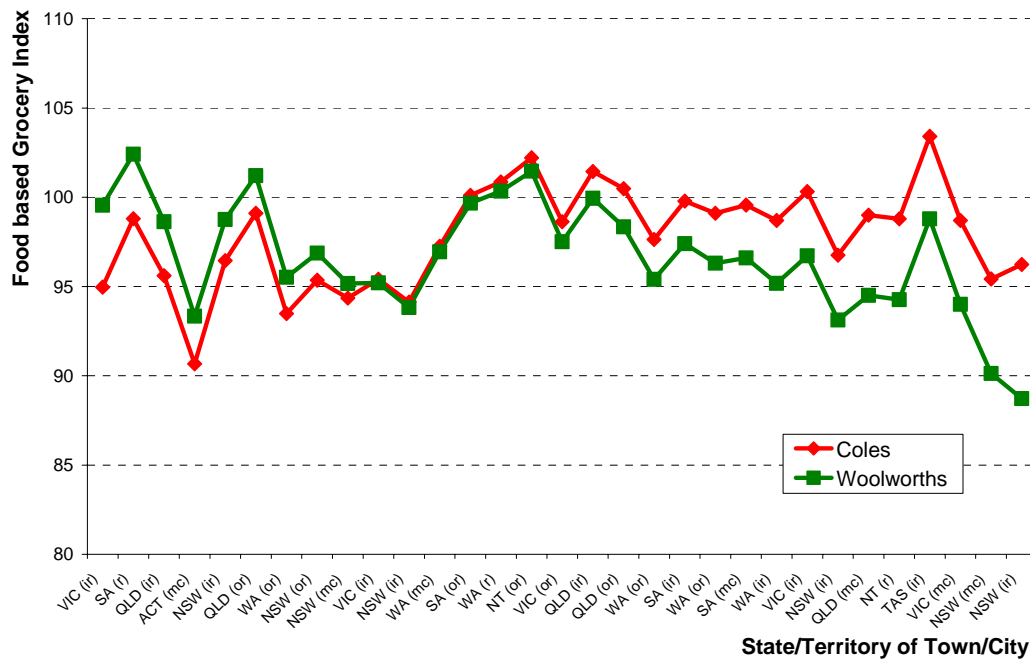
Source: BITRE, 2008.

Figures 5 to 7 provide illustration of data where both Coles and Woolworths were sampled in the same location. They show the relative price indices of the 31 pairs of Woolworths and Coles stores where data was collected. The data has been ordered by the difference between the indices. The locations have not been named, but are distributed across all states as shown and all have populations of more than 4 000 people<sup>3</sup>.

Figure 5 shows the food index, which includes a large range of food items purchased in supermarkets. Sampled Coles stores had a slightly lower index in nine centres and had an overall average index value of 97.8. Woolworths was cheaper in 22 locations and had a lower average value of 96.6. A paired t-test revealed that this difference was significant at the 0.95 level of confidence.

<sup>3</sup> This data was collected with the consent of the stores on the condition that individual stores would not be identified in the analysis.

**Figure 5 Food groceries: comparative indices for Woolworths & Coles stores in the same town/city**

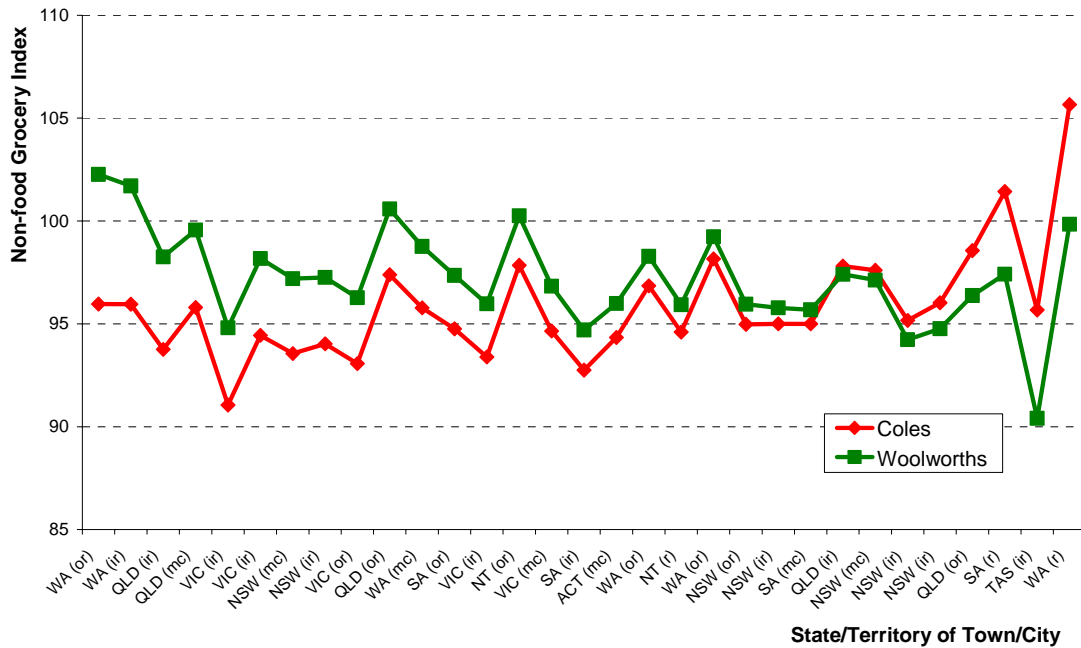


Remoteness class of town/city: mc = major city; ir = inner regional; or = outer regional; r = remote.  
 Source: BITRE, 2008.

Figure 6 sets out the same pairings but for non-food groceries (mostly personal care items, cleaning products, non-prescription medicines etc). In this case the Woolworths average index value (97.2) is slightly higher than the Coles average index of 95.8. Woolworths had a lower index in eight locations while Coles had a lower index in 23 locations. Again, the difference between the means was significant at the 0.95 confidence level.

Results presented in Figures 5 & 6 suggest that the chains have slightly different pricing strategies on food and non-food grocery items. However, the difference in the prices is not large for either category and despite being statistically significant, on average the prices only differ by just over one per cent in each category. This is much less than the size of the variation from location to location.

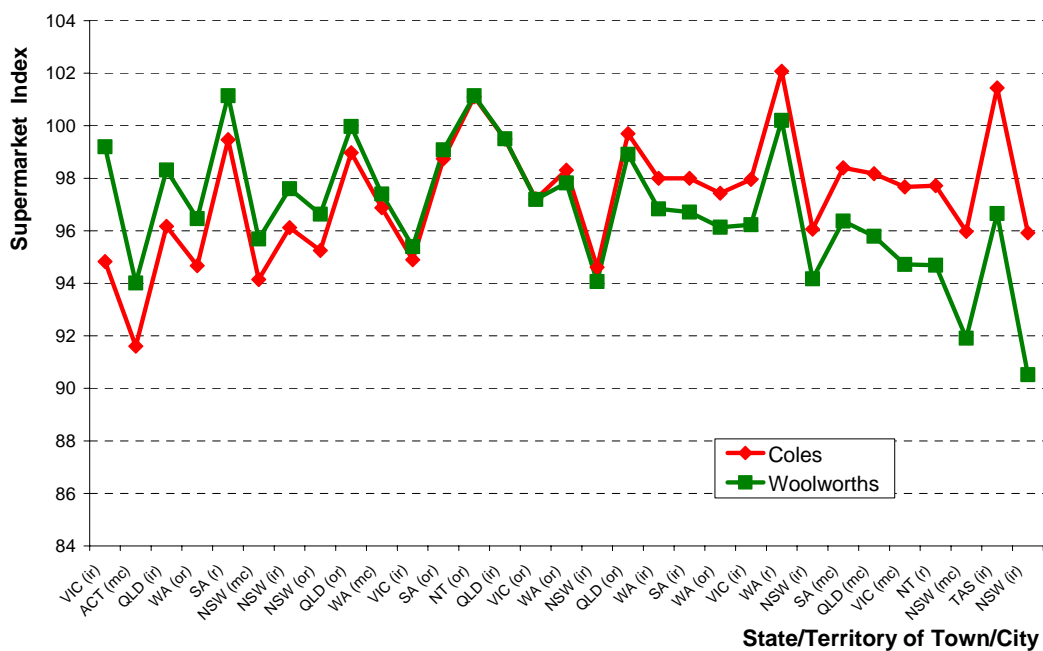
**Figure 6 Non-food groceries: comparative indices for Woolworths & Coles Stores in the same town/city**



Remoteness class of town/city: mc = major city; ir = inner regional; or = outer regional; r = remote.  
Source: BITRE, 2008.

The cost of these different categories may be of less significance than the combined price level of all groceries particularly when transaction costs are considered. This comparison, as shown in Figure 7, illustrates that the overall difference in sampled prices between the chains is only 0.5 per cent. This difference was not significant at the 0.95 confidence level.

**Figure 7 All groceries: comparative indices for Woolworths & Coles stores in the same town/city**



Remoteness class of town/city: mc = major city; ir = inner regional; or = outer regional; r = remote.  
Source: BITRE, 2008.



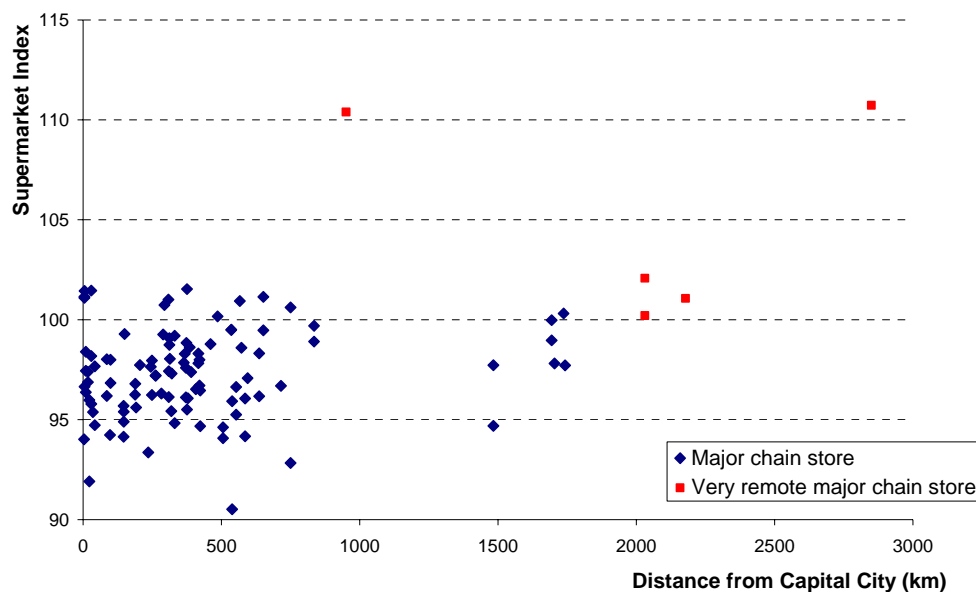
## Major Chains and the impact of distance

The previous section compared the two major chains and found little difference between them in the overall price levels. However, for regional residents the question of pricing consistency within the chains is often asked. That is, how much do the prices of the same chain vary between locations?

Figure 8 graphs the supermarket price indices for Coles and Woolworths stores and their distance from their respective state capitals. Note the range of index values (91.9 to 101.5) at a short distance from the capitals. Most stores remain within this range even when the store is 2000 kilometres or more from the capital. There are two notable outliers with index values above 110. These, along with the other three stores marked in red, are located in extremely remote regions in the northwest of the country and are serviced over particularly long distances (and/or by sea).

Apart from these examples of extreme remoteness, the indices for the major chains are responsive to distance, although this responsiveness appears to be weak. In fact, the cheapest store is over 500 km from its capital and over 300 km from a nearer capital in an adjoining state.

**Figure 8** The Effects of Distance on Prices Charged by Major Chains



Source: BITRE, 2008.

At this stage of our research, the reasons for the lack of responsiveness to distance is not clear, although it is consistent with the observations of BITRE's data collection team that larger chains often maintain the price of a large number of items regardless of the location. The business reasons for this are not understood.

The data presented in Figure 8 leads to a conclusion that, from the consumers' point of view, the presence of a major chain store in a locality is likely to provide groceries at price levels broadly similar to those obtained in similar stores in the capital cities.

## **Comparison of major chain stores and independent grocery stores**

In addition to surveying the major chains (Woolworths/Safeway and Coles/Bi-Lo), BITRE recorded prices at many independent grocery stores. Independent supermarkets are defined here as grocery stores other than Woolworths or Coles. Independents range from large discount stores such as Action and Franklins down to very small general stores.

Independents under many different banners were surveyed, including IGA, 4 square, Action and Foodworks. Aldi was not surveyed because the majority of items on the BITRE collection list were specific popular brands, while Aldi largely stocks its own house brands.

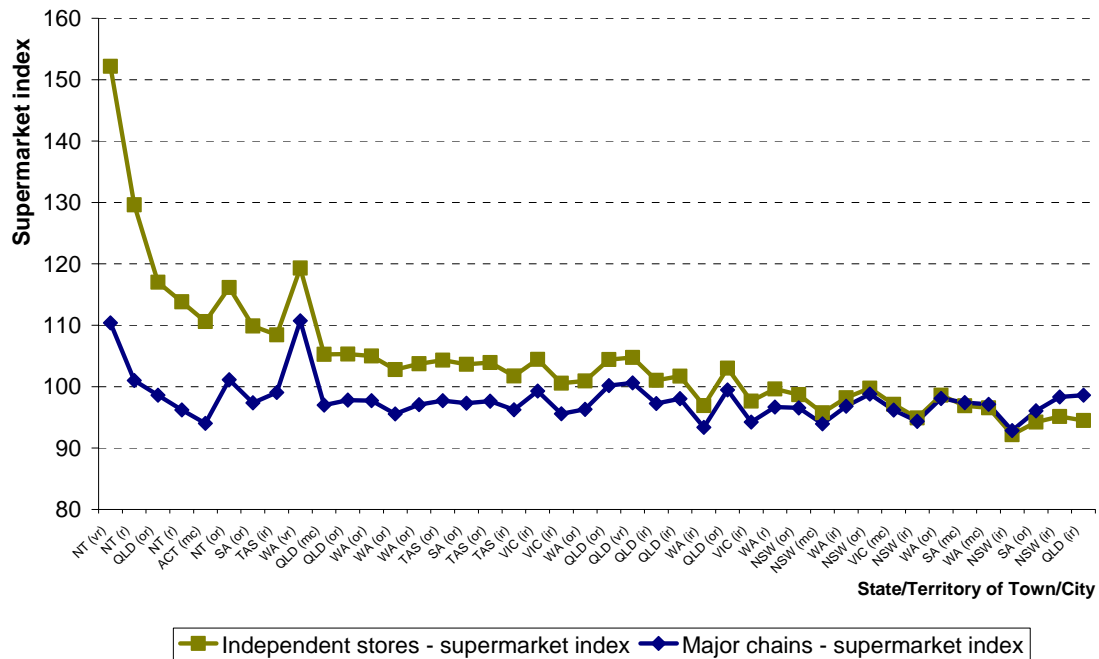
## **Location indices: major chains and independents**

The following examines the relationship between the supermarket index of independents and major chain stores by comparing the supermarket index for each store type in the same location.

Data graphed in [Figure 9](#) is ordered by the size of the absolute difference between the independent store index and the major chain store index in each location. While the major chain indices exhibit a narrow range of variability, the independents have a range of values from 94.5 to 152.2.

The major chain town index has a mean of 97.8, compared with the independent store town mean of 104.3. The difference between the major chain and independent store indices for the 42 locations is statistically significant.

**Figure 9 All groceries: comparative indices for independent and major chain stores in the same town/city**



Remoteness class of town/city: mc = major city; ir = inner regional; or = outer regional; r = remote, vr = very remote  
 Source: BITRE, 2008.

An important feature of this graph (and also a feature of Figures 5 to 7) is that the two indices associated with each town tend to track one another, when compared with other towns. Both indices within a town tend to be higher or lower, as compared with those of another town, despite the variation within pairs. For example, where the major chain index is high, the independent index tends to be high, and vice versa. This suggests that prices in all stores, whether they are Coles, Woolworths or independents, are influenced in a similar way by factors associated with particular locations.

In the collected price sample, there are ten independent store indices that are either lower than the major chain index for the same location, or are less than one percentage point above it. This suggests that based on our sample, the cost of buying groceries at the independents in about a quarter of towns with both types of stores is comparable to the cost of groceries in the major chains.

Clearly, independent grocery stores in some locations are able to compete with the major chains on price, with some even undercutting their competition. However, some independent supermarkets have indices which are greatly higher than the major chains, suggesting that they either cannot compete with them on price, or choose not to.

This does not mean that these independent stores are not competitive – in fact their continuing existence argues otherwise. Rather, it suggests that they may be competing in other areas such as service, variety, opening times, convenient local location and delivery.

Alternatively, the apparent differences in prices of the major chains and independents may result from more uniform pricing policies of the major chain which is implied by [Figure 9](#) which shows relatively consistent prices across regions. This is reflected in the small range resulting in a relatively flat “Majors” curve, compared to the larger range of the independents.

Regardless of the differences between the chains and the independents, consumers in towns with access to both types of stores have the advantage of choice, prices and associated services.

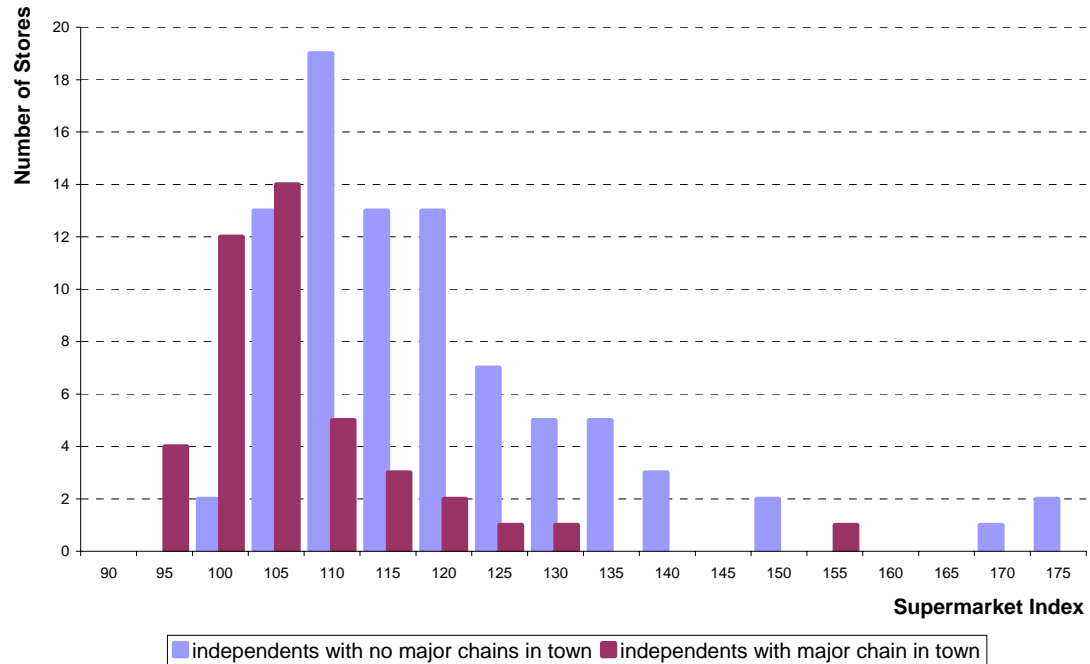
It is worth noting that large centres do not appear to be advantaged in terms of independent or major store pricing. The last ten locations represented on [Figure 9](#), (on the right hand side) show independent stores are cheaper or comparable to the major chain stores. These are drawn from a variety of location types. They include capital cities, four major centres of between 25 000 and 50 000 people, and three are towns with a population of around 5 000. The ten stores with the greatest difference between the index pairs where the independent index is higher (that is, the ten on the left) represent four capital cities, two centres of approximately 20 000 people and four towns between 3 500 and 6 000 people. This suggests that factors other than population size are important in determining the price set by these independent operators.

### **Comparison of independent grocery stores**

The independents shown in [Figure 9](#) operate in competition with a major chain supermarket, generally in larger centres. As is clear from [Figure 2](#), for many small towns independent stores are the only local source for groceries. In locations where there is no major retail chain operating, independents face either minimal competition, competition from another independent, or partial competition from stores in neighbouring towns. However, the overall market size is typically much smaller, so turnovers are likely to be constrained. Given the differences in market conditions, it is reasonable to expect pricing strategies of independents in smaller towns to differ from those located in larger, more competitive centres.

[Figure 10](#) shows the distribution of BITRE’s sample of independent grocery stores. The sample consisted of 85 independent stores without a major chain in the same location and 43 independent stores located with a major chain.

**Figure 10 All groceries: Frequency distribution of comparative indices for independents with and without major chains in the same town/city**



Source: BITRE, 2008.

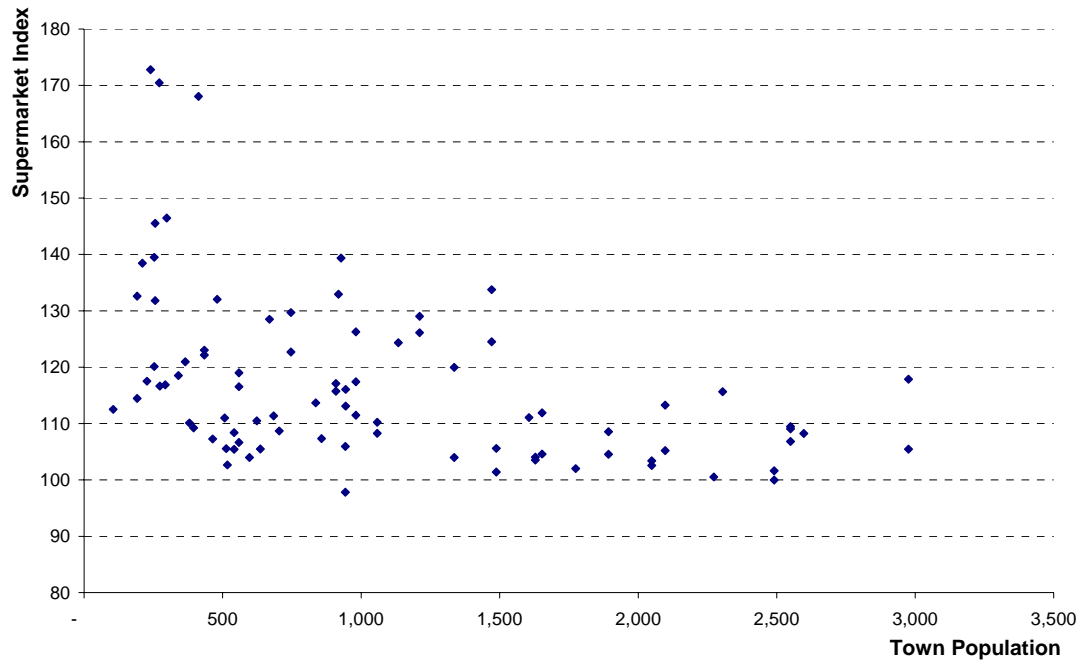
The level of prices observed in the independent stores was higher when there were no major retail chains present in that location. The mean supermarket index for individual independent stores where there is a major chain was 104.6, while the independents without a major chain co-located in the town had a mean index of 116.9. The two groups of independent stores are significantly different at the 0.99% level of confidence.

**Prices in locations without a major chain presence**

There is a wide range of prices in independent grocery stores with no chain store in town: the supermarket index ranges from 97.8 to 172.8.

Whilst it is reasonable to assume competition is important, a case could also be made that prices should be higher where populations are lower and hence turnover is lower. Further, higher transport costs of goods due to greater distance may force higher prices. Examination of population size and the independent supermarket index is presented in Figure 11.

**Figure 11** Independent supermarkets not in competition with a major chain: Supermarket Index and population size

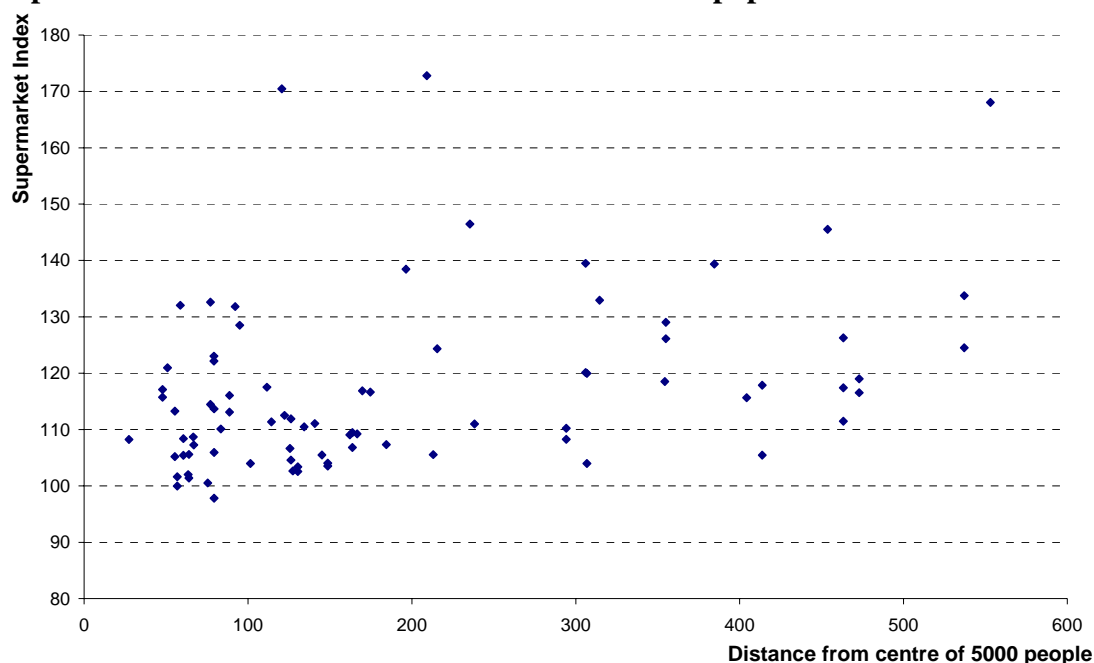


Source: BITRE, 2008. ABS, 2006 Census of Population and Housing.

The distribution of data in [Figure 11](#) suggests that the index has higher values in small locations, thus the relationship exists. The associated correlation coefficient between the two parameters is -0.44 indicating that although the relationship exists, it is not strong.

The relationship between the independent supermarket index and distance from a substantive population centre – characterised as being one with a population of 5000 people or more – is presented in [Figure 12](#).

**Figure 12 Independent supermarkets not in competition with a major chain: Supermarket Index and distance from a substantive population centre**



Source: BITRE, 2008.

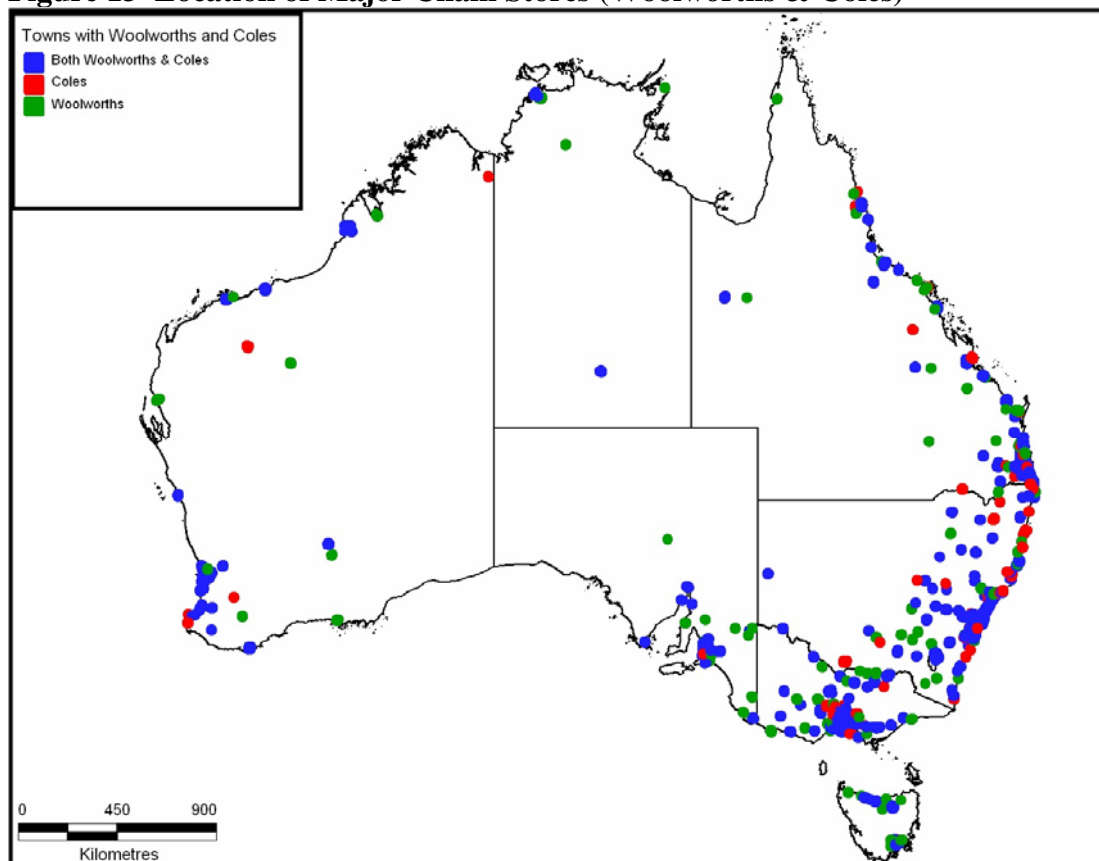
The link (this time positive) between price and distance from a significant sized centre is important. The correlation coefficient for this parameter and the supermarket index is 0.38.

The above suggests that distance and population are both likely to be significant factors in the prices in smaller and/or more remote communities. However, the low correlation coefficients indicate that other factors are involved. Further analytical work by BITRE is aimed at identifying and better quantifying these and other factors underpinning price differences.

### **Distribution of major chains**

The analysis so far indicates that the presence or absence of one or more of the major chains is a practical indicator of the price level of groceries in non-metropolitan centres. The map displayed at [Figure 13](#) shows the location of all Woolworths and Coles stores across Australia in early 2008. The location of the stores is clearly linked to population. They are clustered in the coastal, south eastern and south western parts of the continent. Larger inland centres such as Alice Springs, Mt Isa, Cloncurry, Roxby Downs, Newman, Tom Price, Kalgoorlie and Kambalda also have stores. Areas that have few stores include western Queensland, western NSW, the Eyre Peninsula, and the eastern and northern parts of the Western Australian wheat belt.

**Figure 13 Location of Major Chain Stores (Woolworths & Coles)**



Source: BITRE 2008 compiled from Woolworths and Coles web sites March 2008

The urban centres that have a major chain store contain 84 per cent of the total Australian population, noting that slightly more than 68 percent live in the major cities. Whilst some of those living outside urban centres with major chain stores are likely to live close enough to have convenient access, we would anticipate that a considerable number of the remaining 16 per cent (around half of non-metropolitan Australians) will either have to travel substantial distances or have no effective access.

The average price index of the independent stores available to this group of consumers is 116.9 compared to an average index of 97.6 overall for the major chains sampled. This represents an apparent average 20 per cent premium in prices, or more accurately, around 17 per cent when adjusted for population.

### **Availability of grocery goods by location**

The cost of living concept relates to both the cost to consumers of goods and services, and their availability. For many of the towns visited for the cost of remoteness project, availability of goods and services was an important practical imposition on consumers that could not be captured in the price difference between locations.

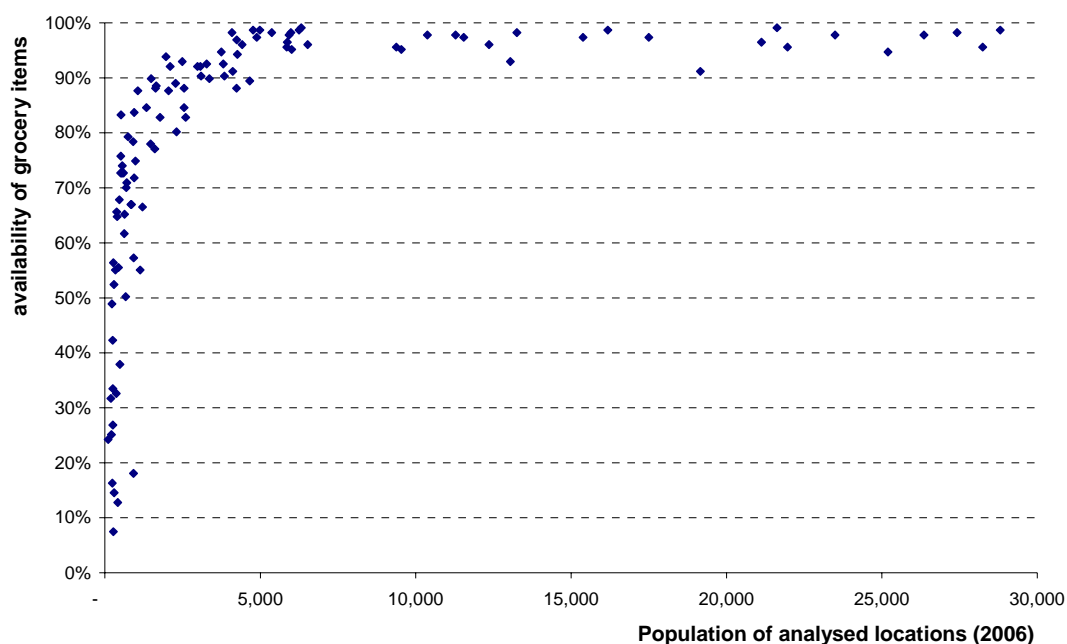
In order to measure availability of goods, BITRE used 227 items to determine an index of grocery availability, consisting of 182 grocery food items and 45 non-food grocery items on a collection list for all states and territories. This analysis is not limited to specific supermarkets but includes all stores visited in a specific centre in



which grocery items were collected. Consequently, it also includes supermarket style items even though they may not have been in a supermarket, but were available in other stores such as butchers and bakeries.

Figure 14 represents locations where data was collected, by population for towns under 30 000 population. Locations with populations above this limit all have availability index between 92 and 100.

**Figure 14 All groceries: availability of groceries for locations with populations of less than 30 000**

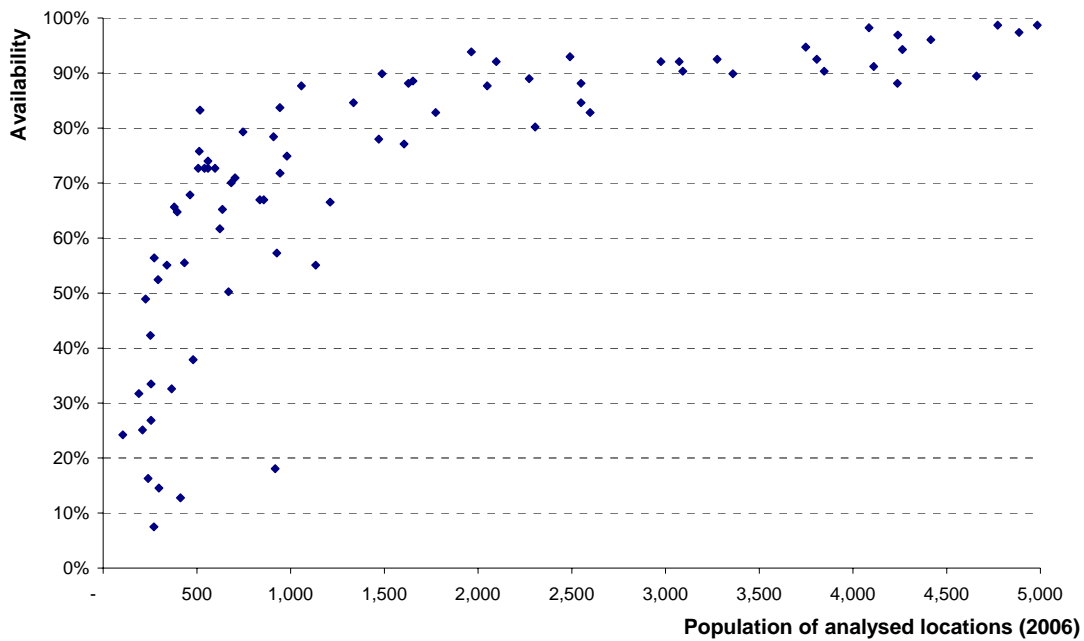


Source: BITRE, 2008. ABS, 2006 Census of Population and Housing.

In locations where a major chain supermarket was present, the availability index ranged from 88 to 100, with a mean of 96. In locations with no major retail chain, the availability index ranged from 7 to 93, with a mean of 63. In other words, a town with a major chain store invariably had a higher level of availability. In the BITRE sample, there was only one location with a population under 3 000 with a major chain supermarket.

Figure 15 illustrates locations in the sample with a population under 5 000. In centres with populations of around 1500 people and below, the local availability index in a significant proportion of towns drops dramatically. This requires further examination and it would be imprudent to assume that large falls in the index necessarily indicate a lack appropriate supplies. Issues such as cultural preferences for alternate goods or smaller packaging and the need to keep sufficient turnover to maintain current “Use by” dates may be relevant to the interpretation of these figures.

**Figure 15 All groceries: availability of groceries for locations with populations of less than 5 000**



Source: BITRE, 2008. ABS, 2006 Census of Population and Housing.

Data was collected in seven Indigenous communities in Western Australia and the Northern Territory. Each of these localities had one community store. Although these locations had some of the lowest levels of availability, the pattern of these locations generally fits with the overall pattern of less availability in smaller locations. The scope of the data collection, which restricted the items considered available to specific comparable product types and sizes, may also be a factor in these communities. It was reported to our field staff that these communities have slightly different consumption patterns, particularly in terms of product size, which may lead to some inherent underestimation of availability.

The data shown in the availability graphs (Figure 14 & 15) suggest that, as with price, availability across regions for grocery items is comparable provided that there is a major chain store. Where the major chains are absent, which tends to be the case in towns under 3 000, the availability of products quickly decreases with the population of a town.

## **Conclusions:**

The short analysis in this paper confirms that location is a key factor in the price and availability of supermarket items and leads to a number of observations regarding the distribution of supermarket prices across Australia.

1. Supermarket prices vary widely – BITRE has recorded supermarket indexes up to 91 per cent higher than the index for the lowest priced store.
2. With only two notable exceptions, the level of pricing in major chains does not appear to be contingent on the remoteness of the store or the population of the town in which it is situated.
3. The presence of a major chain store in a town is a noticeable factor in the overall level of prices within that town.
4. Up to half of Australia's non-metropolitan population is living outside a centre where they have ready access to a major chain store. The average price premium in stores in these locations is 17 per cent above the average major chain store.
5. Coles and Woolworths have very similar prices when the sampled stores are taken as a whole and all groceries are considered.
6. Independent stores appear to compete with the major chains on price in some locations, but more often compete on other factors such as variety, opening times and service.
7. Distance and population are significant factors that impact on price and availability in areas where there is no major chain store.
8. Availability of supermarket items also varies with location and with population size. Typically, availability is considerably lower in centres of less than 1500 people.
9. The survey has noted that some of the highest prices and lowest availability indices are associated with indigenous communities in WA and NT. It is not yet clear if these values are associated with these indigenous communities specifically or if they are simply a logical function of small population, remoteness and/or other factors.

BITRE's upcoming cost of remoteness study was primarily designed to examine how costs of living vary spatially, from the capital cities to very remote areas. This work is continuing and will provide a comprehensive analysis of the factors impacting on the full range of living costs across Australia.