



Australian Government

Department of Infrastructure and Regional Development

Bureau of Infrastructure, Transport and Regional Economics



International trade and Australian cities: what house prices say

At a glance

International trade

- Two thirds of the value of Australia's international trade flows through the four largest cities, Sydney, Melbourne, Brisbane and Perth.
- Sydney dominates Melbourne as Australia's major trading node due to the rise in the value of freight flowing through Kingsford-Smith Airport.
- Perth overtook Brisbane in 2001-02 to become Australia's third largest international trading node by value. The gap is steadily widening.
- The ratio of trade value flowing through city airports and sea ports is quite different. Kingsford-Smith and Perth Airports have about the same value of trade flowing through them as Port Botany and the Port of Fremantle. Tullamarine and Brisbane Airport contribute much less proportionally to the value of international trade flowing through Melbourne and Brisbane.
- The largest port group by value are the West Australian regionals that have seen the value of trade flowing through them grow fivefold in less than ten years. In 2012-13 a fifth of Australia's international trade value flowed through them. Regional ports of Queensland have been growing at a more subdued rate.
- Business travellers through city airports are used as a proxy for where the international trade in services is transacted. Nearly half of all international business travellers pass through the Customs gates at Kingsford-Smith and another quarter flow through Tullamarine. The major growth however, has been in the smaller cities in northern Australia particularly Darwin and the Gold Coast.

Locational value

- From 1980, when systematic records of average city house prices began to be kept in Australia, until 1996, cities tracked in a narrow band, rising and falling together. After 1997, prices not only began to rise rapidly but the locational value of cities measured by their relative house prices began to diverge.
- Of the capital cities, Perth and Darwin have seen the most growth with Melbourne and Sydney also growing strongly.
- Amenity cities saw particularly strong growth in their locational values from around 2000 until the Global Financial Crisis. Since then, most of these cities have come under periodic heavy selling pressure and prices have not returned to their pre Global Financial Crisis levels. This is in contrast to their United States counterparts that have largely recovered their pre Global Financial Crisis price trajectories.

- Australia's only city with a high proportion of Advanced Producer Services and low levels of international trade is Canberra. Like its international counterparts, its locational value has grown more slowly than the metropolises since the Global Financial Crisis.
- Inland cities more than 90 minutes' drive from capital cities have mostly grown more slowly than other cities.
- Values within the trade exposed Global Arc of Sydney and trade exposed parts of Melbourne declined more than the rest of these cities during the Global Financial Crisis but also recovered strongly and are now growing much faster than other areas of the cities.

International trade and locational value

- The shift in locational value to the north and west of Australia following the new direction of Australia's trade as noted at the continental scale in the first paper (BITRE Information Sheet 65) is confirmed at the city level in this paper.
- The relationship between international trade and locational value is tested mathematically for Sydney, Melbourne, Brisbane, Perth and Townsville. The results indicate that the relationship is strong in all cities but particularly so in the metropolises.

Introduction

This is the second paper to look at the relationship between changes in the volume and direction of international trade and the changing locational value of cities. Whereas Information Sheet 65 looked at the relationship at the continental scale in a number of countries comparable to Australia, this one focuses on the 41 cities in Australia with a population over 30,000.

It begins with a discussion of some recent developments in thinking of Australia's trade. In particular, it looks at how new measurements of value add increase the understanding of trade patterns.

To better understand trade flows at the regional level, Section 2 presents the value of international merchandise goods flowing through major airports and sea ports. It also shows trends in international business travel as a proxy for the trade in services.

In the third section, Australian house prices are examined in some detail including for the first time the presentation of a time series spanning 22 years for every city in Australia with a population above 30,000.

Section 4 looks inside Sydney and Melbourne to examine the proposition that the locational values of internationally exposed areas in these cities are growing more quickly than those that are less trade exposed.

Section 5 uses regression models to assess the strength of the relationship between locational values and international trade flows.

The paper concludes with some observations on the social, economic and infrastructure implications of changes in international trade and locational values.

Section I: Concepts in international trade

To introduce the discussion on international trade in Australia, three recent developments are summarised to inform the rest of the paper.

The first is a wide ranging and comprehensive assessment of Australia's international competitiveness prepared by McKinsey Australia for the Business Council of Australia. At the risk of over simplifying a comprehensive analysis, the report concluded that Australia was very competitive in agricultural products, less so in mining products, education and tourism and marginally competitive in financial services. The country was not currently competitive in other sectors.

While agriculture is spread across Australia, mining is not. The heavy lifting in Australian mining over the last decade has been done by Western Australian iron ore and Queensland coal. In other words, the nation's major exports are being produced in the north and west of the country and exported through ports in the north and the west.

Education and tourism are also industries where Australia is internationally competitive. The *2013 State of Australian Cities* showed that the international trade in education is strongly concentrated in capital cities in general and the centres of Sydney and Melbourne in particular. Likewise, the 2012 report showed that most visitor nights for international tourists were spent in capital cities in general and Melbourne and Sydney in particular. The 2012 report also showed that the other area where Australia is (marginally) competitive, Financial Services, is again concentrated in capital cities, particularly Sydney and to a lesser extent Melbourne.

This means that the location of Australia's international competitiveness outside agriculture is overwhelmingly concentrated to the north and west of Australia (regional Queensland and Western Australia) and the capital cities, particularly the metropolises of Sydney and Melbourne.

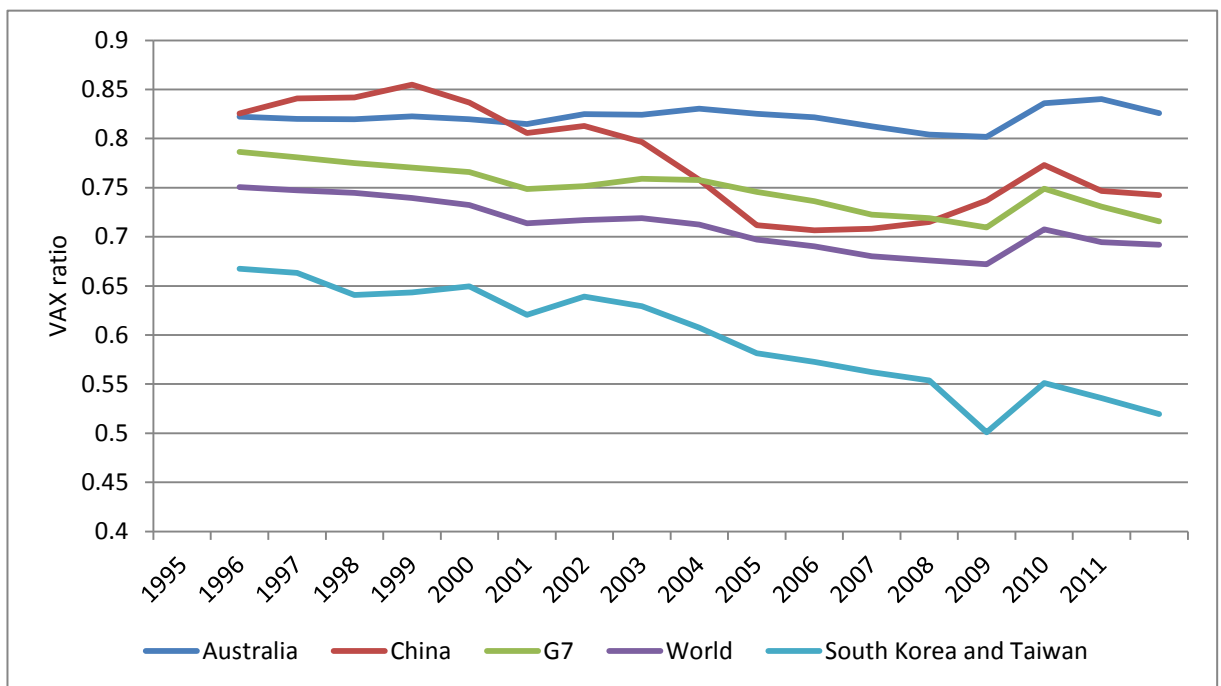
The second paper by Gerard Kelly and Gianni La Cava, recently published by the Reserve Bank, has provided new estimates for the value-add (called the VAX ratio) of Australian trade and is an important addition to the value estimates produced further below. The central thesis of this paper is that as trade costs fall and liberalisation increases, the production process becomes more internationally disaggregated. The production of an iPhone is perhaps the most well-known example. A myriad of vertically integrated design and production companies in a number of countries occupy very small parts of the production process and rely on high volumes

and small margins. Even though trade volumes are very high, the value-add for each trade is low (Xing and Detert 2010). This can lead to the seeming paradox of increasing trade and declining economic value of that trade.

This puts a different complexion on how international trade is valued. If for example, Australian iron ore is used to produce a refrigerator in China which is then shipped to a Department store in the United States, China could be seen as an intermediate country for Australia-US trade instead of a receiver country for Australian trade. So the direction of trade figures produced below need to be read with the understanding that, for example, Australia's trade is not just affected by what is going on in China. In other words, Australian iron ore is not just going into buildings in China but into a refrigerator destined for a kitchen in Seattle.

They go on to say that the value add to Australia's exports is relatively high by global standards for two reasons. The first is that because of the country's geographic isolation there are fewer intermediate steps in the production process requiring imports. The second is that the type of exports, mainly raw materials, also requires few VAX sapping intermediate inputs.

Figure 1: International VAX ratios¹ 1995-2011



Source: Kelly and La Cava 2014

This lack of segmentation explains why the VAX ratio has stayed relatively constant in Australia while it has fallen for key trading partners (Figure 1).

¹ VAX is the ratio of value added to gross exports

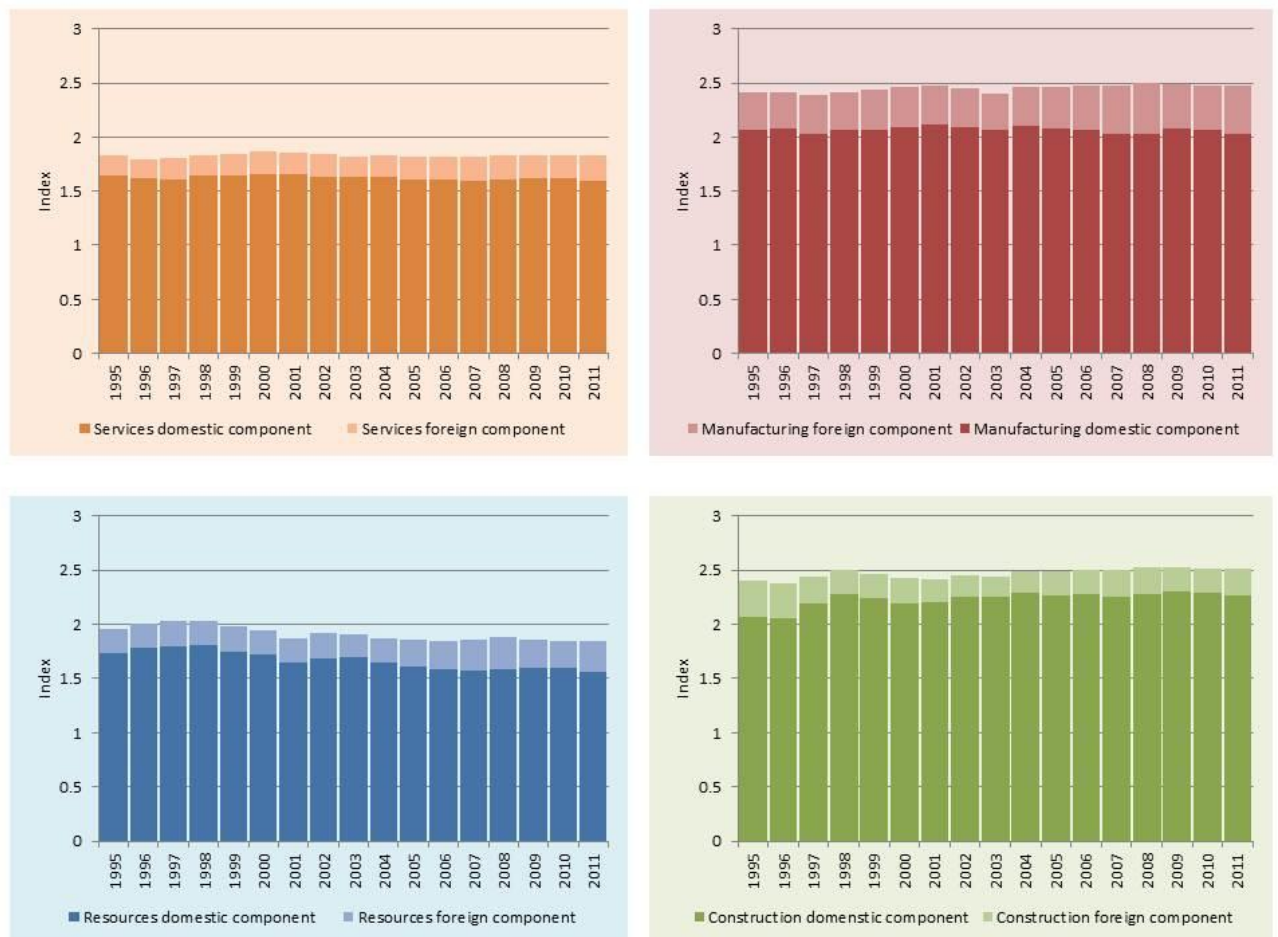
Table I: Australian VAX ratios by sector

Sector	Share of gross exports	Share of value-added exports	Difference (per cent)	VAX ratio
Manufacturing	37.6	18.9	-18.7	0.41
Resources	38.9	37.2	-2.7	0.77
Construction and utilities	0.2	3.1	2.9	11.93
Services	22.3	40.8	18.5	1.51
Total	100	100	0	0.82

Source: Kelly and La Cava 2014

When looked at sectorally in Table I, the larger value-add of the services sector becomes apparent as does the smaller value-add for manufacturing.

Figure 2: Fragmentation by major industry group 1995-2011



Source: Kelly and La Cava 2014

Figure 2 needs to be read in combination with Table I. What they are saying is that the raw values of exports (and by implication imports) may not be the same as the total value. If VAX is added or subtracted, manufacturing exports are not as valuable as the raw figures would suggest while services are more valuable. One of the main reasons for this (Figure 2) is because the manufacturing process is more fragmented, i.e. it has more value sapping stages, than that in the services or resources sectors.

As the world, including Australia, becomes more economically meshed, the production process will become increasingly fragmented, particularly in sectors of the economy that are trade exposed and where the human capital requirements are low. In Australia, human capital tends to decline with distance from the CBDs of large cities (SOAC 2012) and it seems likely that these areas will come under further pressure as Australia is

integrated further into the world economy. This may be part of the reason why, for example, there has been little, if any, net private sector employment growth in the manufacturing areas of western Sydney (SOAC 2013).

A way to integrate the two strands of the reports discussed above; Australia's competitiveness and increasingly internationally segregated production, is offered by Goldhar and Berg (2010). The central idea of this paper is that thinking in terms of industry types may distract from a focus on production processes. Many production processes are shared between industries. For example service industries try and reduce costs by adopting assembly line type processes traditionally used in manufacturing. The substitution of call centres for over the counter services is an example. Manufacturing industries try and become more like services with more customised product for an increasingly differentiated market by making short runs for discrete markets rather than the one size fits all that characterised the large production line based manufacturing of the twentieth century.

Many technologies are shared across industries. For example, programmable robots are used in manufacturing to make cars, in logistics to sort 'digitally wrapped' parcels and in the finance sector for teller services (ATMs). The implication is that it is production processes which are internationally traded rather than just goods and services. This suggests rather than thinking in terms of the industries where Australia is competitive, the thinking perhaps should be in terms of which production processes are internationally competitive.

Changes in Australia's industrial profile (described in the 2012 and 2013 State of Australian Cities reports) suggest that the goods and services that can be formatted into a production line process are those that are moving offshore and that those regions no longer internationally competitive are moving to non-trade exposed industries such as personal services.

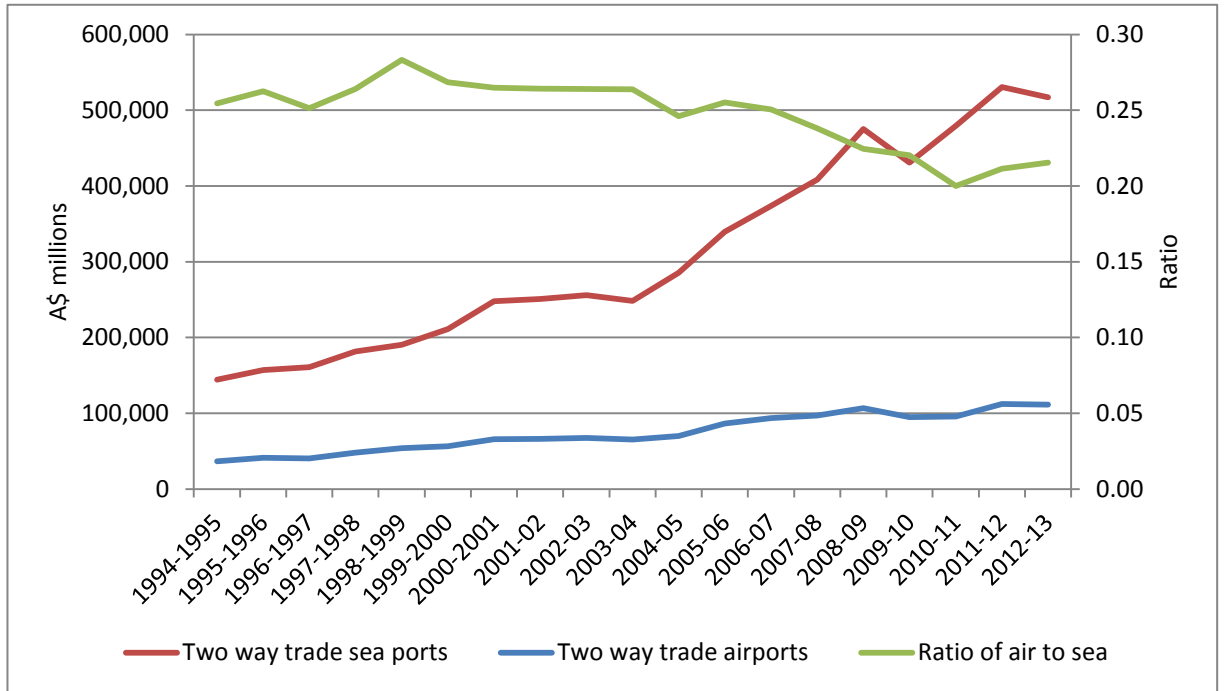
To summarise this section, the trade figures presented below need to be read with the understanding that while they are good indicators, they are only part of the story. Understanding VAX increases the ability to make an assessment of *where* the value of international trade is flowing but with the knowledge that we still have a very incomplete understanding of the geography of trade in Australia. Similarly, the knowledge that it is processes rather than industry sectors that are being integrated globally increases the understanding of which parts of the economy and which regions are being affected by the internationalisation of Australia's economy.

Section 2: The value of international trade flowing through Australia's sea and airports.

In Information Sheet 65, the value of Australia's international trade was presented at a national scale. To help understand where the major Australian nodes in the international trade network are located, this section presents data on the value of merchandise goods passing through Australia's sea and airports since 1994-95. It will then examine the flow of international business travellers through Australian airports as a proxy for where the international trade in services is occurring.

Trade in merchandise goods

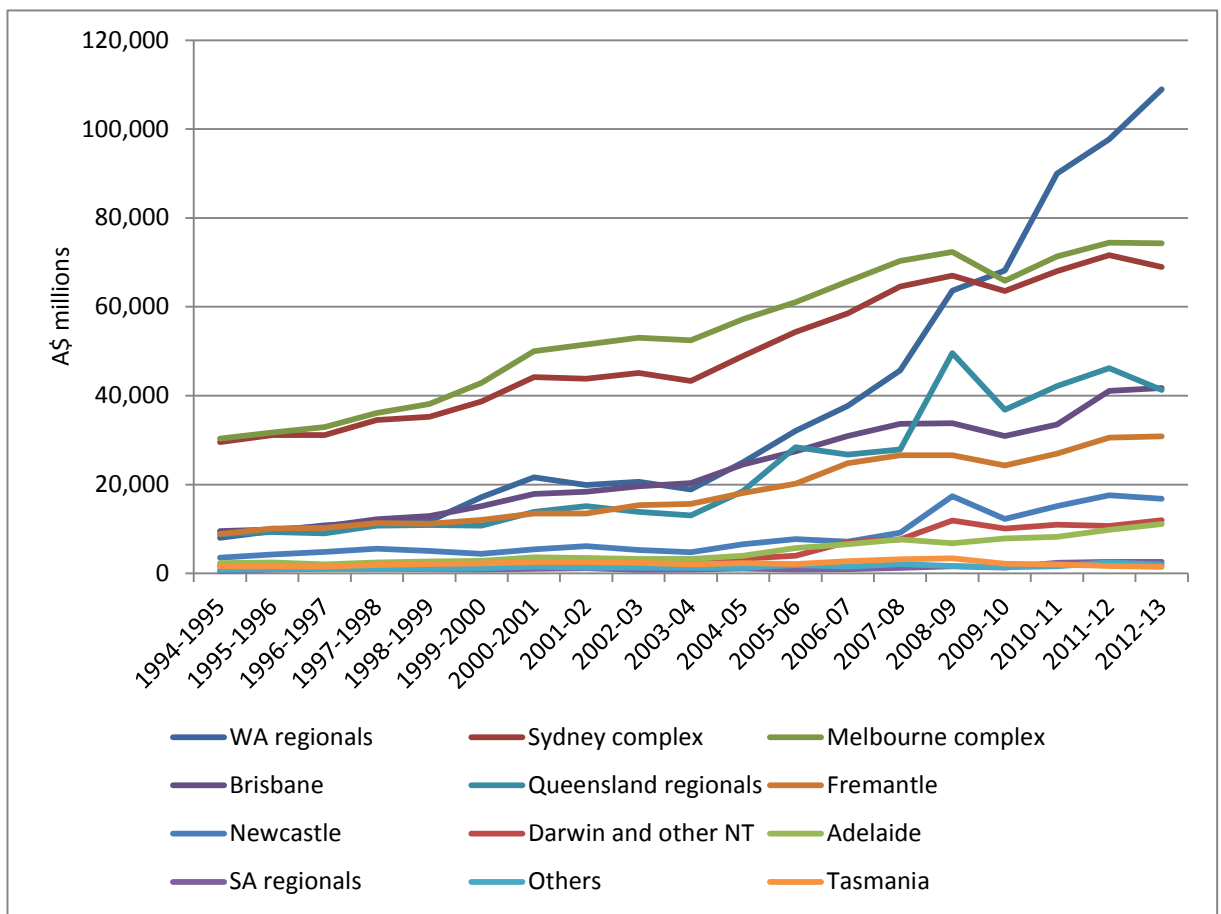
Figure 3: Value of two way trade in merchandise goods passing through Australia's sea and airports 1994-95 to 2012-13



Source: Unpublished ABS data

Figure 3 shows the value of two way trade moving through Australia's sea and airports. A step change in the value of merchandise goods being traded by sea around 2002-04 is evident as is the smaller proportion of merchandise goods being traded by air (green line).

Figure 4: Value of international trade flowing through major Australian seaports 1994-95 to 2012-13



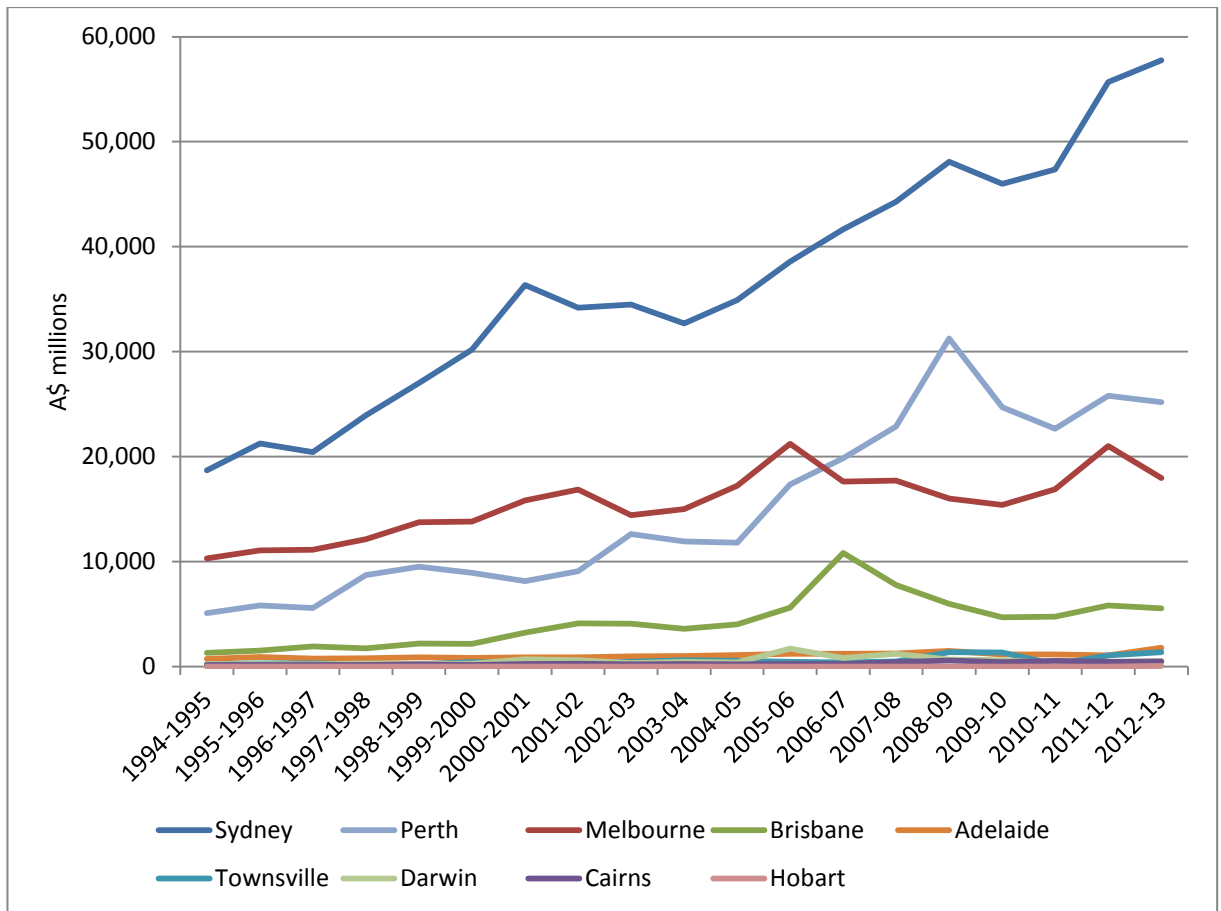
Source: Unpublished ABS data

Figure 4 shows the total value of merchandise trade moving through Australian international sea ports between 1994-95 and 2012-13. Since Port Kembla and Port Botany work synergistically to a significant extent, they are grouped together as the Sydney complex. Likewise the Port of Melbourne, Hastings and Geelong are also linked and are grouped as the Melbourne complex.

Perhaps the most noteworthy feature of the graph is the influence of mining exports on the trade going through Australia's ports over the last decade. Western Australian regional ports have become by far the largest Australian ports by value since 2009-10. In 2011, Port Hedland was ranked as the 11th largest port in the world by volume while the Port of Dampier is ranked 19th (World Shipping Council 2014).

Strong growth was also recorded for Queensland where the Port of Brisbane and Queensland's regional ports jostled for position over the period, again driven mainly by coal exports. The port with the largest increase could be missed in the bottom section. The value of goods going through the Port of Darwin increased more than six fold over the period. It seems likely that there is significant upside to this growth over the next decade at least.

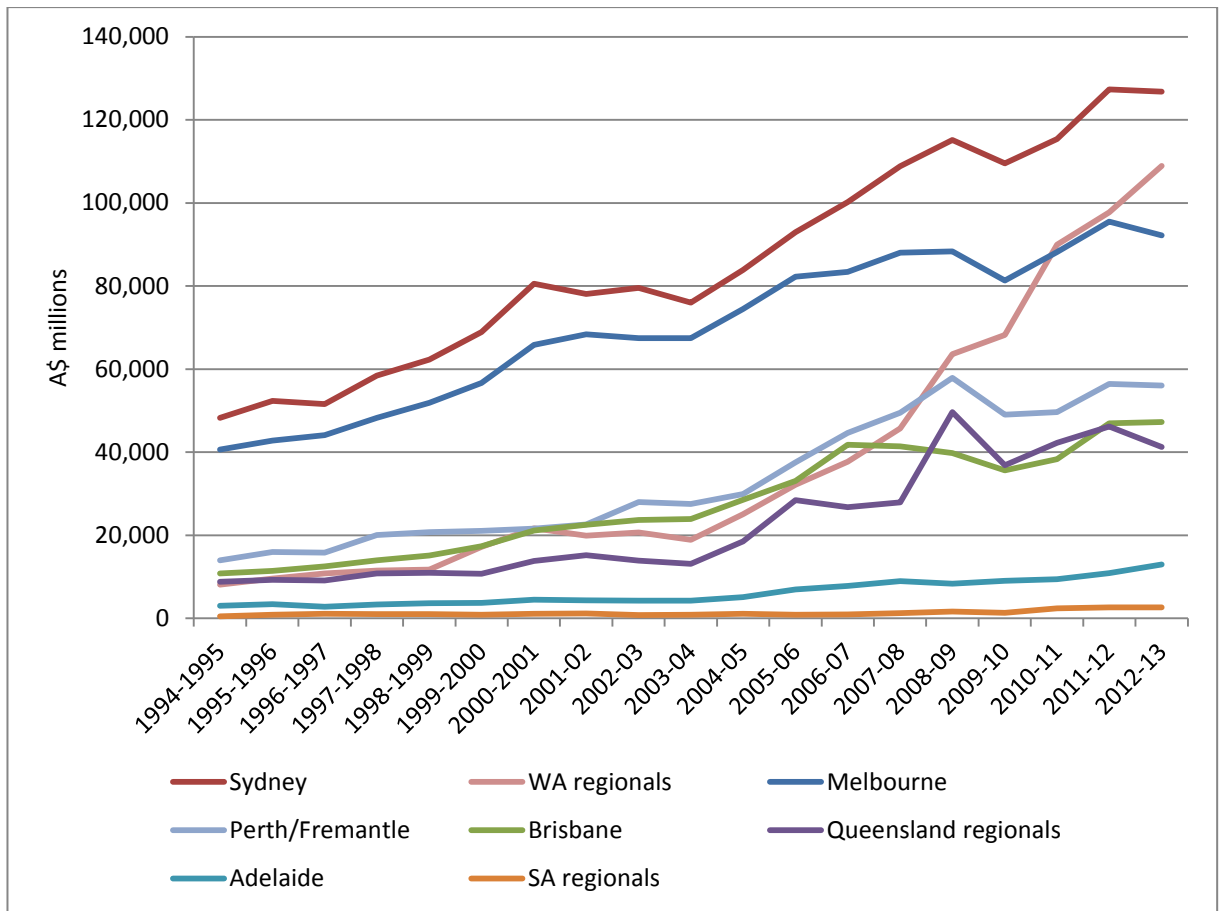
Figure 5: Value of international trade flowing through major Australian airports 1994-95 to 2012-13



Source: Unpublished ABS data

Figure 5 shows the value of international merchandise goods moving through Australian international airports between 1994-95 and 2012-13. There are several features to note. The first is the almost unbroken rise of international freight through Sydney's Kingsford-Smith. In 2012-13 it accounted for more than half the value of all Australia's international air freight. The second is that Perth airport overtook Tullamarine in 2006-07 and by 2012-13 just under a dollar in every four of airborne international trade went through Perth. Like Brisbane, its growth was severely curtailed by the Global Financial Crisis. The third feature to note is that Tullamarine has shown no growth for a decade and in 2012-13 just 16 per cent of airborne international trade flowed through Australia's most southerly major airport.

Figure 6: Value of international trade flowing through Australian sea and airports 1994-95 to 2012-13

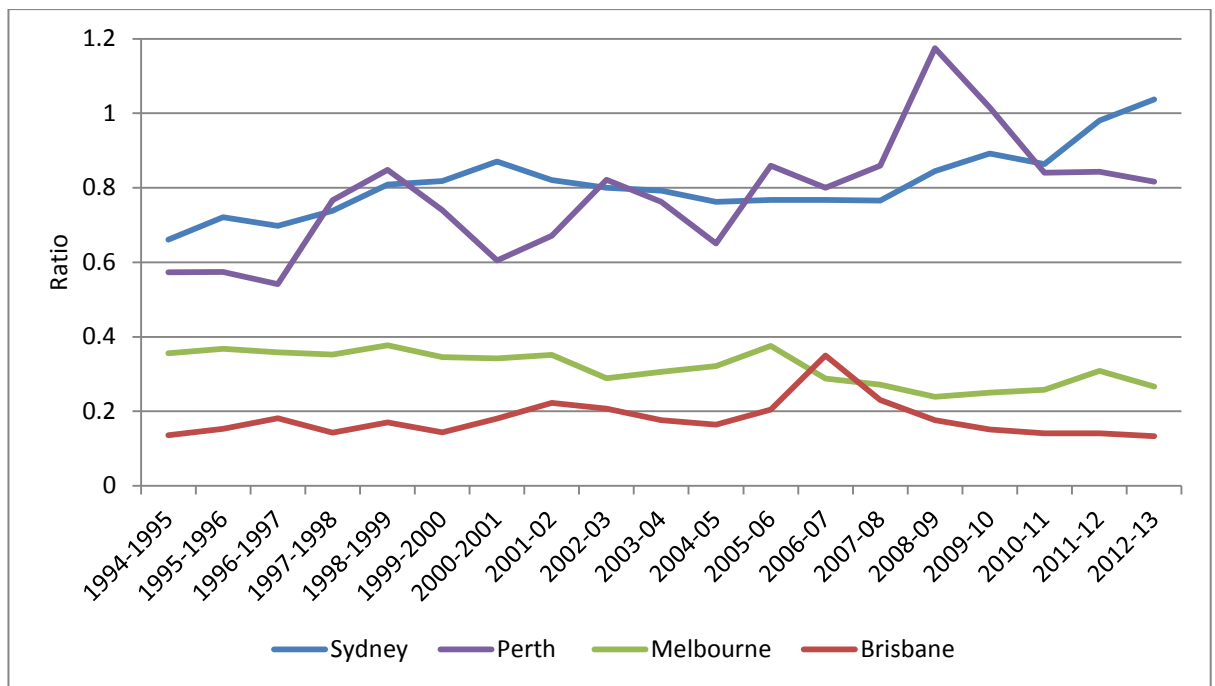


Source: Unpublished ABS data

Figure 6 shows the situation when airports and sea ports are combined. Sydney's dominance in Australia's trade in merchandise goods has grown over the last decade. A comparison between this figure and Figure 4 shows just how much of the heavy lifting in Sydney's economy is being done by the aircraft taking off from Kingsford-Smith. While Melbourne's ports are growing strongly, the value of freight through Tullamarine is relatively flat and this is the key reason for the divergence between Sydney and Melbourne's international trade flows.

The flow of trade through Perth/Fremantle overtook Brisbane's sea and airport at the start of the century and the gap has widened ever since. The extent which Perth is benefitting from the international trade through Western Australia's regional sea ports (which overtook Melbourne in 2010-11) is unknown but a study of the relationship between Brisbane and regional cities in Queensland suggests it could be substantial (Spiller 2012).

Figure 7: Share of international trade between sea and airports in Australia's four largest cities 1994-95 to 2012-13



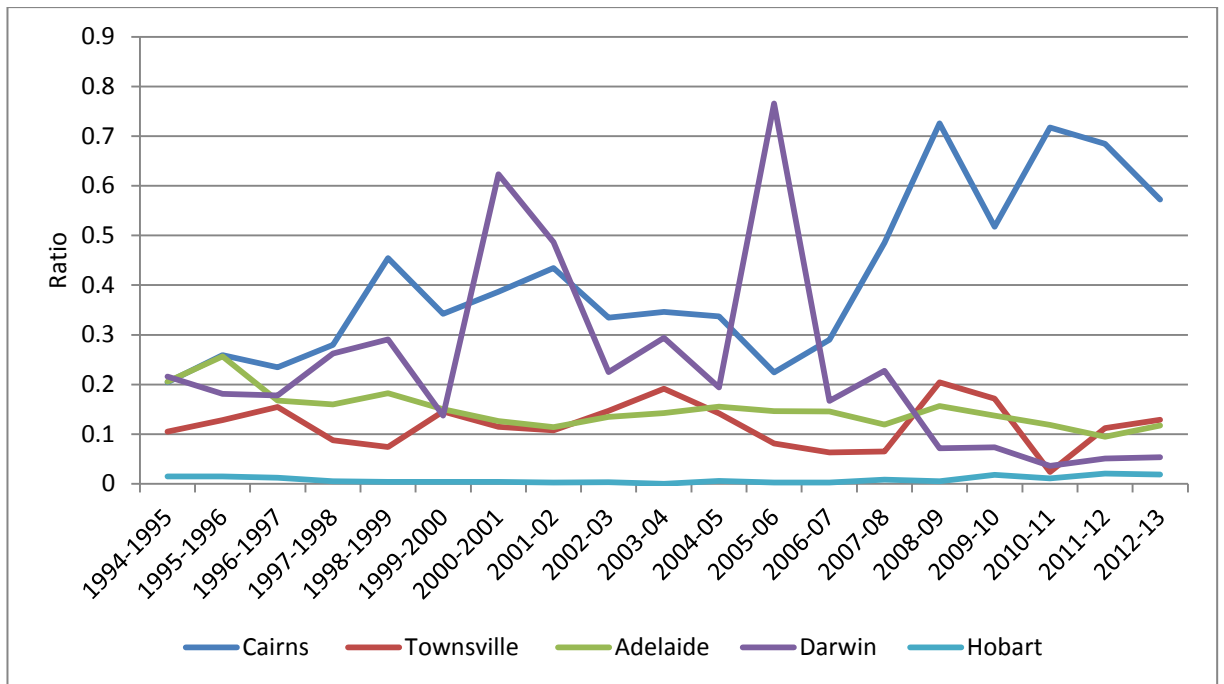
Source: Unpublished ABS data

The airports and sea ports of Australia's four largest cities accounted for two thirds of the value of Australia's merchandise goods trade measured at the port in 2012-13. Figure 7 shows how the balance of international trade is shared between their airport and sea ports constructed as a ratio. If the same amount is travelling through both the sea and airport, the ratio is one, if the airport is handling half the value of the sea port the value is 0.5 and so on.

Kingsford-Smith and Perth airports are increasing their share of international trade flowing through these cities. Indeed, before the Global Financial Crisis, greater value was flowing through Perth Airport than through the Port of Fremantle. In 2012-13, the flow of value through Kingsford-Smith exceeded Port Botany for the first time and if the trend continues this will become a permanent feature of Sydney's economy.

The picture is quite different in Brisbane and Melbourne. Tullamarine's proportion of the value of international trade flowing through Melbourne has been in long term decline since at least the mid-1990s and would be lower still if the Port of Geelong and the Port of Hastings were included in Melbourne's sea trade. Brisbane Airport's share of the value of the city's international merchandise goods trade has never been high and after a brief spike before the Global Financial Crisis has been in steady decline.

Figure 8: Share of international trade between sea and airports in smaller cities 1994-95 to 2012-13



Source: Unpublished ABS data

Figure 8 shows the situation for the five smaller cities that have a significant sea and airport. As would be expected with their smaller populations and trade flows, there is more volatility. Nevertheless, some trends are evident. Cairns airport is becoming steadily more prominent in the city's international trade while nearby Townsville is variable. It seems probable that the difference in the trade mix (bulk, container, high value air freight) between the cities may explain much of this.

Adelaide airport's share of the city's trade, never high, has halved over the period and seems to have settled into long term decline whilst Hobart's airport remains a minor part of the city's trade. Darwin's airport, as a proportion of its trade flows, may also be in long term decline although in this case the sharp rise in sea borne trade is the major factor.

Trade in services

Figure 9: International business travellers and Australian trade in services



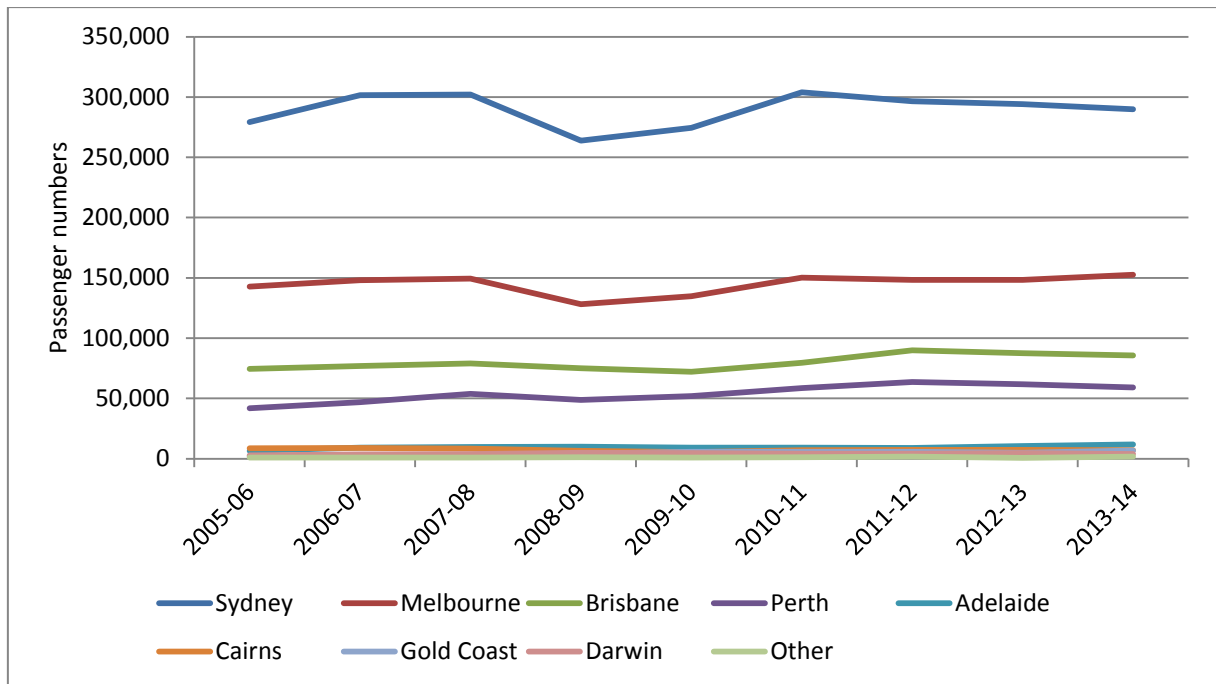
Source: Trade figures UNCTAD 2014, passenger figures from data kindly provided by Tourism Research Australia

Assessing where the international trade in services in Australia is transacted faces two challenges. The first is the general difficulty of measuring services discussed in Information Sheet 65 and the second is that there is no published data at the sub national level for Australia. Since the services trade relies on face to face contacts to a greater degree than that of merchandise goods, the number of foreign business travellers passing through Australian airports is used here to identify the major Australia network nodes for the trade in services. Unfortunately, the time series for the international business travel data is relatively short and based on a survey rather than a head count.

Another challenge to locating the trade in services is that education makes up 29 per cent of Australia's service exports and is not captured by business travel. However, the *2013 State of Australian Cities* report contains a detailed discussion on where international education services are provided (pp50-56). This indicates that the bulk of it is in Melbourne and Sydney.

Bearing in mind these limitations, Figure 9 would suggest that the number of business travellers is a leading indicator of the two way trade in services. In other words, changes in passenger numbers will later be reflected in the service trade figures. Based on Figure 9, it seems probable that future services trade figures will record at least a plateauing if not a decline in services trade.

Figure 10: Number of international business travellers passing through Australia's airports 2005-06 to 2013-14

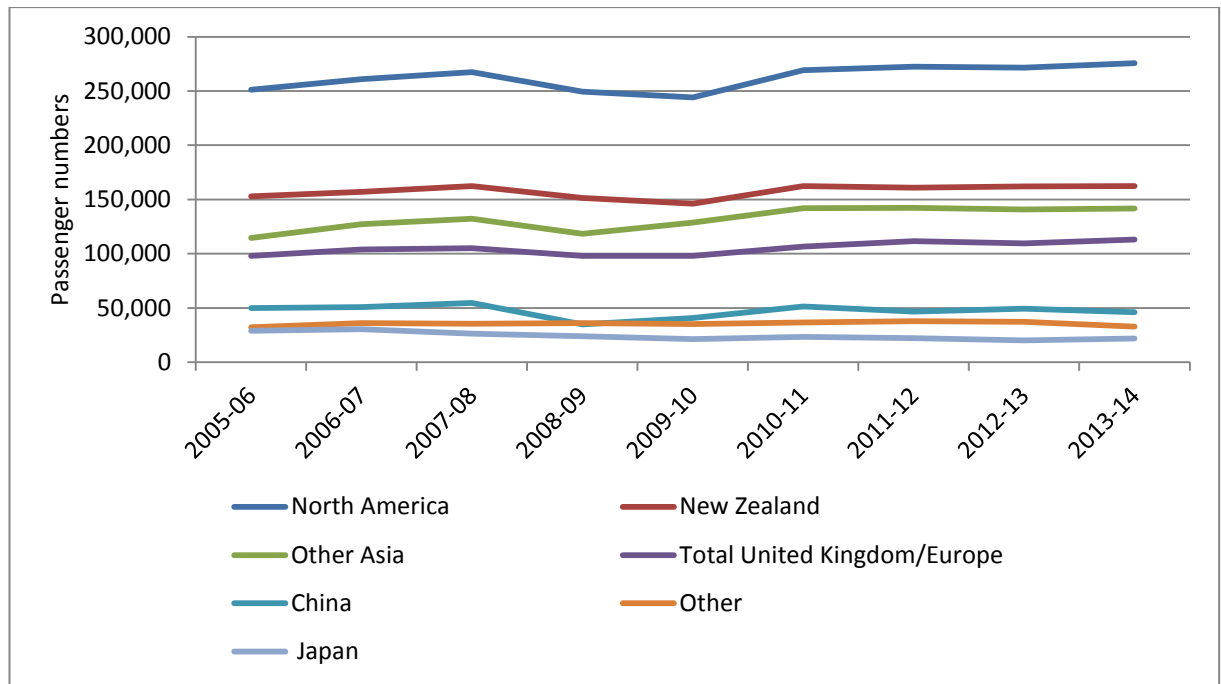


Source: Data kindly provided by Tourism Research Australia

Figure 10 shows the number of international business travellers passing through Australia's major airports for the period that data is available.

Sydney's dominance is clear with 46 per cent of the total travelling through Kingsford-Smith. The effect of the Global Financial Crisis on the flow of business travellers is also evident. A quarter of international business travellers pass through Melbourne's Tullamarine airport and numbers are slowly increasing. The numbers travelling through Brisbane and Perth are rising again since the Global Financial Crisis though the increase has been somewhat moderated by the slowdown in mining since 2012. Some of the most impressive growth is at the bottom of the graph. Business travel through Darwin has risen by more than a third over the period while the Gold Coast has tripled. As an aside, the proportion of business travellers going through individual Australian airports matches almost exactly their proportion of international air freight *tonnages* (BITRE 2014).

Figure 11: Nationality of business passengers travelling through Australia's airports 2005-06 to 2013-14



Source: Data kindly provided by Tourism Research Australia

Figure 11 shows the nationalities of business travellers. As discussed in Information Sheet 65, the United States is Australia's most important service trade partner and 34 per cent of business travellers originate from North America. The closeness of the New Zealand and Australian economies is also evident by the amount of trans-Tasman business related traffic. The 'other Asian' category is broad but the data underlying this graph shows strong growth in business travel from Singapore, Malaysia, Indonesia and India. This echoes the increasing amount of service trade with Asia shown in Figure 42 in Information Sheet 65. Interestingly, this may not include China. The amount of business travel from China shows no growth over the period. Business travel from Japan fell by a quarter. This may also reflect China's and to some extent, Japan's role as intermediate countries in Australia's global trade discussed above.

Summary

There are a number of aspects of this section that are relevant to the following sections. The first is the profound impact of the 'mining boom' on the geography of Australia's international trade. The regional ports in Western Australia in particular went from near the bottom of the main pack to dominant ports within the space of three years.

The second trend, which is of longer standing and arguably more enduring, is the increasing prominence of Australia's four largest cities in the nation's international trade network. Of these, Sydney is becoming increasingly dominant mainly because of Kingsford-Smith's role not only in merchandise trade but also as the main gateway for the trade in services. This has been crucial to Sydney pulling away from Melbourne to become decisively Australia's largest node in the international trade network. Perth overtook Brisbane to become Australia's third largest trade node. The fact that this predated the mining boom and has continued after it would suggest that the change may be permanent.

The third aspect of this section is that the role of airports is important to both merchandise goods and services trade but that this varies between cities. Perth and Sydney are the stand outs in this regard with nearly half of the value of their merchandise trade going through their airports. In contrast Melbourne and Brisbane's airports are a much smaller part of their trade networks and will become smaller still on current trends. There are various possible explanations; the relative distances between CBDs and airports, trade product mixes, patterns in international travel affecting hold space availability and cost, trade origins and destination distances or a combination of these things.

Unseen in the relationship between the airports and the sea ports is the neighbouring CBDs. Their role is known to be substantial because more than half of the merchandise goods transactions will have a multinational company on one end and often on both ends and these are based in CBDs (Scott 2012). We also know that CBD's role in the trade in services is critical firstly because the Advanced Producer Services they need are located in CBDs and secondly because most of the skilled migration is centred on the CBDs, particularly those of Sydney and Melbourne (SOAC 2013). Unfortunately, ways to quantify their role in international trade in Australia currently remain elusive.

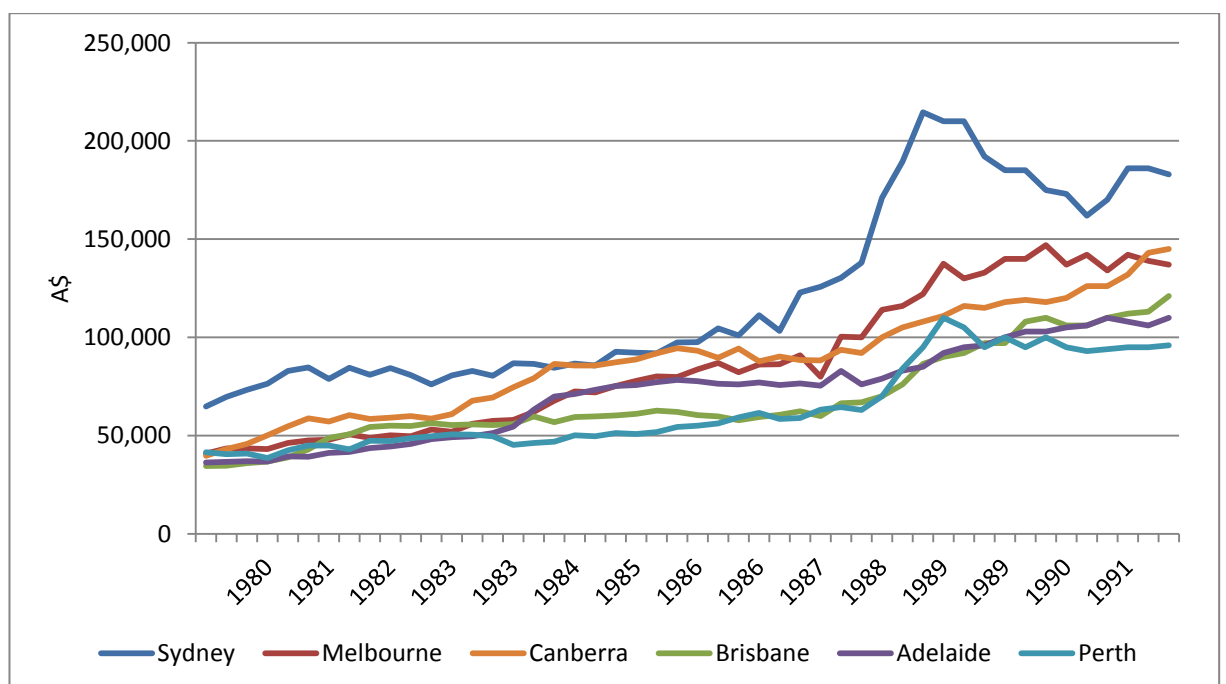
The fourth aspect of this section is that when surveyed in the broad, the shift in Australia's international trade's centre of gravity to the north and west which was discussed in Information Sheet 65 at the continental scale is confirmed here at the city scale. This will be explored in more detail in the next section.

Section 3: Changes in the locational value of Australian cities

Figures 8 and 9 Information Sheet 65 showed an almost exponential increase in house prices in English speaking countries including Australia beginning around 1997. To capture this period, the data presented below goes back to 1992, the earliest year for which data is available for all Australian cities with a population above 30,000. Eighty one per cent of the population live in these cities and many more commute to work in them or access their services every day (SOAC 2012). All cities are shown to allow as many readers as possible to see where their cities fit in with the changes to locational value as the nation's economic geography continually moves. This information is presented in three ways, changes in nominal values, percentage change between 1992 and 2014 and changes in index values. The number of cities or areas within cities can make for sometimes challenging graphs but the information is summarised later in the section. At the end of this section, areas within Sydney and Melbourne are plotted.

The data is sourced from the commercial firm, RP Data. In the early years of the series, there were a few instances of missing or apparently aberrant data that affected around half of one per cent of records. Missing data was interpolated using the average percentage change of the group. For aberrant readings a rule was applied that if a price change exceeded the average change for the group by more than 30 per cent, the average of the years either side of the cell was used. The geography used is Statistical Divisions for capital cities and Statistical Districts for the non-capitals. For the analysis of Melbourne and Sydney, the Statistical Subdivisions within the Statistical Division are used.

Figure 12: Nominal house prices in Australian capital cities 1980-1991



Source: Data sourced from individual Real Estate Institute of Australia quarterly reports

The Real Estate Institute of Australia has compiled a longer time series than RP data but it contains fewer cities. This data for the period 1980-1991 is shown in Figure 12 and indicates that except for the 'Bicentenary blip' in Sydney, the capitals were tracking broadly together. In passing, the reader's attention is directed at Perth which trailed the group over most of the period.

For the period 1992-2014, the cities will be grouped by their population at the 2011 Census into capital cities, non-capital major cities (i.e. non-capital cities with a population of over 100,000), midi cities (populations between 50,000 and 100,000) and mini cities, those with populations between 30,000 and 50,000.

Capital cities

Map 1 Australian capital cities Statistical Divisions (green) and non-capital major cities Statistical Districts (blue)

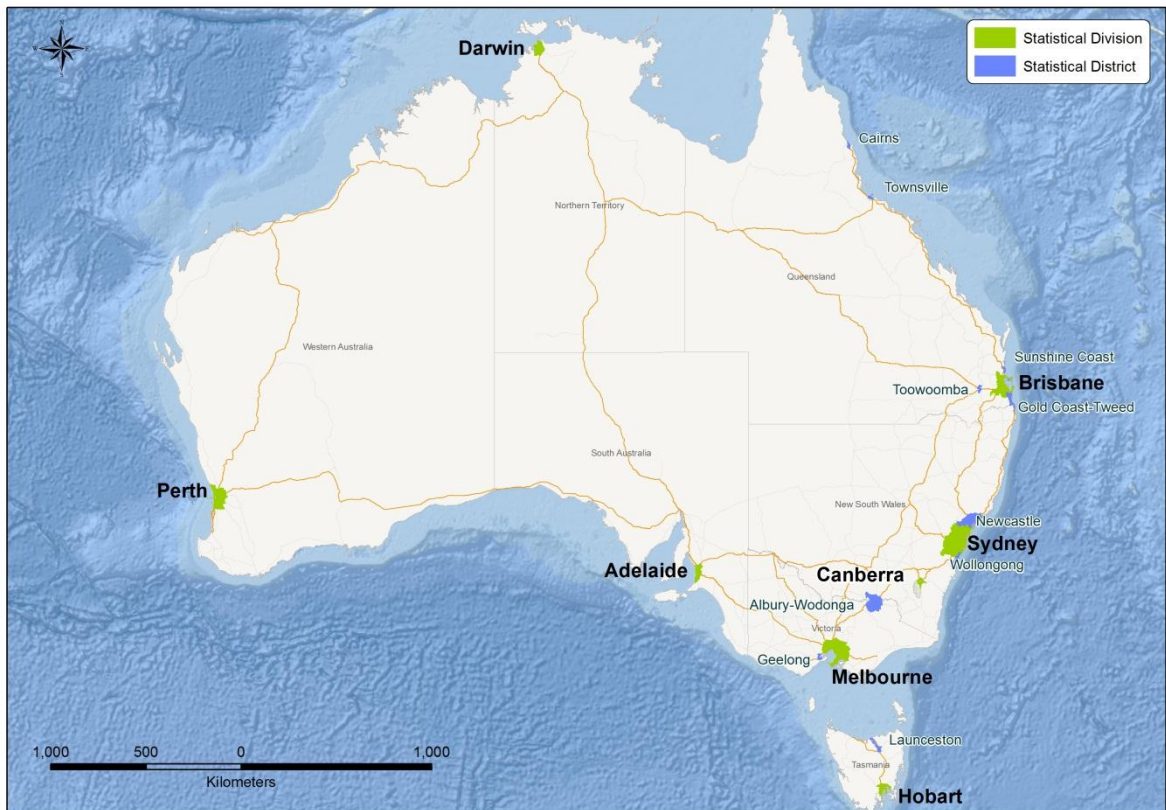
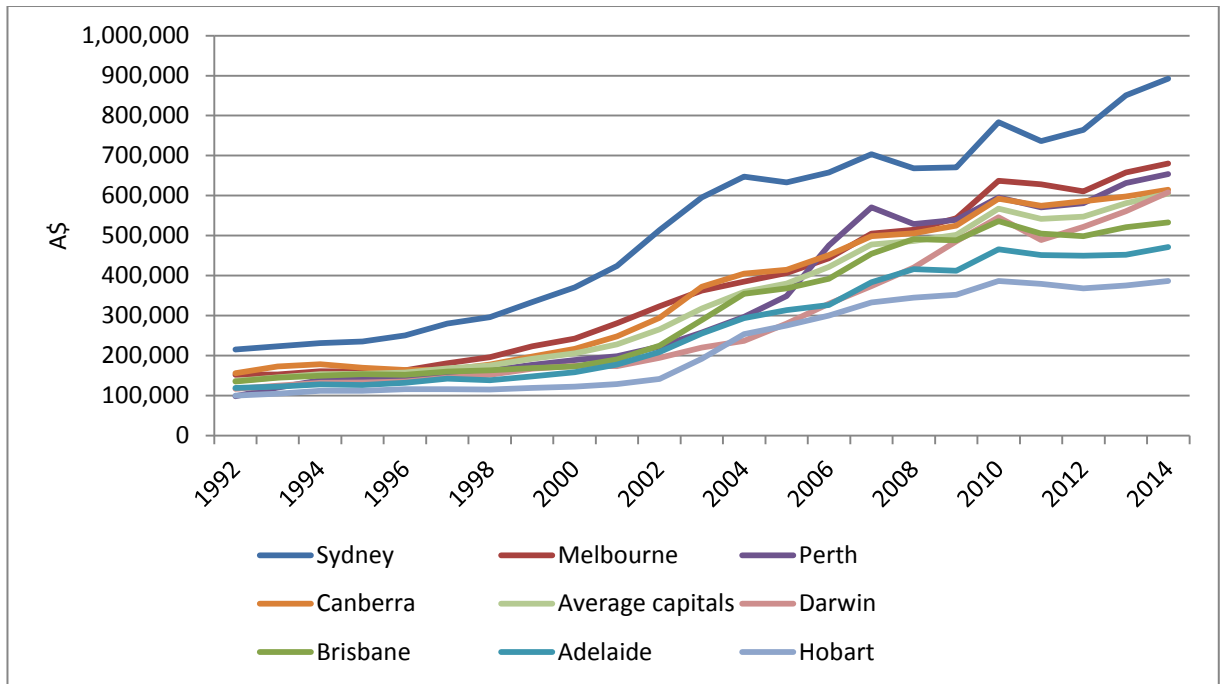


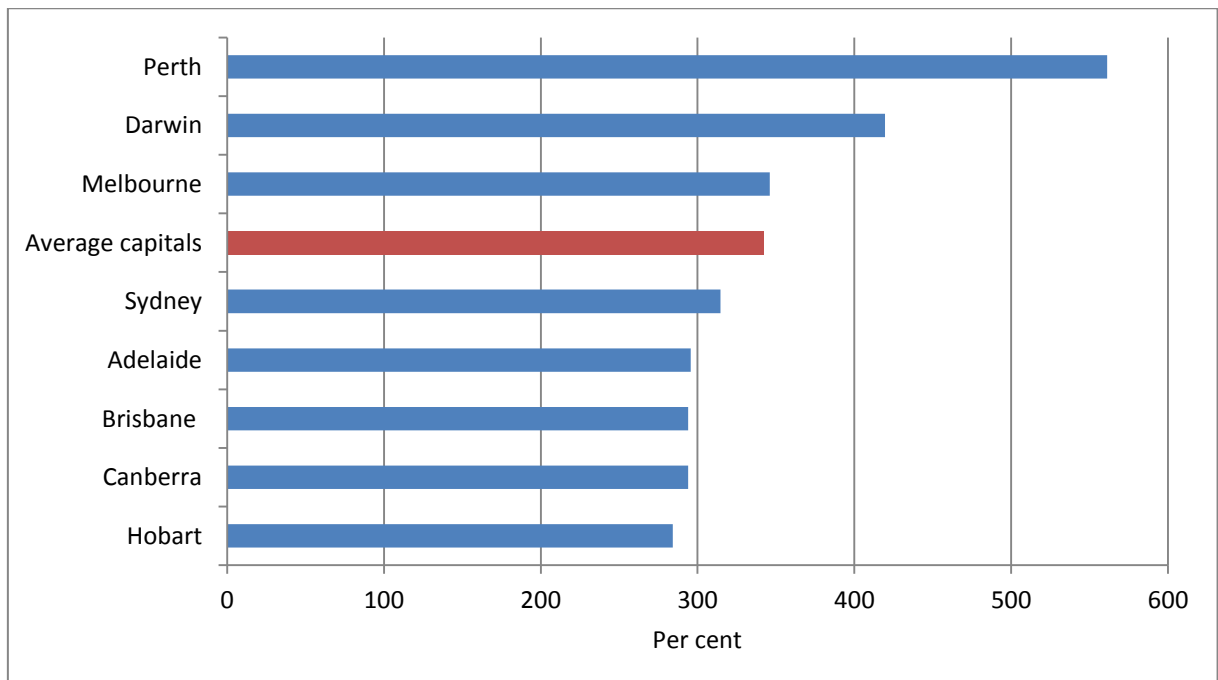
Figure 13: Nominal house prices in Australian capital cities 1992-2014



Source: Unpublished RP Data tables

Figure 13 shows the changes in nominal house prices in Australian capital cities from 1992 until June 2014. This shows a widening gap between Sydney and the others until around 2005 when Perth and then Melbourne closed the gap somewhat. Sydney, Melbourne, Perth and Darwin have recovered strongly after the Global Financial Crisis while the other cities have remained subdued. Hobart has stayed below the other capital cities for almost the entire period.

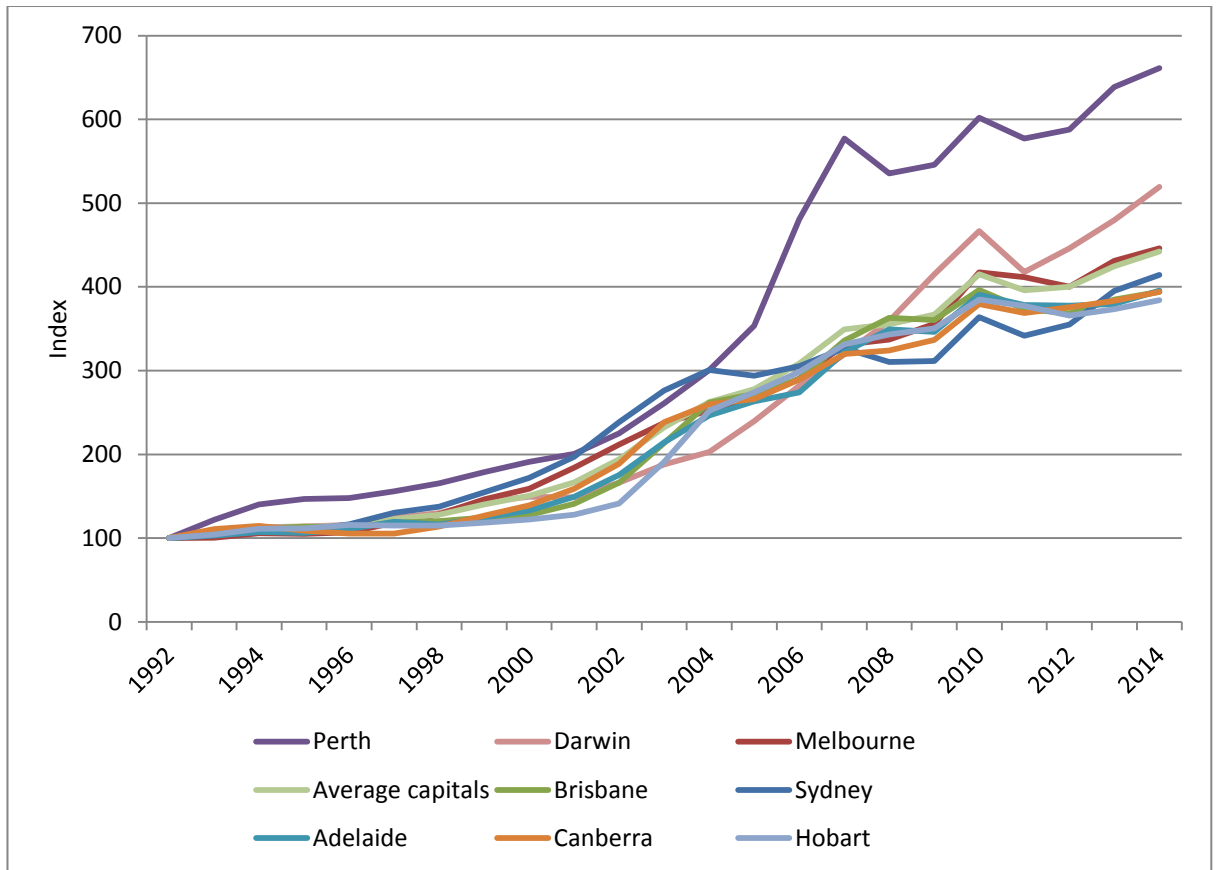
Figure 14: Percentage growth in Australian capital city house prices between 1992 and 2014



Source: Unpublished RP Data tables

Figure 14 shows the percentage change in nominal house prices over the period. This shows more clearly the extent of Perth and Darwin's growth. Melbourne too came off a low base to register an above average growth while the other cities were below the average.

Figure 15: Indexed house prices in Australian capital cities 1992-2014

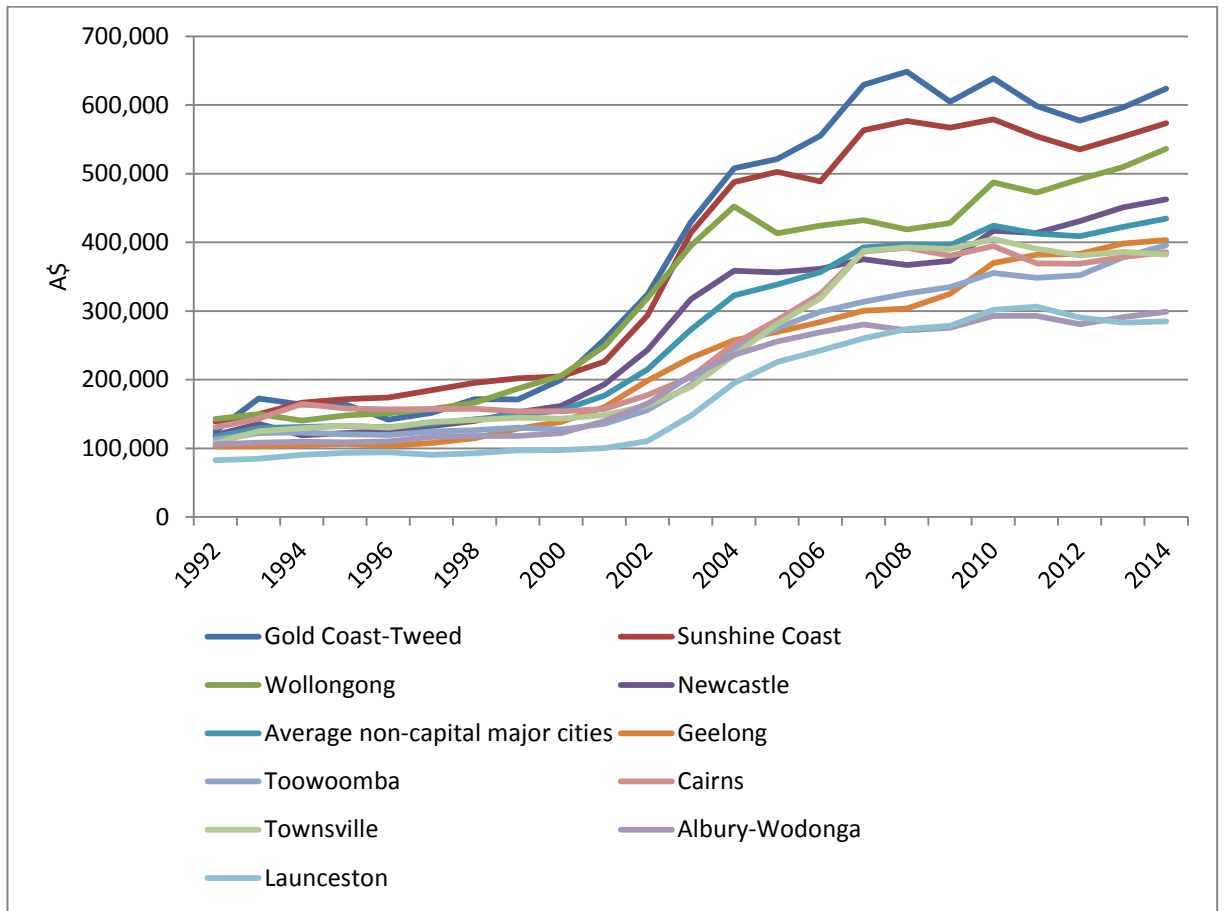


Source: Unpublished RP Data tables

The index graph (Figure 15) shows the high growth of Darwin and Perth more clearly. Sydney's performance looks much less impressive than the nominal prices in Figure 50 would suggest and it has been trailing Melbourne since 2005 (the internal house price variations in these cities are discussed below). Although Canberra is directly influenced by Australian Government policies, its lower rate of price growth since the Global Financial Crisis is similar to that of a number of cities that are based on Advanced Producer Services and was discussed in Information Sheet 65. Wellington, Ottawa and the group in the US that includes Washington and university cities such as Tucson and Ann Arbor have also shown slower price growth over the last six years than those cities that are major nodes in the international trade network. This suggests that it is not the presence of Advanced Producer Services that has driven recent locational value increases but rather the Advanced Producer Services and trade.

Non-capital majors

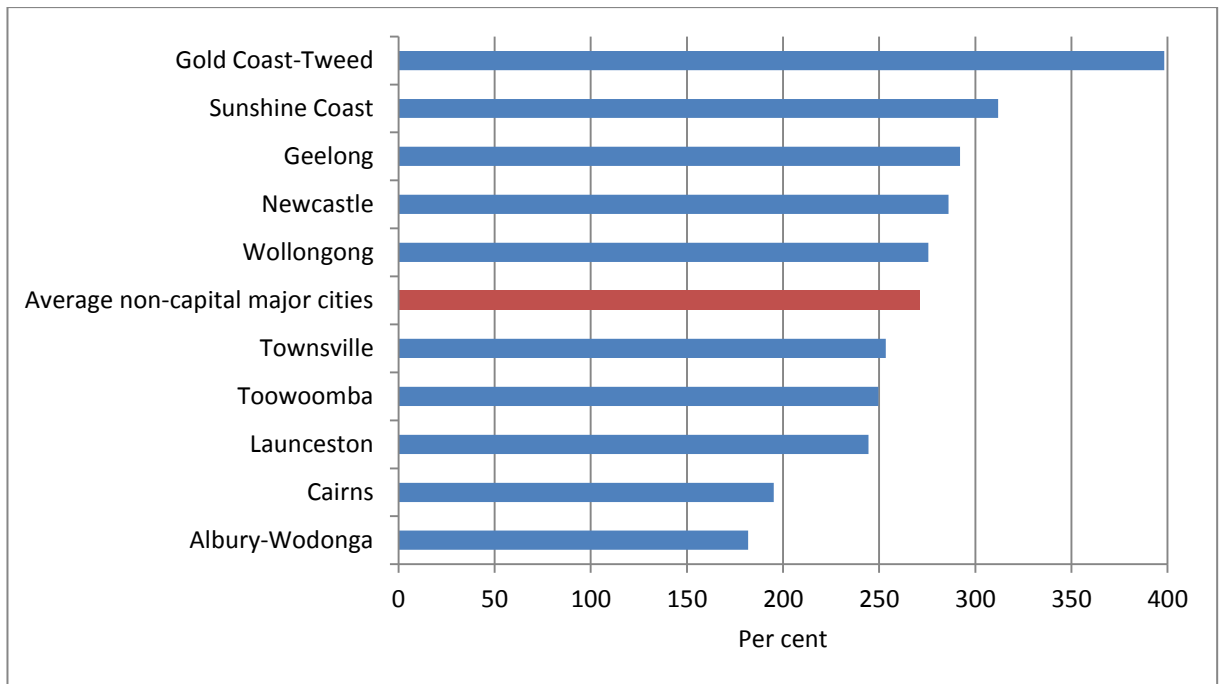
Figure 16: Nominal house prices in Australian non-capital major cities 1992-2014



Source: Unpublished RP Data tables

Figure 16 shows the change in nominal house prices in the non-capital major cities between 1992 and June 2014. The similarity between the trajectories of the amenity cities of the Gold and Sunshine Coasts and similar cities in the US shown in Figure 28 in Information Sheet 65 is striking. As discussed in Information Sheet 65, the major difference is that while prices in amenity cities in the US are slowly recovering, their Australian equivalents have generally not returned to their pre Global Financial Crisis levels.

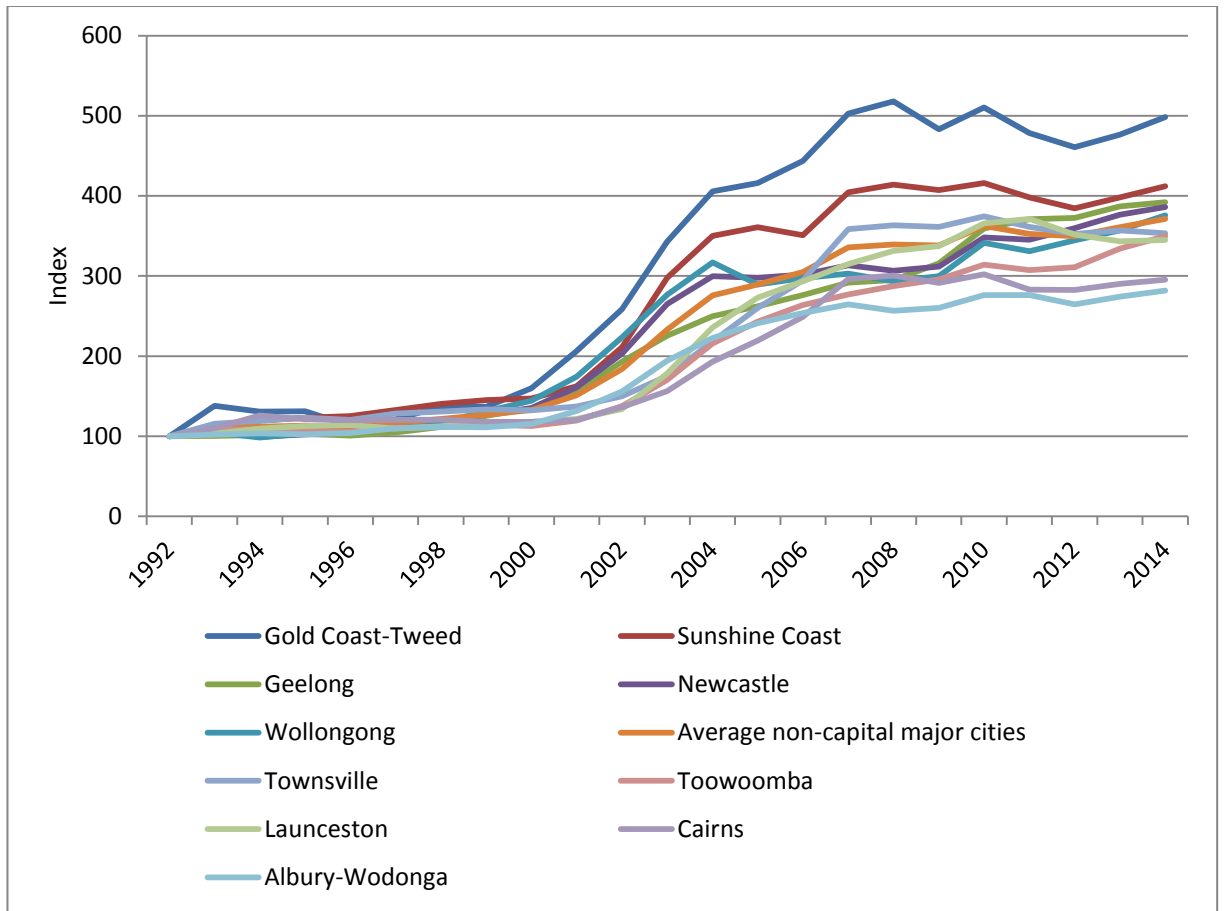
Figure 17: Percentage growth in Australian non-capital major city house prices between 1992 and 2014



Source: Unpublished RP Data tables

Figure 17 shows that people who bought a house on the Gold Coast in 1992 would not be too unhappy about their capital increase despite the low growth over the last six years. The cities above the average are all within 90 minutes' drive of a capital city while those below the line are independent regional centres.

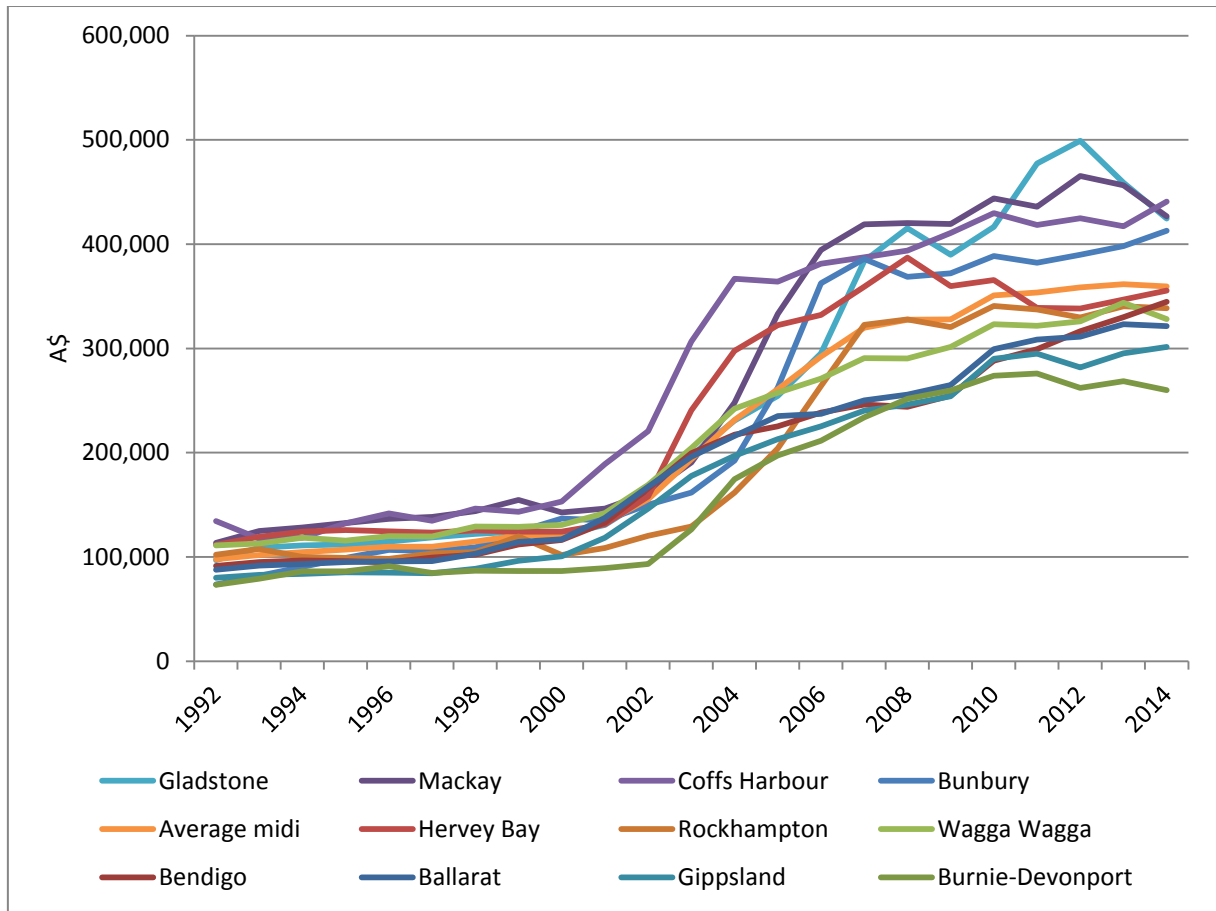
Figure 18: Indexed house prices in Australian non-capital major cities 1992-2014



Source: Unpublished RP Data tables

Figure 18 essentially confirms the previous figure but also emphasises how slow house price growth has been in most of the non-capital major cities since the Global Financial Crisis.

Figure 19: Nominal house prices in Australian midi cities 1992-2014

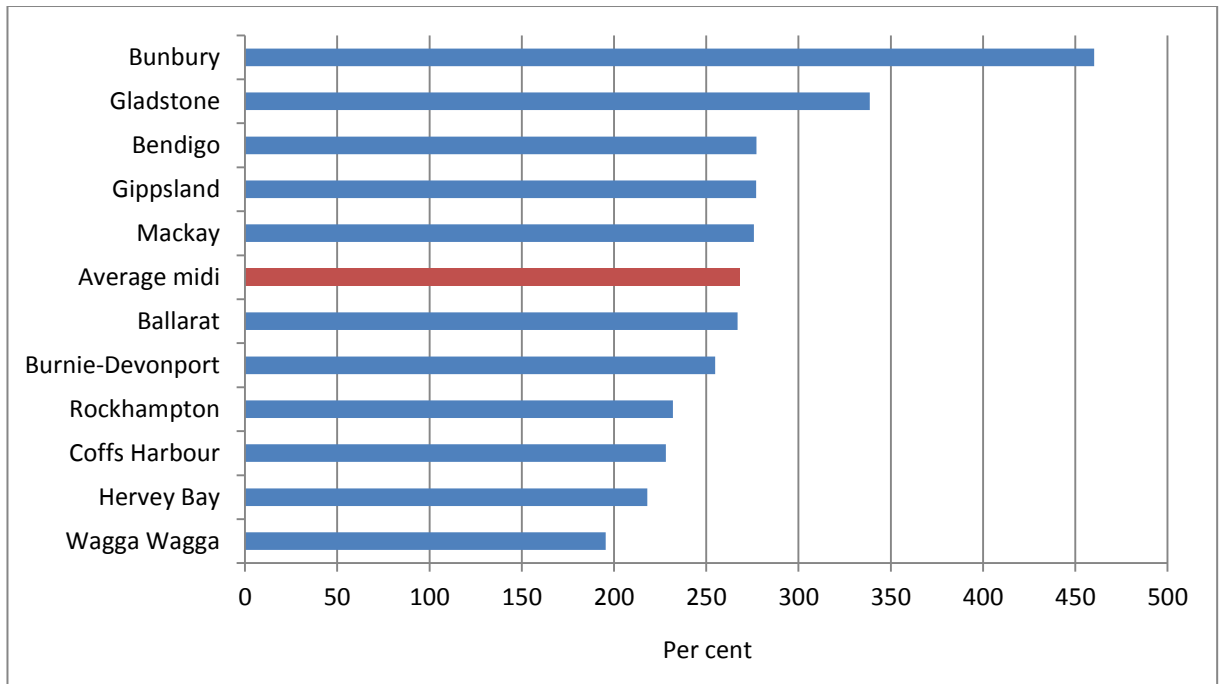


Source: Unpublished RP Data tables

Figure 19 shows nominal price changes in the midi cities, those with a population between 50,000 and 100,000, between 1992 and 2014. The group is large and diverse ranging from Wagga Wagga, a long established and prosperous city servicing a rich agricultural hinterland to Hervey Bay, a more typical sun-belt city with a large tourism sector and a high proportion of retirees.

Perhaps the most remarkable thing about this figure is that all these cities tracked in a narrow price band until 2000-01 when there was an explosion of diverse trajectories. Gladstone and Mackay show strong price rises as they became the base of the Bowen Basin expansion. These rises appear to have tapered in recent years. The course of Hervey Bay's prices most strongly resemble those of the Gold and Sunshine Coasts with a strong rise until 2008 followed by a sharp fall that appears to have stabilised since 2012. Coffs Harbour, a city that is a similar size to Hervey Bay and also shares a similar socio-economic profile broke out from the pack early and has a solid and almost uninterrupted price growth ever since. Bunbury's price growth shows the effect of new road and rail infrastructure making its amenity accessible to many working in Mandurah or Perth. Also affecting Bunbury's values is the significant number of its residents in Fly In-Fly Out (FIFO) mining employment.

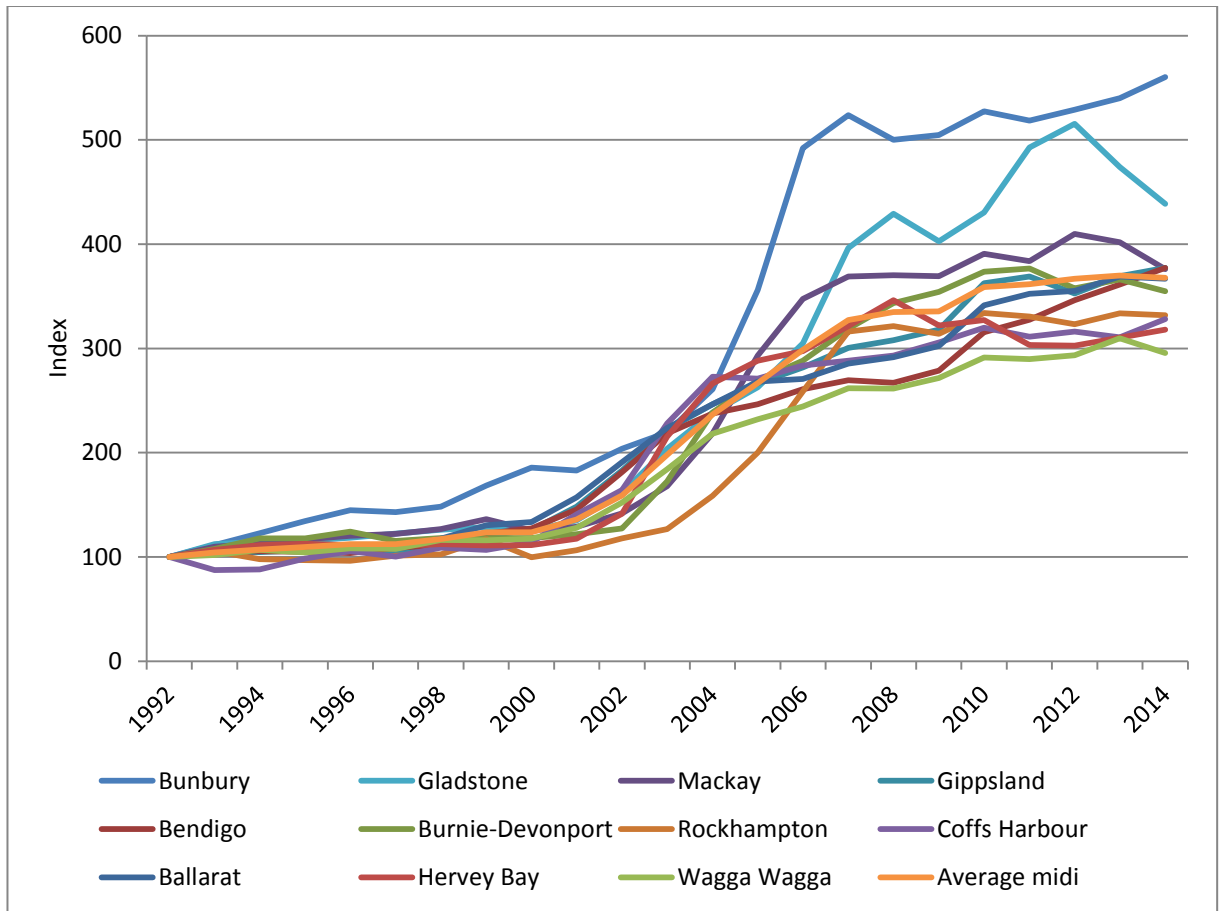
Figure 20: Percentage growth of house prices in Australian midi cities between 1991 and 2013



Source: Unpublished RP Data tables

Figure 20 shows the growth in nominal prices for midi cities from 1992 until June 2014. The results of improved infrastructure and the mining boom are obvious on Bunbury's house price growth. Bendigo is also benefiting from improved transport infrastructure such as the regional rail link and improved freeway access to Melbourne shown by its strong growth in the last few years. Ballarat has also grown strongly recently but coming off a higher base, the improvement is more obvious in the figure below. The other cities with above average growth are all associated with mining.

Figure 21: Indexed house prices in Australian midi cities 1992-2014

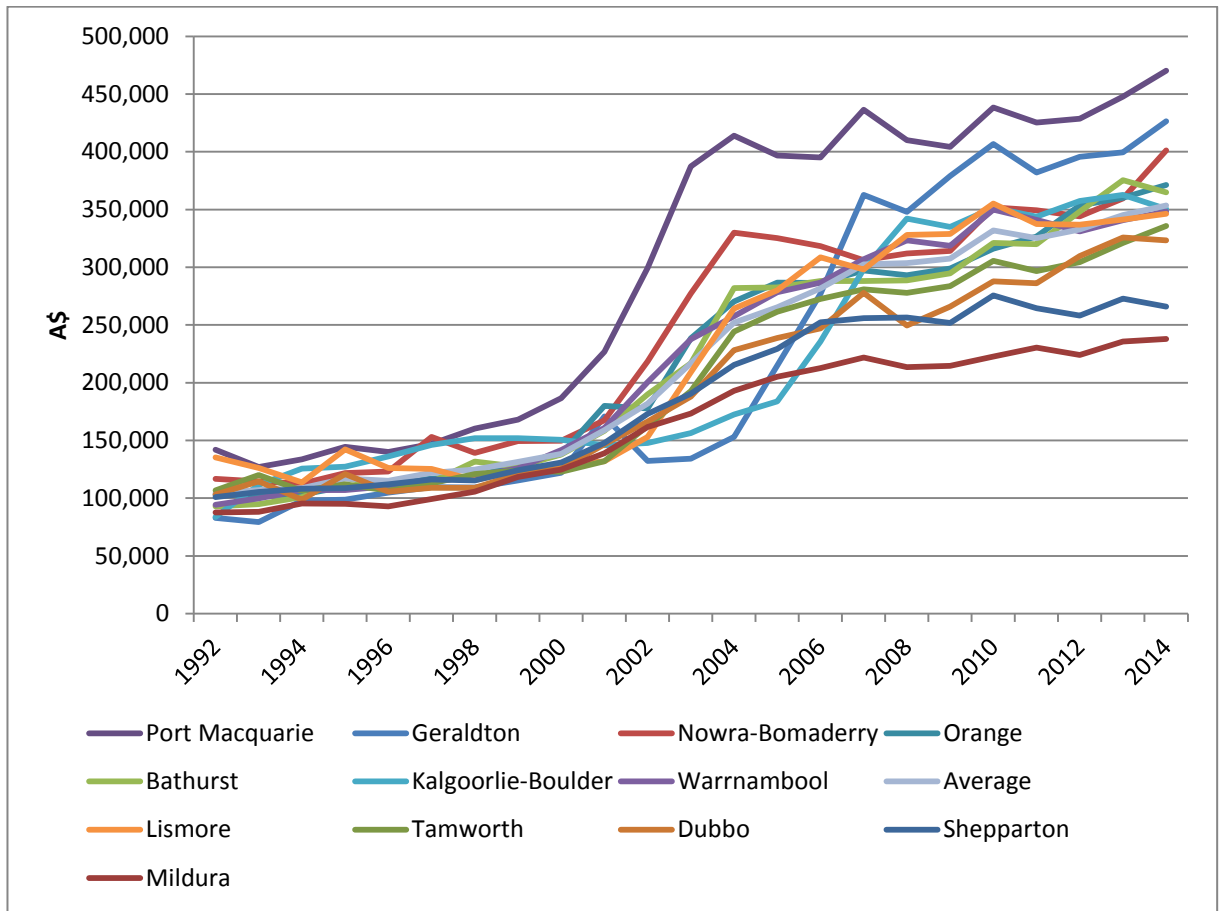


Source: Unpublished RP Data tables

Figure 21 shows Bunbury's rapid growth in more relief but also the rise and in recent years, the fall of Gladstone and Mackay.

Mini cities

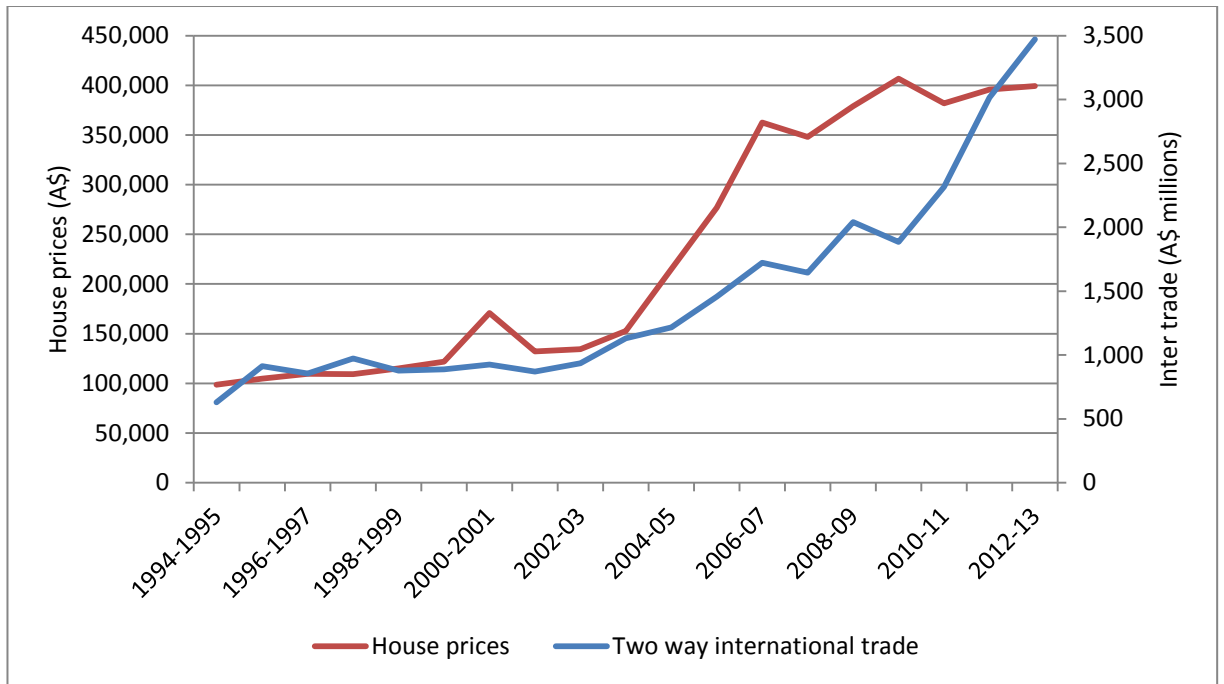
Figure 22: Nominal house prices in Australian mini cities 1992-2014



Source: Unpublished RP Data tables

Figure 22 shows nominal house price changes since 1992 for cities with a population between 30,000 and 50,000 at the 2011 Census. Kalgoorlie-Boulder is the only mining based city in the group and along with other mining based cities in previous figures shows very rapid growth from 2005 until 2008 where it begins to taper off. Port Macquarie's prices rose 250 per cent in the four years between 2000 and 2004 but this rate tapered in subsequent years showing a similar pattern to that of many Australian amenity cities.

Figure 23: International trade and Geraldton's house prices 1994-95 to 2012-13



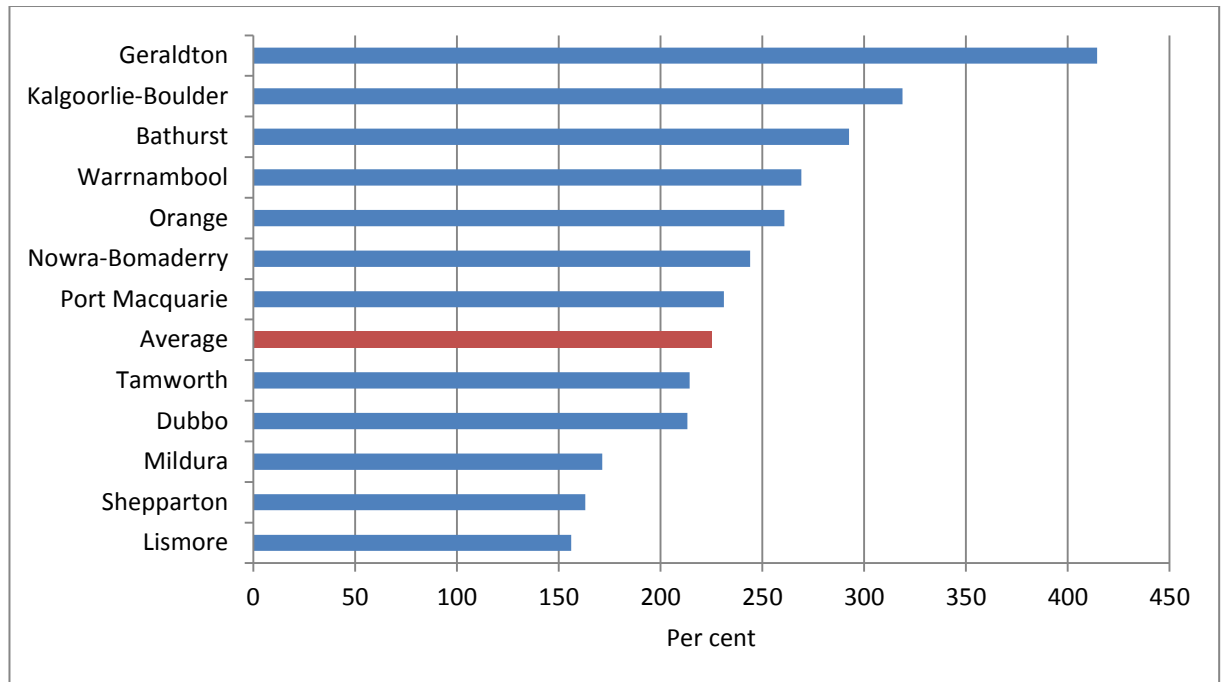
Source: Unpublished RP Data tables and unpublished ABS data

Looking at Geraldton in more detail, Figure 23 shows the amount of international merchandise trade flowing through the Port of Geraldton tripled between 2001-02 and 2012-13 and its house prices have also tripled reflecting the increase in the relative economic value of the city. Of interest, is that house prices ran ahead of trade values. There may be several reasons for this. Geraldton has also become a major freight and logistics hub for domestic freight over the last decade in addition to its role as a node in international trade. In addition, the City of Geraldton, with the assistance of the West Australian government, has increased the connectivity of the port through major infrastructure works which has had the additional benefit of increasing the amenity value of the city. It may also be that people's assessment of the future of the city was being built into house prices in the same way that many mining stock values ran ahead of production.

The amenity cities in the group, Nowra and Warrnambool, show much the same trajectory as similar cities in the previous figures, though the growth of Nowra in recent years goes against the trend somewhat.

Those below the average growth line, like Wagga Wagga in the previous figure, are all inland regional centres built on servicing largely agricultural regions.

Figure 24: Percentage house price growth in Australian mini cities between 1992 and 2014

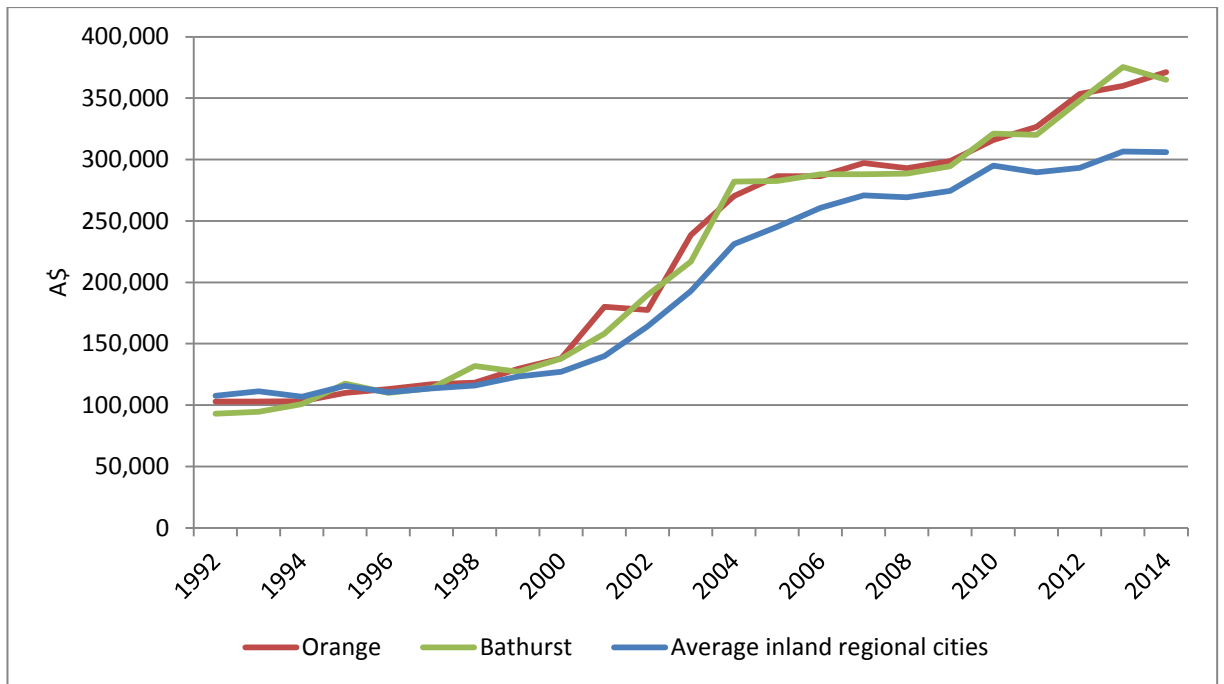


Source: Unpublished RP Data tables

The rapid growth in values of the Western Australian cities is more apparent in Figure 24. The sea change cities of Warrnambool, Nowra and Port Macquarie are also ranked above the average for the minis.

The position of Bathurst and Orange is also clearer. Orange is located only 55 km to the west of Bathurst and both have a population a little over 35,000. The midpoint between the cities is around three hours' drive from the Sydney GPO. Bathurst is the oldest inland city in Australia and Orange was established soon afterwards. Both have fertile agricultural hinterlands based on rich basalt soils from the extinct volcanoes (Mounts Panorama and Canobolas) located adjacent to the cities. Both have been major educational centres for more than a century. Why should they be growing above the average in this group? It seems probable that the key difference is the Cadia gold mine, the second largest open cut gold mine in Australia, located between them.

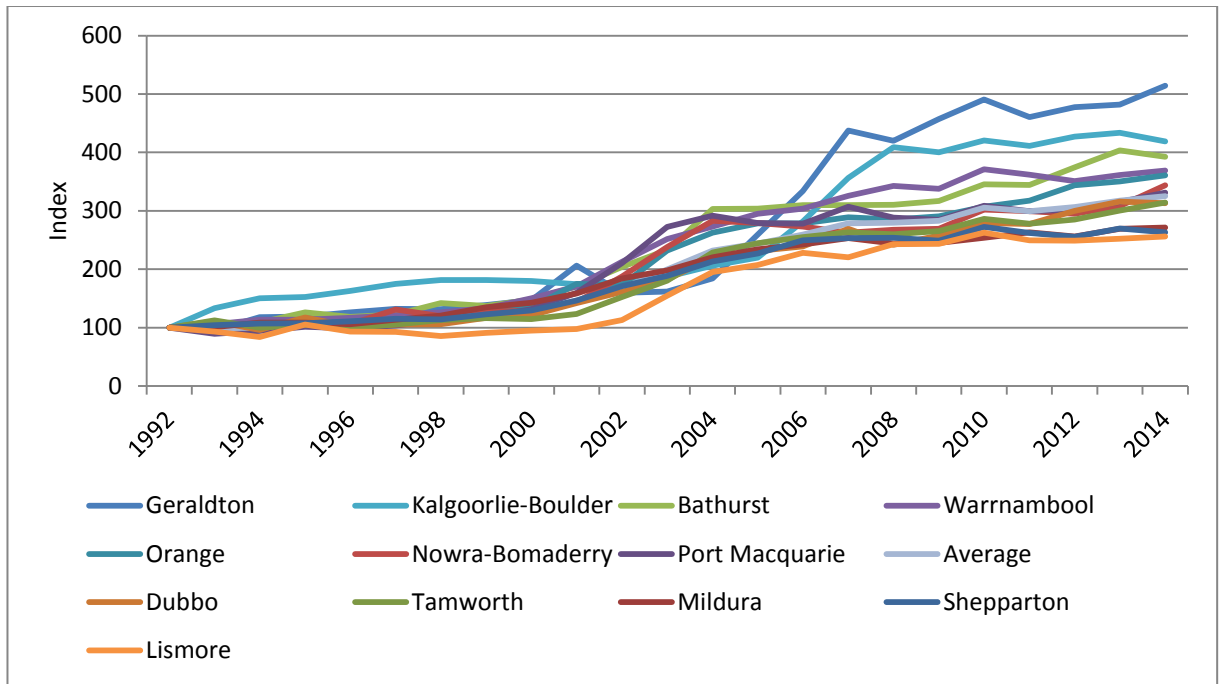
Figure 25: House prices in Bathurst and Orange compared to other inland regional cities 1992-2014



Source: Unpublished RP Data tables

Support for this proposition comes from looking at the timing of divergence of Bathurst and Orange's house prices and the average of other inland regional centres (Dubbo, Tamworth, Lismore, Mildura, Wagga Wagga and Shepparton) shown in Figure 25. This coincides fairly exactly with the ramp up for Cadia's production. The recent announcement of an extension to the mine to become one of the world's largest gold producers appears also to be reflected in the price trajectory. The difference in the average price of a house in Orange and Bathurst and the average of other inland regional centres was \$61,943 in June 2014. In other words, each of the 24,000 houses in these two cities was worth 18 per cent more than if they were located in other inland regional centres. In aggregate, this values these two cities at \$1.5 billion more than if they had remained on the same trajectory as other inland regional centres which would have been likely with the absence of Cadia.

Figure 26: Indexed house prices for Australian mini cities 1992-2014



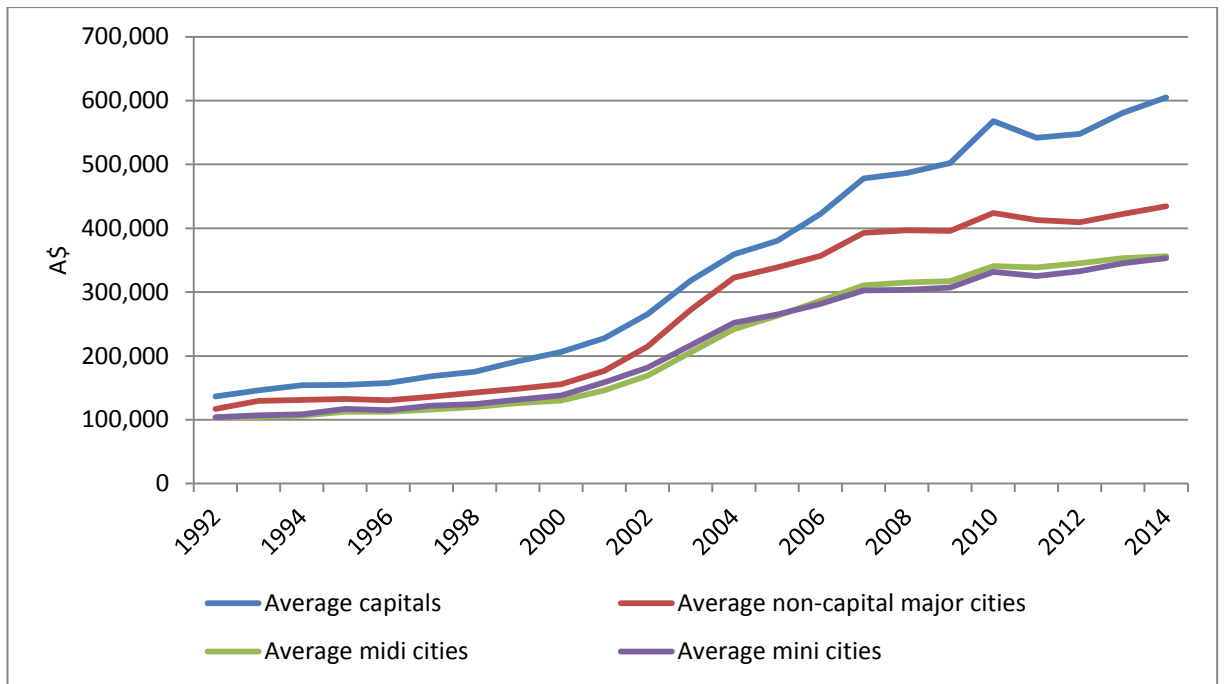
Source: Unpublished RP Data tables

The most obvious feature of the mini cities index graph in Figure 26 is the trajectories of both Geraldton and Kalgoorlie. In the decade between 1992 and 2002, their relative house price growth was some of the slowest in the group. Within three years they were at the top of the group and have been there ever since albeit with a recent downturn in Kalgoorlie. The 'other' mining cities, Orange and Bathurst have followed a similar path if perhaps dampened somewhat by their more diverse economies. The sea changers follow with the inland regional centres following them.

City groupings

The paper will now turn from discussion of cities as individual entities to cities based on the population based groupings used above; capitals, non-capital majors, midis and minis.

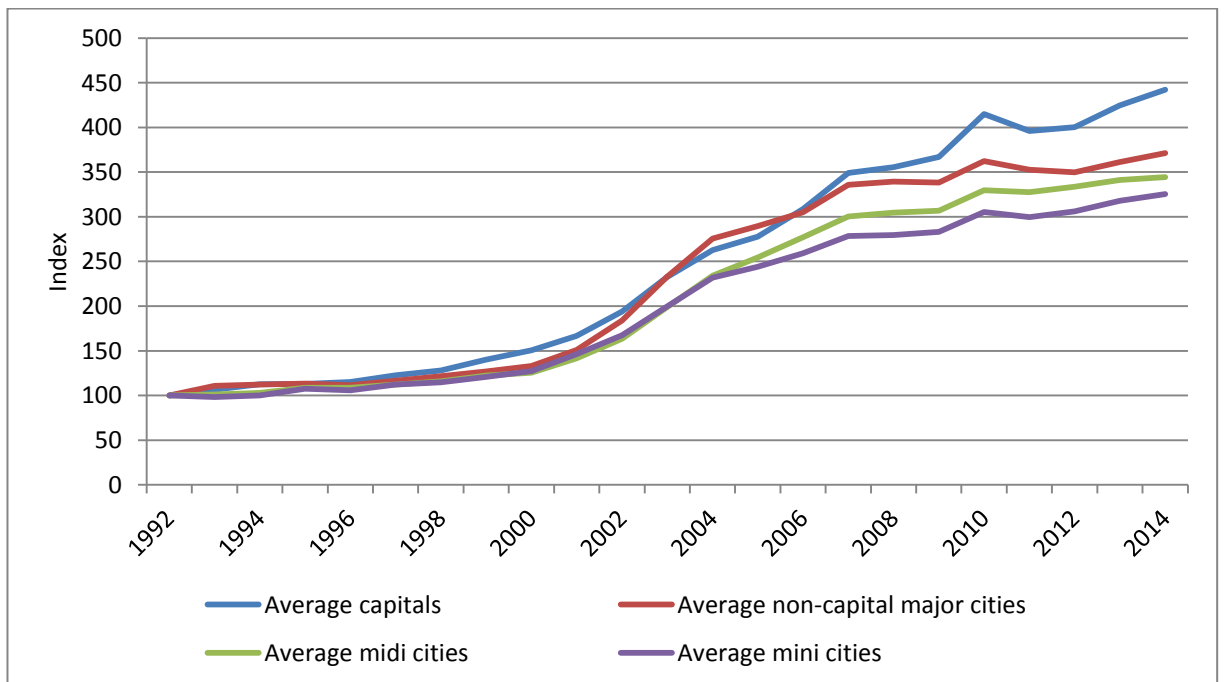
Figure 27: Nominal house prices of capital cities, non-capital major cities, midi and mini cities 1992-2014



Source: Unpublished RP Data tables

Figure 27 shows the widening divergence of their locational values as reflected by nominal house prices between the capitals and others particularly since the end of the Global Financial Crisis. The non-capital majors also pulled away from the smaller cities in the first few years of the century but growth has been slower since 2007.

Figure 28: Indexed house prices of capital cities, non-capital major cities, midi and mini cities 1992-2014



Source: Unpublished RP Data tables

When this data is expressed as an index (Figure 28), the strong rises in the non-capital majors between 2002 and 2007 is more evident as is the capital cities' strong recovery from the Global Financial Crisis. This figure also shows that the midi cities have pulled away from the minis over the last decade.

Section 4: Changing locational values inside Sydney and Melbourne

As discussed in Information Sheet 65, there are many indexes that rank cities according to their importance in the international trade network. Sydney generally ranks about 10 -12 in these indexes which is about where it would be expected given that Australia is the world's 12th largest economy (Global Economic Institute 2014) Melbourne generally comes in about eight or ten places further down.

Given the importance of these cities to Australia's international trade, this section examines how the locational values inside them have changed over the last 22 years. In particular, it looks at median prices in the Statistical Subdivisions to assess whether the locational values of those areas of the city that are most exposed to international trade, called the 'Global Arc' in Sydney, are growing faster than those that are less exposed.

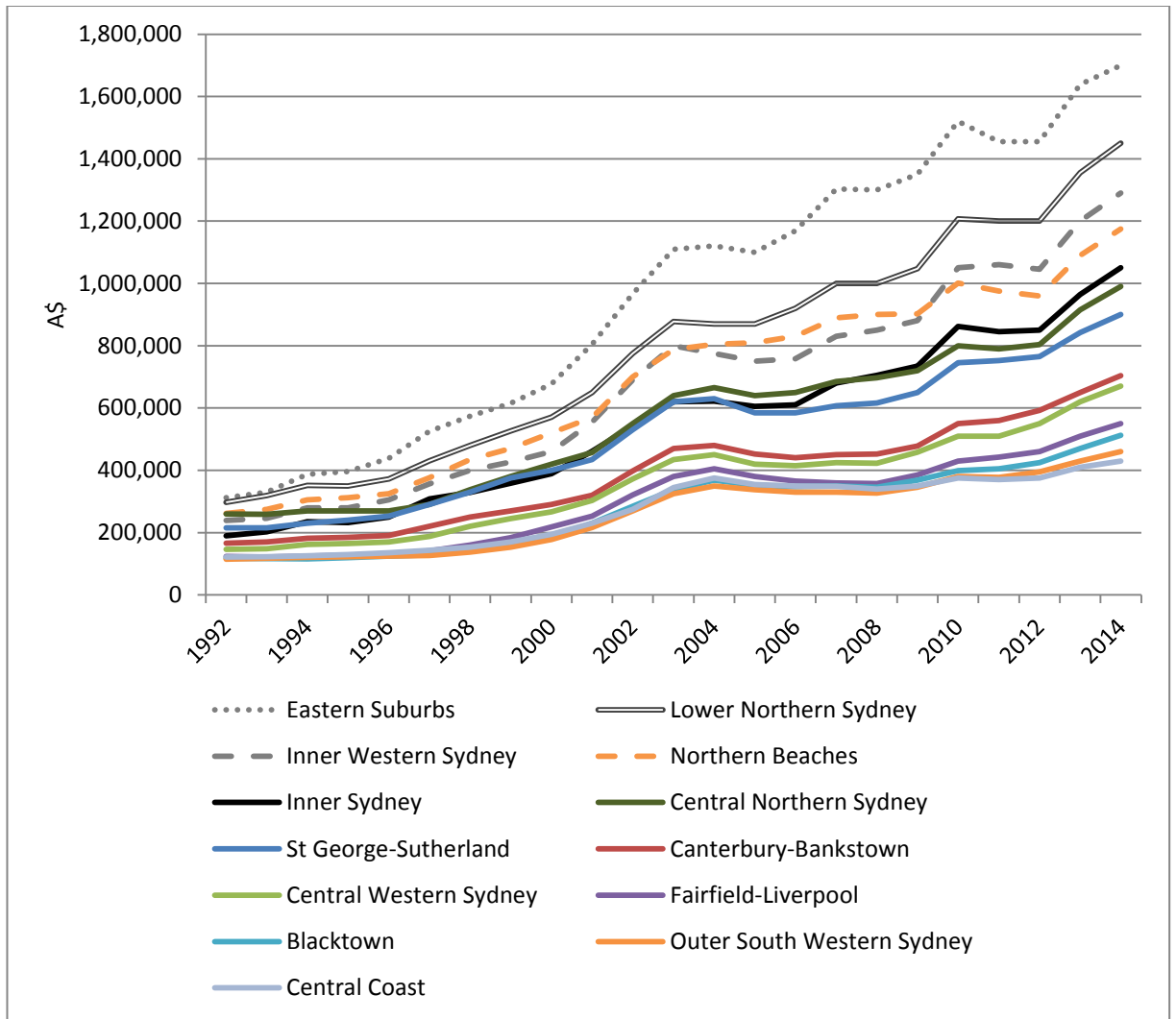
Sydney

Map 3: Sydney showing Statistical Subdivisions and the location of the airport, sea port and Central Business District (CBD)



Noteworthy in Map 3, is the close proximity of Sydney's CBD, Port Botany and Kingsford-Smith Airport. This gives Sydney a great advantage in international trade because it lowers the cost of internal transport between these locations. The areas of the Global Arc, discussed below, are shaded in pale green.

Figure 29: Nominal house prices in Sydney's Statistical Subdivisions 1992-2014

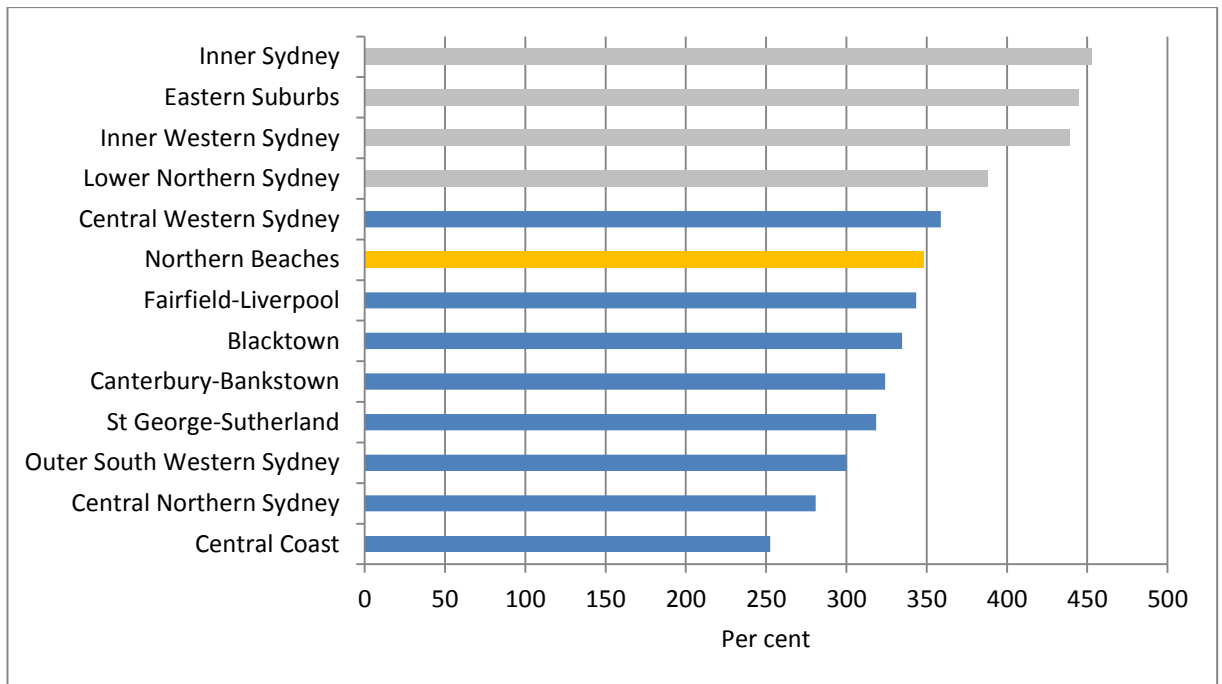


Source: Unpublished RP Data tables

Figure 29 shows nominal house price changes for the 13 Statistical Subdivisions of Sydney. Of note is that the order has not changed significantly for the 22 years for which data is available. The most expensive areas in 1992 were even more expensive in 2014. Most obvious is that the areas towards the top are in an arc from the airport to the north shore with prices generally falling according to the distance from this arc. These regions are coloured in shades of grey in Figure 29 and the following Figures 30 and 31.

An exception to this trend is the Northern Beaches (the orange dotted line) where price growth has also been relatively high. This effect is what is known colloquially as the 'Macedon bump' after Mt Macedon on the outskirts of Melbourne. These are areas, generally on the edge of cities that offer high amenity within an hour or so from the centre of the city. The *2013 State of Australian Cities* noted this phenomenon in its discussion of skills which fell with distance from the centre of the cities only to rise again at the very edge. The discussion of house prices in the United States section of the Information Sheet 65 also noted this 'Macedon bump' for New York and Chicago suggesting that it may be an international phenomenon.

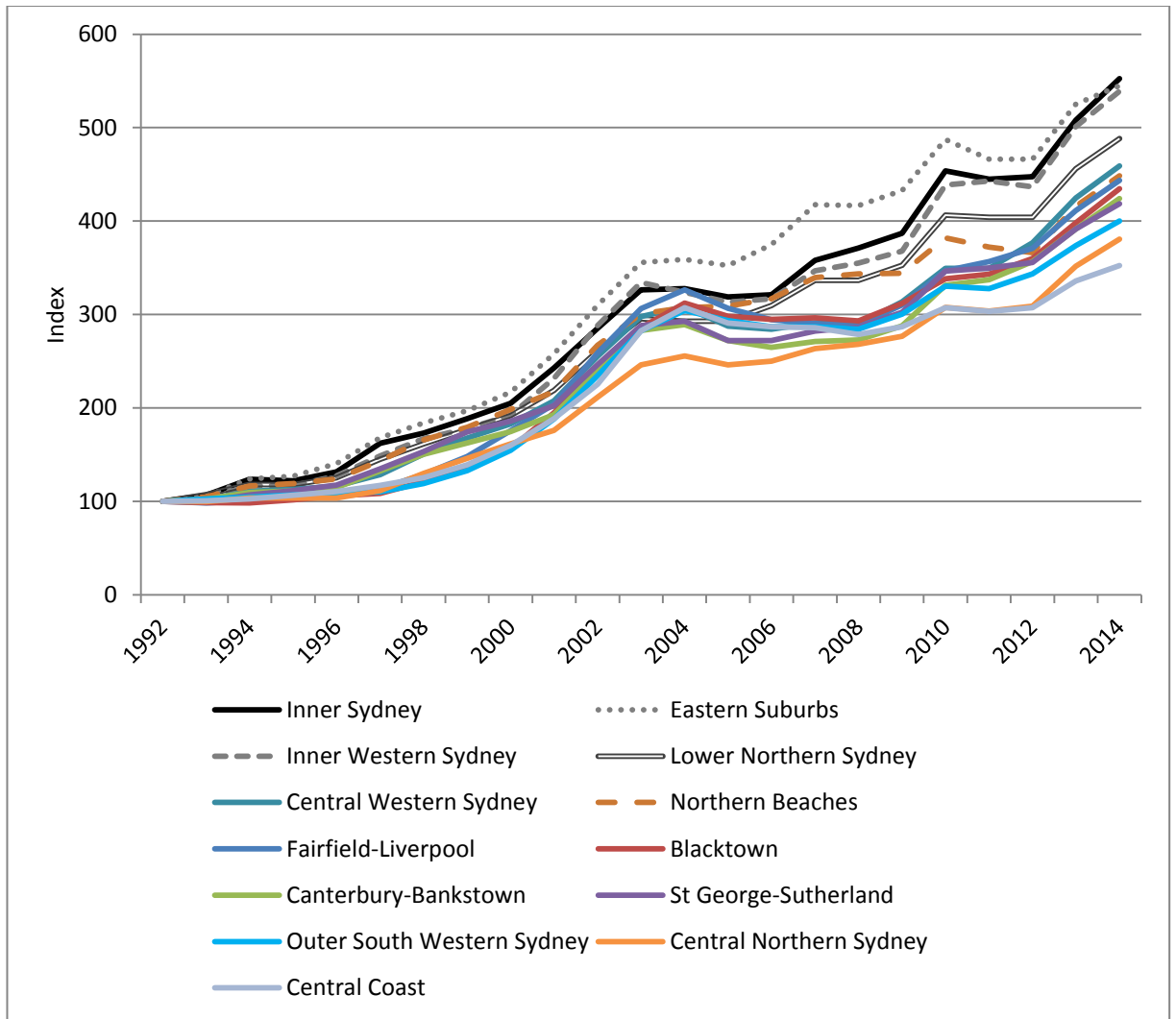
Figure 30: Percentage house price growth in Sydney's Statistical Subdivisions between 1992 and 2014



Source: Unpublished RP Data tables

The ranking of the growth in locational value is clearer in Figure 30. In particular, the stronger growth in the Global Arc, the grey bars on the graph, is apparent. The concept of a Global Arc for Sydney, essentially an area stretching from Kingsford-Smith, through the CBD and Eastern Suburbs and on to the North Shore, has gained currency over the last decade. Hu (2013) has calculated a Global Competitiveness Index for Sydney's Local Government Areas using measures of industry type (percentage of Advanced Producer Services), the human capital of the workforce and income. Allowing for the different geographic units used in this study and Hu's, those parts of Sydney with a high Global Competitiveness Index are also the ones recording the highest growth in Figure 30.

Figure 31: Indexed house prices in Sydney's Statistical Subdivisions 1992-2014

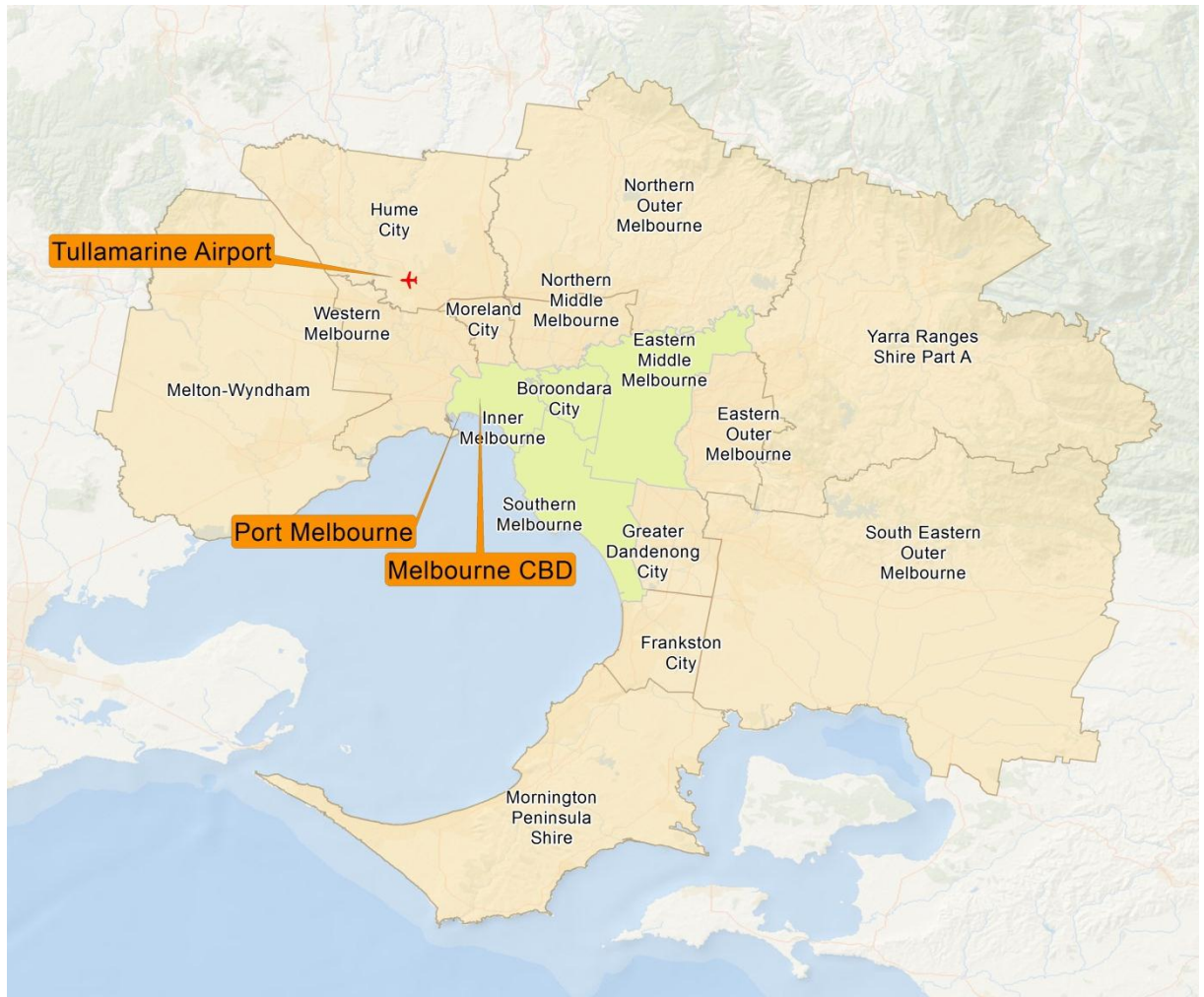


Source: Unpublished RP Data tables

When the data is expressed as an index graph in Figure 31, the higher growth in values towards the centre of the city, particularly since 2005, becomes more apparent. There seems to be three groups. The Global Arc at the top in the grey shades, another group of mostly mid ring areas in the middle group with values being subdued towards the outside of the city (the Central Coast, Outer South Western Sydney and Outer Northern Sydney that is accommodating much of Sydney's current growth). Blacktown's growth is relatively higher when shown as an index.

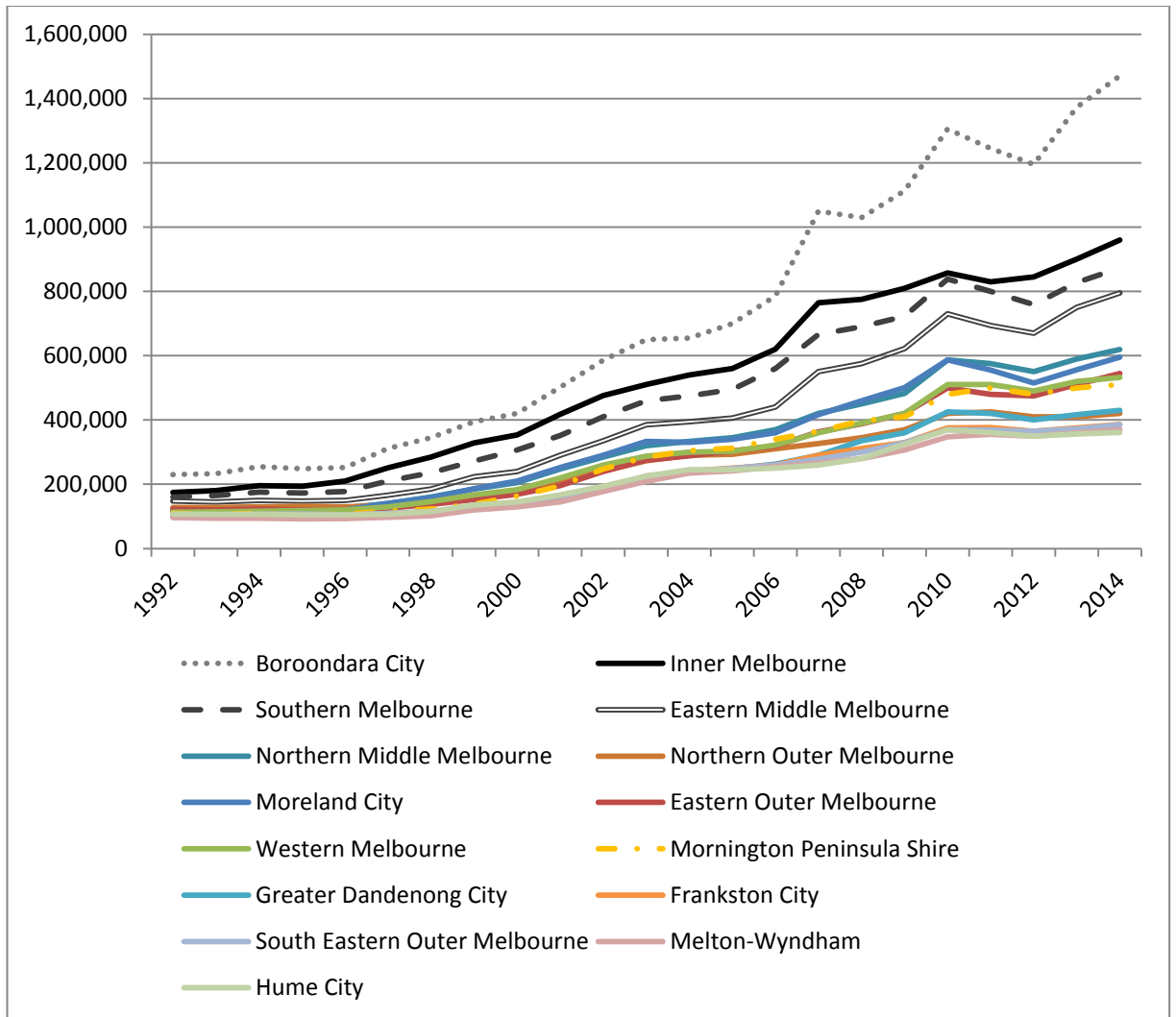
Melbourne

Map 4: Melbourne showing Statistical Subdivisions and the location of the airport, sea port and Central Business District (CBD)



A key aspect to note in Map 4 is the distances between the CBD, Port of Melbourne and Tullamarine Airport. Melbourne's CBD and Port are only 8 minutes apart by road but it takes 28 minutes to travel by car from the CBD to the airport. Readers are reminded of Figure 7 showing that the Port of Melbourne has a much larger share of the city's international trade than Tullamarine. Kingsford Smith and Port Botany are located almost equidistant from each other and the CBD and share Sydney's international trade value virtually equally. The internationally exposed areas of Melbourne (equivalent to Sydney's Global Arc), those that are near the CBD and the port, are shaded in pale green.

Figure 32: Nominal house prices in Melbourne's Statistical Subdivisions 1992-2014

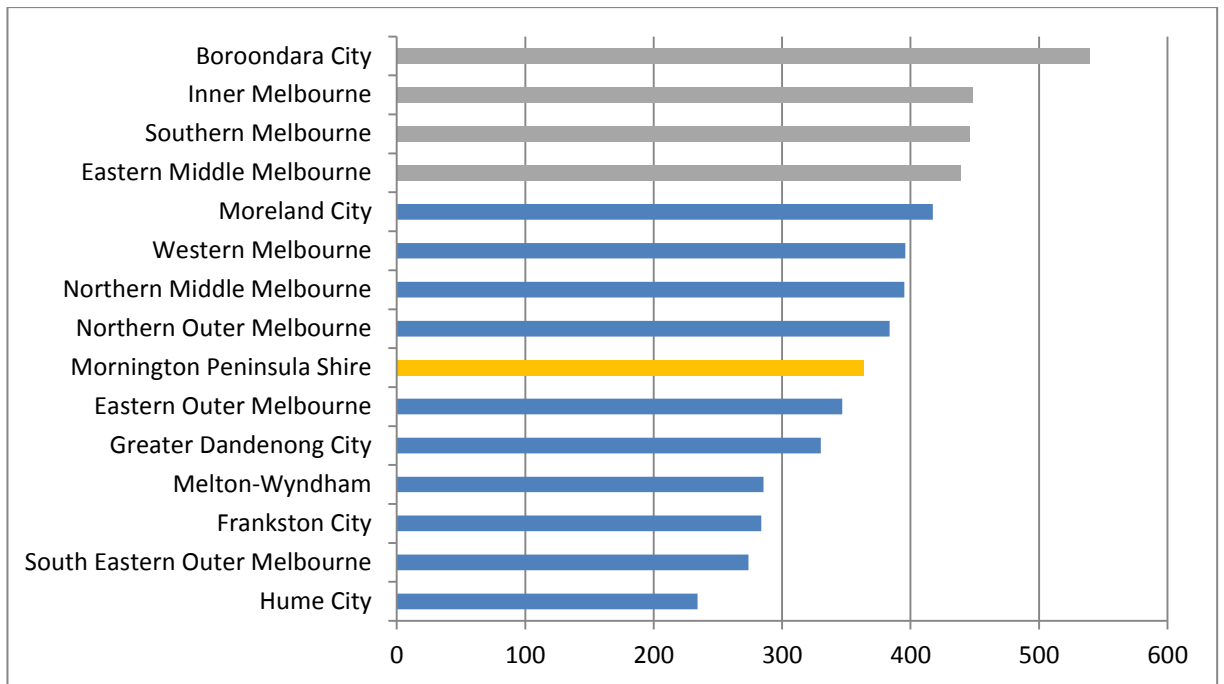


Source: Unpublished RP Data tables

Perhaps the most notable feature of Figure 32 is the rapid growth of Boroondara City to the east of Melbourne's CBD. This area is a place of high amenity and is richly served by mass transit links to the CBD where many of its house owners work (BITRE 2011). The growth in the value for Boroondara shows no signs of slowing, if anything this area is increasing its divergence from the rest of the city. Three other areas, Inner Melbourne, Southern Melbourne and Eastern Middle Melbourne, are also pulling away, particularly since the Global Financial Crisis. These four Subdivisions have lines in shaded grey to signify that they are in a more internationally exposed part of the city. The growth in values in Moreland City that adjoins both the University of Melbourne and the Royal Melbourne Institute of Technology will be more apparent in the index graph below.

As in Sydney's case, the areas in the lower portion of the graph are towards the outer parts of the city. Before leaving this graph, the reader's attention is directed at the difference in the quantum of the fall in house prices post the Global Financial Crisis in 2008. As shown in Figure 35 in Information Sheet 65, this was the sharpest fall in international trade Australia has experienced for 150 years. The effect of this fall was felt most profoundly and immediately in the house prices of those areas of the city most exposed to international trade.

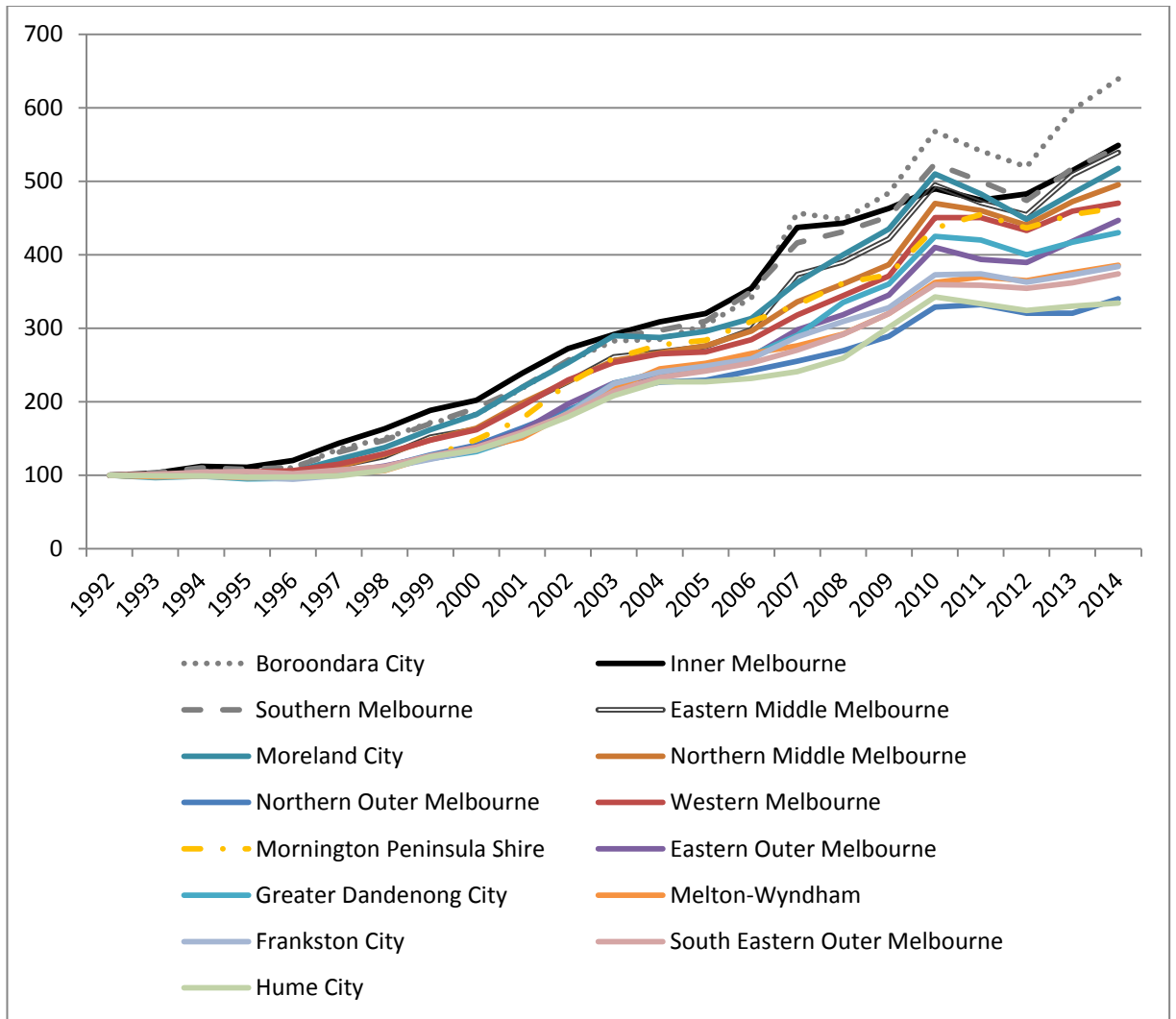
Figure 33: Percentage house price growth in Melbourne's Statistical Subdivisions between 1992 and 2014



Source: Unpublished RP Data tables

The bar graph of Figure 33 shows that since 1992, the growth in value of the inner areas (grey bars) of the city has more than doubled the outer areas. Western Melbourne, the site of much of Melbourne's freight and logistics industries, also posted solid growth.

Figure 34: Indexed house prices in Melbourne's Statistical Subdivisions 1992-2014

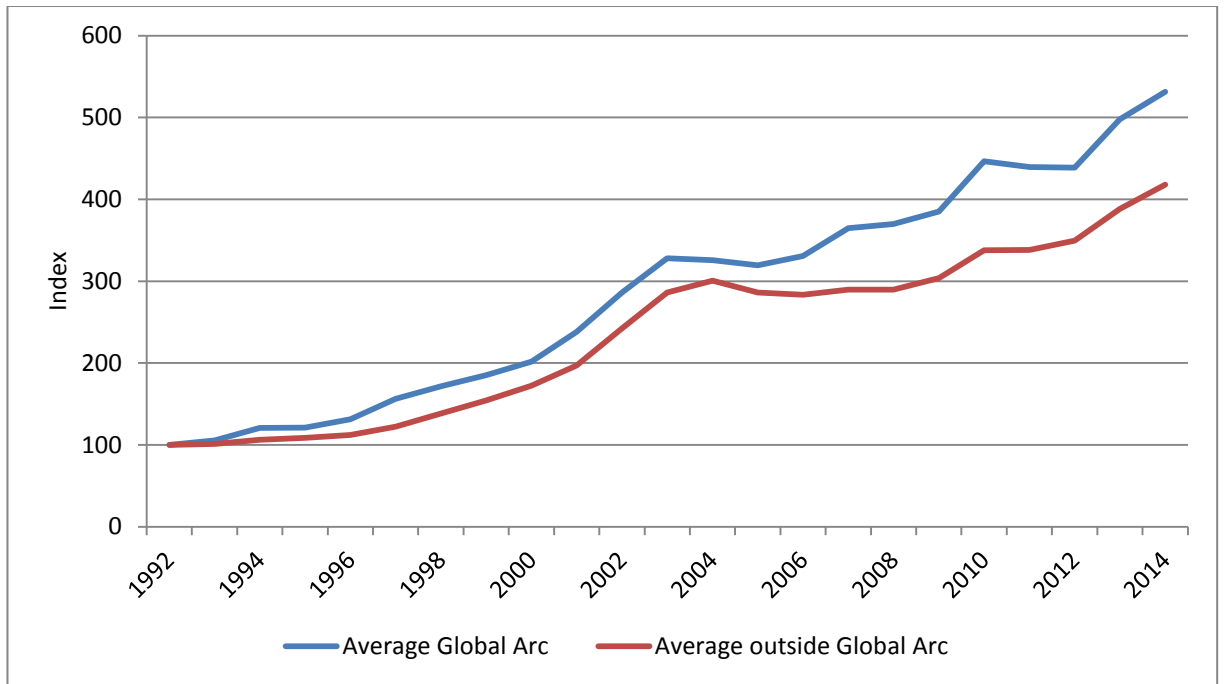


Source: Unpublished RP Data tables

The index graph of Figure 34 shows more clearly the differences in the rate of recovery from the Global Financial Crisis induced downturn. The value increase in Moreland City that takes in the suburbs of Brunswick and Coburg is also more evident in this graph. Towards the centre of the city, prices have recovered strongly while towards the edge, prices remain subdued.

The reader's attention is directed to areas at the edge of Melbourne's internationally exposed areas such as Northern Middle Melbourne. This Subdivision seems to be gradually pulling away from the regions below it as the internationally exposed areas of Melbourne expand along City Link in a similar way to the rise in Central Western Sydney values as Sydney's Global Arc expands along Parramatta Road. Before leaving this graph, the reader's attention is drawn to the Mornington Peninsula (the dashed orange line) that like the Northern Beaches of Sydney (a dashed orange line in Figures 29 and 31) is a place of high amenity on the outskirts of the city. The trajectory of the relative house price growth of the two areas is very close indeed.

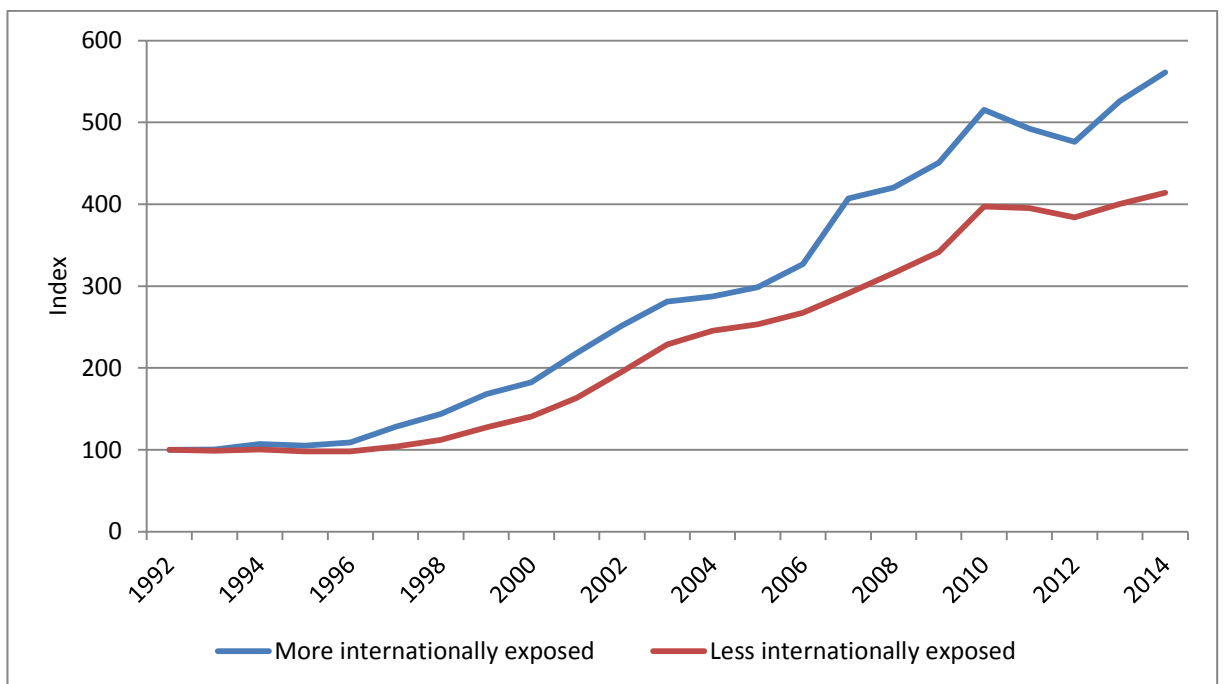
Figure 35: Indexed house prices inside and outside Sydney's Global Arc 1992-2014



Source: Unpublished RP Data tables

Figure 35 is an index graph showing the value trajectory of those areas of Sydney within the Global Arc (Inner Sydney, Eastern Suburbs, Inner Western Sydney and Lower Northern Sydney) and those outside it. As in so many instances in this paper, the year 2005 marks a parting of ways which increased over the Global Financial Crisis. It would be a courageous commentator that would attempt to predict house prices a decade ahead, nevertheless as a preparation for the last section of this paper; the reader is asked to imagine what the situation would be like in 2024 should these trends continue.

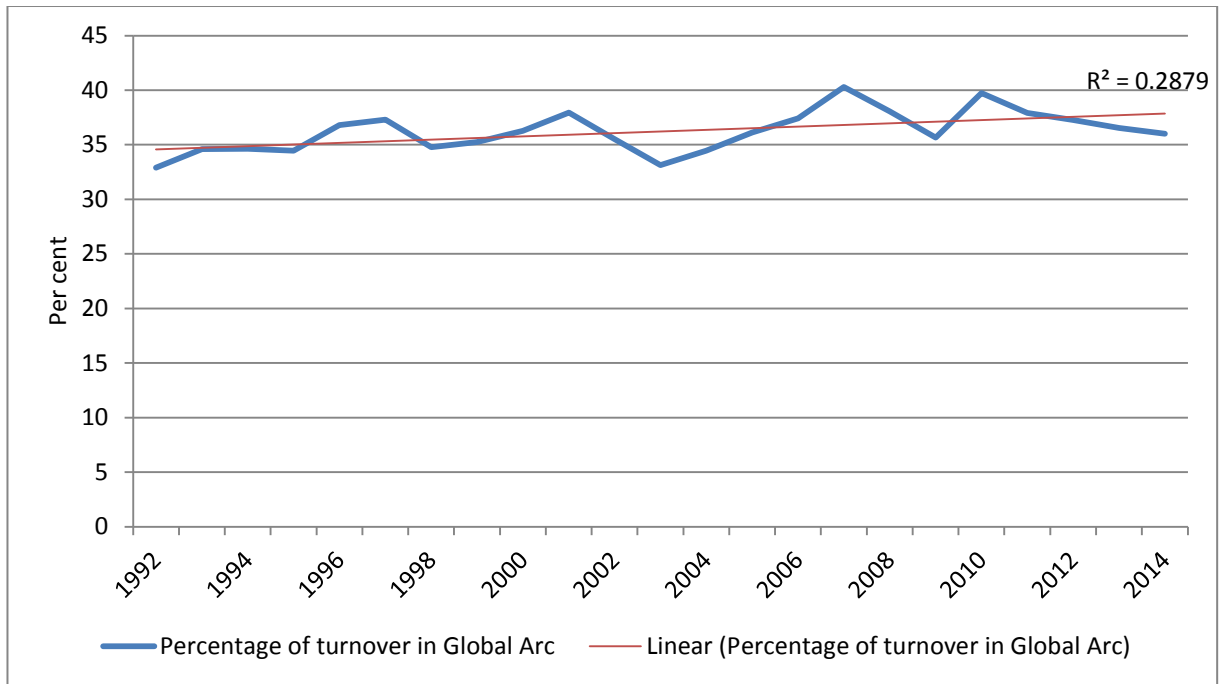
Figure 36: Indexed house prices inside and outside Melbourne's internationally exposed areas 1992-2014



Source: Unpublished RP Data tables

Figure 36 shows that the situation in Melbourne is very similar.

Figure 37: Percentage of the value of Sydney's house price turnover inside the Global Arc

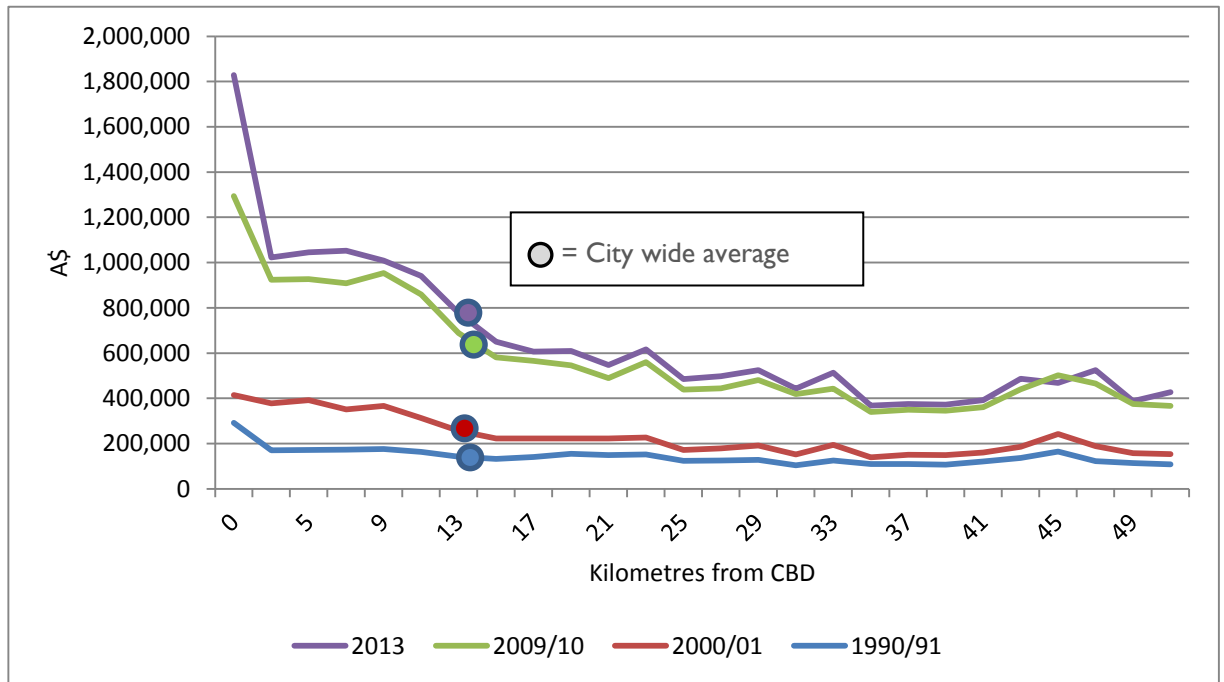


Source: Unpublished RP Data

Figure 37 is somewhat tangential to this paper but is included to inform the public discourse on housing. One of the questions arising from Figures 35 and 36 is, if the prices within and outside the Global Arcs of Sydney and Melbourne continue to diverge is the average price for Sydney or Melbourne still meaningful? To test this using Sydney as an example, the total value of sales *turnover* (median price by total number of houses and units sold) was calculated for each Statistical Subdivision. The Statistical Subdivisions were then aggregated into those inside and those outside the Global Arc. Then the percentage Sydney's total sale value that was inside the Global Arc calculated. The results suggest that by and large, the average price for Sydney is still representative of the city. The main reason for this is that the value of sales of houses and units inside the Global Arc represent less than a quarter of Sydney's total turnover. Thus, the effect of the divergence in prices is muted by the much larger volume of sales outside the Global Arc.

Conclusion

Figure 38: Median value of houses in Melbourne by distance from the CBD 1990-91 to 2013 and average Melbourne house prices for that year.



Source: Unpublished data from SGS Economics and Planning

Figure 38, the last in this section, is included as its capstone. Drawn from data from SGS Economics and Planning, it shows the changes in Melbourne's house prices since 1990-01 in relation to their distance from the CBD rather than by areas as in the discussion above. There are two key features to note. The first aspect is the increasing divergence in prices across the city. In other words, the affordability 'ramp' is getting progressively steeper. Recalling Figure 27 that showed a widening gap between the locational of Sydney and Melbourne and the rest of Australia, much of non-metropolitan Australia is unseen to the right of this graph. If this is linked to the increasing importance of international trade as a proportion of Australia's GDP which shows no signs of slowing, what will the economic geography of Melbourne and by extension the rest of Australia look like in the future if the price ramp becomes even steeper?

The second aspect of the graph is that the average house price for the whole city for the year of the lines (marked with the dots) stays within a few hundred metres of the 14 kilometre radius for the entire 23 years of available data. Interestingly, the demographic centre of Melbourne has also stayed within a few hundred metres of the Tooronga Railway Station in the south-eastern suburb of Malvern since 1981 and the employment centre has stayed within a five minute walk of the next station on the line, Gardiner in Glen Iris. Although this suggests a fundamental structure of cities, more data and analysis from other cities will be needed to confirm it.

Section 5: Analysis

In the course of Information Sheets 65 and 67 there has been a gradual move to a finer geographic scale. Information Sheet 65 dealt with the relationship between international trade and locational value at the continental scale while this paper has moved from the city scale to areas within cities and finally within one city. The time scale has also become finer. The first paper dealt with movements at a decadal scale and in this paper the time scale has become finer with the geographic resolution. Now the paper will be looking at annual changes.

This section analyses the mathematical relationship between locational value, as expressed by house prices and international trade. It does this by testing a hypothesis that a change in international trade will be reflected in house prices 18 months later. To do this, a regression model is used to analyse the relationship between changes in the value of international trade flowing through cities' air and sea ports and house prices 18 months later (a lagged regression) to predict what house prices will be in the future based on international trade values.

The difference between the actual house values and the predicted values are shown on a graph. The regression output is shown below the line graph. The first two figures will deal with the Global Arc/non Global Arc areas of Sydney and Melbourne. The next two largest cities, Brisbane and Perth, are then discussed. The last analysis is of Townsville, here used as an example of medium sized cities with a significant port and airport.

The purpose of this section is not to demonstrate a way to forecast house prices but rather assess the strength of the relationship between trade and locational values.

Figure 39: Relationship between modelled and actual house values inside and outside Sydney's Global Arc 1996-97 to 2014-15

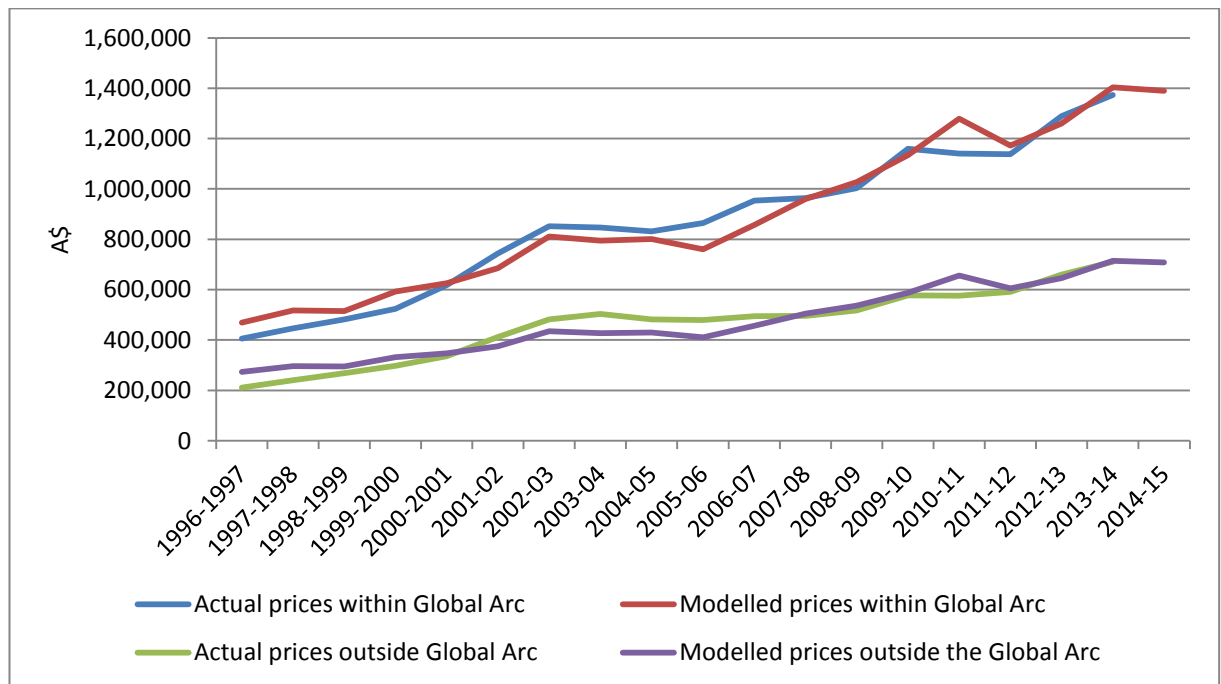


Table 2: Regression outputs for Sydney

<i>Sydney inside Global Arc</i>						
Multiple R		0.971092961				
R Square		0.943021538				
Adjusted R Square		0.939222974				
Standard Error		66670.06204				
Observations		17				

ANOVA						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	1	1.10348E+12	1.10348E+12	248.2573711	9.67608E-11	
Residual	15	66673457584	4444897172			
Total	16	1.17015E+12				

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	-50336.72639	58703.47347	-0.857474412	0.404675285	-175460.2182	74786.76546
International trade	10.03257142	0.636738609	15.75618517	9.67608E-11	8.675395203	11.38974764

<i>Sydney outside Global Arc</i>						
Multiple R		0.949038362				
R Square		0.900673812				
Adjusted R Square		0.894465926				
Standard Error		46413.59971				
Observations		18				

ANOVA						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	1	3.12546E+11	3.12546E+11	145.0854134	1.94849E-09	
Residual	16	34467555811	2154222238			
Total	17	3.47014E+11				

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	28564.45503	37672.06302	0.758239734	0.459331289	-51296.75099	108425.661
International trade	4.732286434	0.3928793	12.04514066	1.94849E-09	3.899419523	5.565153344

Figure 39 and the accompanying regression outputs indicate that there is a close relationship between international trade values flowing through Port Botany and Kingsford-Smith and later house price changes and that the widening gap between locational values within the Global Arc and those outside will continue. The model also suggests that Sydney house prices will stabilise or fall slightly during 2014-2015 in response to the falling value of international trade flowing through its ports and airports.

It is important to emphasise here that the paper is not asserting that international trade is the sole determinant of house prices. Annual fluctuations in international trade can also reflect the overall health of the economy or fluctuations in supply. Nevertheless, whether looked at either through a continental lens or a city lens, there is strong evidence that changes in the value of international trade flows is a key contributor to changes in locational value.

Figure 40: Relationship between modelled and actual house values inside and outside Melbourne's internationally exposed areas

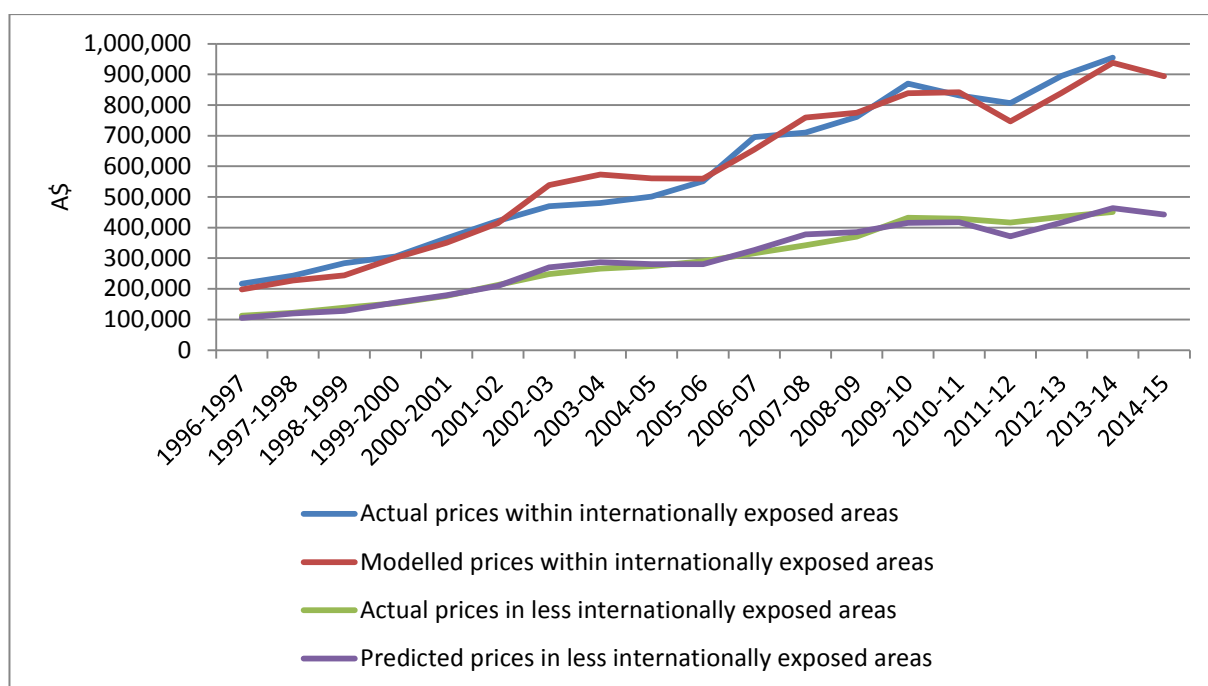


Table 3: Regression outputs for Melbourne

<i>Melbourne inside Global Arc</i>	
Multiple R	0.984272817
R Square	0.968792977
Adjusted R Square	0.966842538
Standard Error	44365.96696
Observations	18

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	9.77684E+11	9.77684E+11	496.7051107	1.79154E-13
Residual	16	31493424390	1968339024		
Total	17	1.00918E+12			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	-350040.9467	42833.01839	-8.17222267	4.20197E-07	-440842.8893	-259239.004
International trade	13.49380446	0.605459501	22.28688203	1.79154E-13	12.21028766	14.77732127

<i>Melbourne outside Global Arc</i>	
Multiple R	0.987680417
R Square	0.975512607
Adjusted R Square	0.973982145
Standard Error	18985.20037
Observations	18

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	2.29742E+11	2.29742E+11	637.3974407	2.56696E-14
Residual	16	5767005328	360437833		
Total	17	2.35509E+11			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	-160587.734	18329.21702	-8.761298091	1.6725E-07	-199443.9383	-121731.5298
International trade	6.541170802	0.25908981	25.24673129	2.56696E-14	5.991924941	7.090416662

Figure 35 shows the model has similar levels of explanatory power for Melbourne albeit with some undershooting of values in the more internationally exposed areas of the city in the last few years. While the model suggests that Sydney's house prices will stabilise in 2014-15, a fall for Melbourne is suggested.

Figure 4I: Relationship between modelled and actual house values in Brisbane

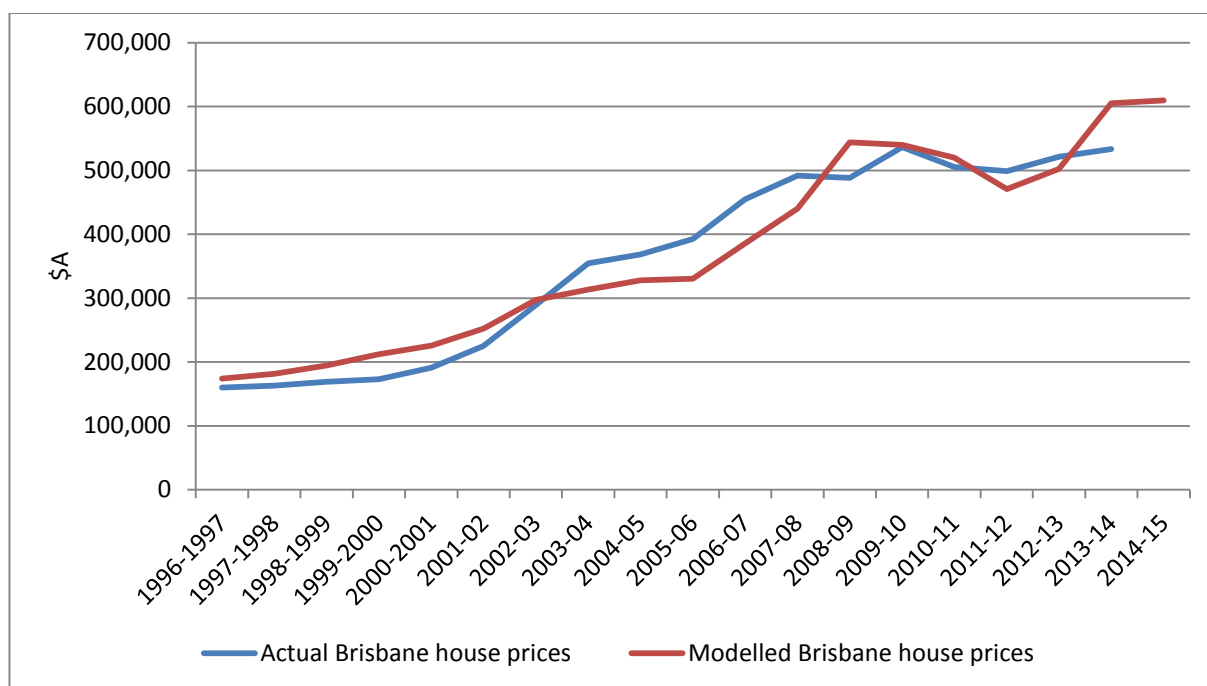


Table 4: Regression outputs for Brisbane

<i>Brisbane</i>	
Multiple R	0.960485259
R Square	0.922531932
Adjusted R Square	0.917690178
Standard Error	42522.95057
Observations	18

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	3.44529E+11	3.44529E+11	190.536712	2.63988E-10
Residual	16	28931221207	1808201325		
Total	17	3.7346E+11			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	45217.16631	25040.17998	1.805784397	0.089799835	-7865.643933	98299.97655
International trade	11.93683878	0.864768766	13.80350361	2.63988E-10	10.10361089	13.77006667

While the explanatory power of the model is still very good for Brisbane in Figure 4I, there are sustained periods of undershoot and overshoot of modelled house prices although these are generally under five per cent. The model suggests a rise in Brisbane house prices during 2014-15 as locational values better reflect the increase in the value of trade flowing through Brisbane's sea port and airport.

Figure 42: Relationship between modelled and actual house values for Perth showing Perth/Fremantle and all Western Australian trade

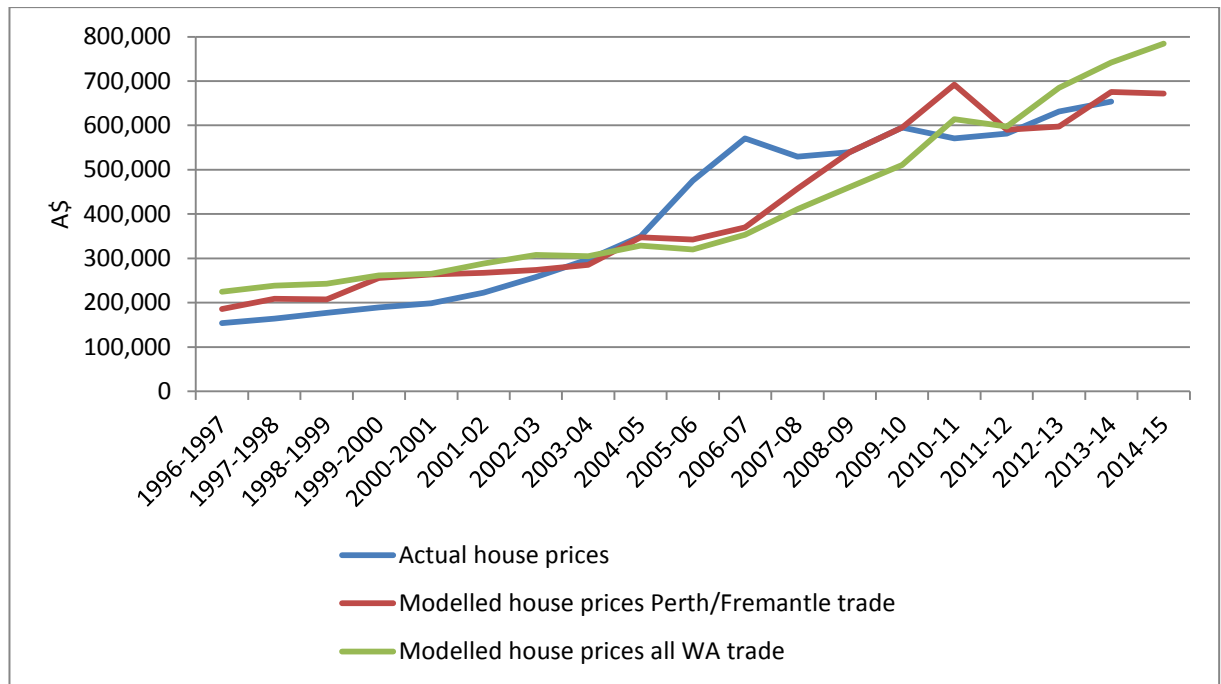


Table 5: Regression outputs for Perth

<i>Perth airport and sea port</i>	
Multiple R	0.9182516
R Square	0.843186002
Adjusted R Square	0.833385127
Standard Error	76989.29293
Observations	18

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	5.0994E+11	5.0994E+11	86.03170747	7.74152E-08
Residual	16	94837619611	5927351226		
Total	17	6.04778E+11			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	24725.70119	44109.49716	0.560552778	0.582867466	-68782.25559	118233.658
International trade	11.53979665	1.244138945	9.27532789	7.74152E-08	8.902339911	14.17725339

<i>Western Australian air and sea ports</i>	
Multiple R	0.873561943
R Square	0.763110468
Adjusted R Square	0.748304872
Standard Error	94626.08064
Observations	18

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	4.61512E+11	4.61512E+11	51.54203044	2.19254E-06
Residual	16	1.43266E+11	8954095138		
Total	17	6.04778E+11			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	138417.9601	42438.89807	3.261582331	0.004900101	48451.51517	228384.405
International trade	3.915639982	0.545408614	7.17927785	2.19254E-06	2.759425371	5.071854593

The fit between the modelled value and the actual value (red and blue lines) in Figure 42 is not as good for Perth as it was for Sydney and Melbourne. Like Geraldton in Figure 23 above, house prices ran ahead of international

trade between 2005-06 and 2008-09 before they undershot for a period. The model is suggesting Perth house prices will be flat for the period 2014-15.

Given that a significant number of Fly-In Fly-Out (FIFO) workers from Perth are employed in export industries in the north of the state, another model was built (the green line) to see whether there might be a better match between Perth house prices and the total international trade flowing through Western Australia's sea and airports. As the regression table shows, the model has lower explanatory power than the one based on the Fremantle/Perth airport trade.

Figure 43: Relationship between modelled and actual house values for Townsville

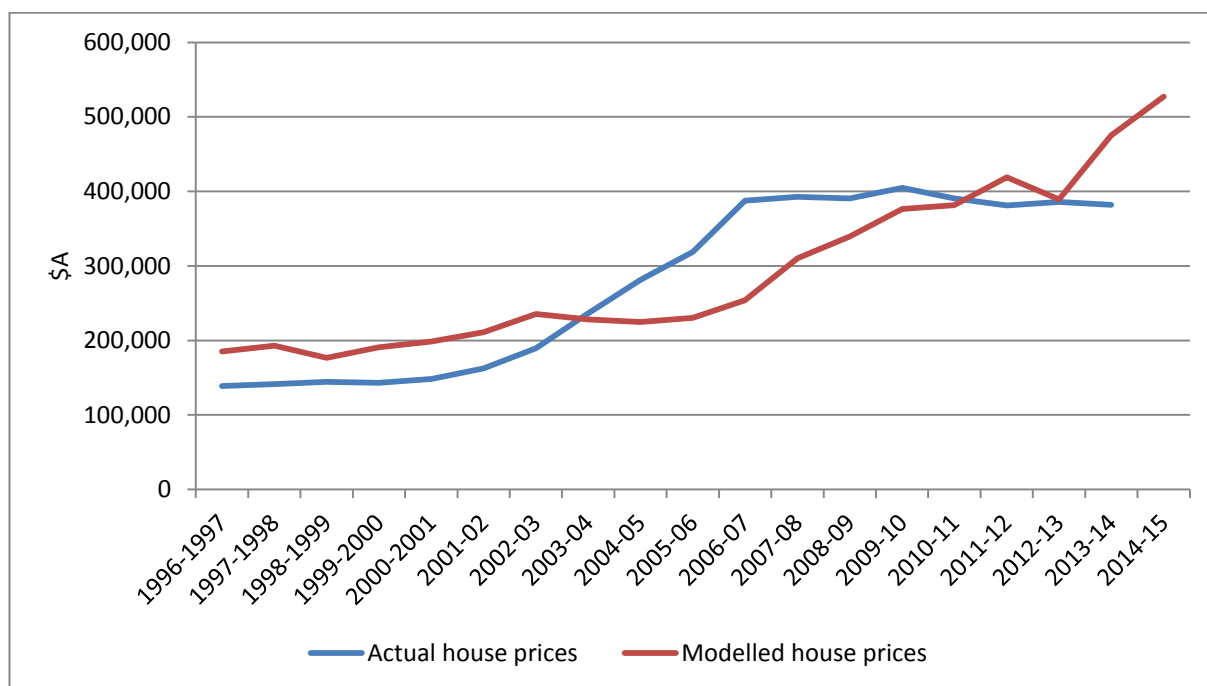


Table 6: Regression outputs for Townsville

Townsville	
Multiple R	0.837232219
R Square	0.700957789
Adjusted R Square	0.682267651
Standard Error	63417.54977
Observations	18

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	1.50834E+11	1.50834E+11	37.50415225	1.4666E-05
Residual	16	64348569898	4021785619		
Total	17	2.15182E+11			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	97077.00416	33231.69131	2.921217679	0.009990944	26628.96566	167525.0427
International trade	35.75910701	5.839114459	6.124063378	1.4666E-05	23.38073733	48.1374767

To test the relationship between international trade and locational value in a city with a sea and airport but without a significant presence of Advanced Producer Services, a model was built for Townsville. This model has less explanatory power than those for the metropolises indicating that although there is a relationship, the link between locational value and international trade flows is weaker in Townsville.

Conclusion

Alan Berube and Joseph Parilla captured the essence of the issues discussed in these papers when writing on cities and trade for the Brookings Institution, 'Metro areas not only facilitate trade, but are also themselves an

outcome of trade' (2012:12). In other words, cities both large and small exist for trade and are formed by that trade. If international trade becomes more important then all cities, wherever they are in the network, will be affected.

Part of the effect will be the inexorable forces of location. It is a truism that bears repeating, 'Geography does not argue, it simply is' (Gray 2013:136). If the centre of gravity for Australia's trade moves north and west then those cities located there will be advantaged. This is what Robert Kaplan describes as the *Revenge of Geography* (2013). However, as Kaplan makes clear, geography is not always destiny. Part of the effect of the shift in trading geography will always be in a city's agency. Those cities that improve their nodal efficiencies by, for example, reducing trade frictions through efficient transport and logistics or increase their amenity value will improve their value in the network.

The changing of relative locational values in Australia has profound implications for the nation's economy and society as well as transport provision. Among them are:

- *Geographic labour mobility.* One of the main reasons cities exist is to provide what are called thick labour markets i.e. a large labour force available to fill jobs as they become available. Thick labour markets have three main benefits; first, they allow better job matching because it is more likely that a person with the right skills for the job is available. Second, the workforce can share infrastructure thus significantly reducing costs. Third and most importantly, thick labour markets allow greater division of labour. In other words, greater specialisation. Therefore, any thinning of the labour market will significantly reduce productivity.

A divergence in locational value reduces geographic labour market mobility both between cities and within them and thins labour markets. Figures 28 and 38 amongst others indicate just such a divergence in Australia. This increasing divergence is long standing and changes in the geography of trade are behind it. This would indicate that the divergence is structural rather than cyclical. As each year goes past, anyone contemplating a move from, for example, an inland regional centre to a metropolis to access high value jobs, will face an ever increasing challenge to buy a house near the job. Anyone who already lives in a metropolis and outside the Global Arc (used here in the generic sense) and wishes to access high value jobs inside it also faces an increasing challenge to afford a house within a 35 minute commute². Because of this divergence in locational values, the number of people that have access to jobs connected to international trade is reduced and the labour market is thinner in precisely the area of the Australian economy that is growing.

A key response to this is urban densification. Both the 2012 and 2013 State of Australian Cities reports charted the increasing density in the centre of large cities, describing it as 'cities shrinking in on themselves'. It is an open question however, whether the current rate of this process can provide sufficient thickness to the trade exposed labour markets to prevent a loss of productivity.

- *Social equity.* As figure 38 showed, In just twenty years, Melbournians have gone from a situation where the average house buyer could purchase a home virtually anywhere in the city and had access to the whole of the city's job market to one where they are unable to afford the housing that will allow them to access the high value jobs in the city centre. This situation is being replicated at scales both large and small across Australia and in all probability, most developed countries. This 'geographic sieving' by house values is similar to that of human capital discussed in SOAC 2013. A recent Australian Housing and Urban Research Institute (AHURI) report has also identified the suburbanisation of disadvantage in Australia (Cheshire et al 2014).
- *Infrastructure provision.* Often the most critical constraint on the provision of urban transport infrastructure is space (mainly land prices). Space is becoming progressively more expensive inside the Global Arcs of the metropolises precisely where the advanced transport infrastructure that is needed to reduce the internal frictions in international trade needs to be located. As the proportion of international trade in Australia's economy progressively increases, the challenge of infrastructure provision will become progressively more acute. These connections affect the nation as a whole since if the main nodes are functioning poorly, the whole network is degraded.

² The 35 minute commute refers to the operation of Marchetti's constant. Marchetti proposed that people will devote an average of 90 minutes a day to travel and no more. There is strong evidence in Australian and overseas cities that around 35 minutes is the ceiling for average commuting times (SOAC 2012).

The other implication of the changes in the relative value of space goes to transport modes. Urban transport systems are essentially a compromise between access and space efficiency. Light passenger vehicles are very accessible. They can generally transport people from where they are usually to the door of their destination. The downside is that they need a lot of space to do that. This is not a problem when space is cheap, it is when space is expensive. The projected costs of WestConnex in Sydney and the East West Link in Melbourne are examples of the effect of expensive space on the cost of road infrastructure.

Mass transit, especially heavy rail, can be very space efficient. A single commuter line operating at peak efficiency can move as many people as a ten lane freeway (Hale 2011). The downside is that accessibility is low. Heavy and light rail generally only services people who can afford to live within walking distance of the station³ and their destination if they do not wish to incur the transaction costs of mixed modes. This comparatively lower accessibility is one of the main reasons why the full cost of mass transit is very expensive on a passenger/km basis. Perhaps part of the urban transport and labour market mobility discourse should be how to transition between areas where space is cheap to those where space is expensive.

One of the most important parts of this paper is what was not measured, the triangle between the Advanced Producer Services of the CBD, sea ports and airports in a cities' relationship with international trade. If a city does not possess any of these and does not have amenity value, then its locational value will be growing more slowly than the national average (Information Sheet 65: Figure 44). If the city only has one or two of these and is not an amenity city its locational value will be growing at a much slower rate than the metropolises. Canberra is an example of this because it has Advanced Producer Services but no international airport or sea port. Townsville and Cairns are other examples because they have significant international trade flowing through their sea and airports but do not have a critical mass of Advanced Producer Services.

Of those cities with all three, their relative and actual locational value rise in proportion to the volume of trade flowing through their ports *and* airports and to the extent that the data shows, their international trade in services.

If airports, sea ports and a critical mass of Advanced Producer Services are necessary to become a major node in the international trade network, then as this trade increases as a proportion of GDP the locational value of these cities will increase relative to those that have less than three or none. In other words, it is like a three legged stool. All three legs have to be there for it to be usable.

References

- Berube, A. and Parilla, J. 2012, *Metro trade: Cities return to their roots in the global economy*, The Brookings Institution Metropolitan Policy Program 2012.
- Bureau of Infrastructure, Transport and Regional Economics (BITRE) 2011, *Population growth, jobs growth and commuting flows in Melbourne*, Research Report 125, Canberra.
- Bureau of Infrastructure, Transport and Regional Economics (BITRE) 2014, *International airline activity, Table 4: Scheduled international airport traffic and aircraft movements*, http://www.bitre.gov.au/publications/ongoing/international_airline_activity-annual_publications.aspx.
- Cheshire, L., Pawsin, H., Easthope, H and Stone, W. 2014, *Living with place disadvantage, community practice and policy*, AHURI Final Report No.228. Melbourne: Australian Housing and Urban Research Institute, <http://www.ahuri.edu.au/publications/projects/myrp704> [Accessed 23 October 2014].
- Goldhar, J. and Berg, D. 2010, 'Blurring the boundary: convergence of factory and service processes', *Journal of Manufacturing Technology Management*, 21(3): 341 – 354.
- Gray, C. 2013, *Perspectives on strategy*, Oxford, Oxford University Press.
- Hale, C. 2011, *Evolving futures for Australian and international passenger rail*, presented at the 34th Australasian Transport Researchers Forum 28-30 September 2011, Adelaide.

³ A Pedestrian Shed or Ped Shed for short is the area within walking distance of a facility. For railway stations, this is generally considered to be anywhere within a 10 minute walk or a radius of about 700 meters.

- Hu, R. 2013, Knowledge is power: Measuring the competitiveness of Global Sydney, ANZSOG, Institute for Governance, University of Canberra.
http://www.governanceinstitute.edu.au/magma/media/upload/publication/232_GCI-publication-for-ANZSOG.pdf [Accessed 15 October 2014].
- Kaplan, R. 2013, *The revenge of geography, What maps tell us about coming conflicts and the battle against fate*, New York, Random House.
- Kelly, G. and La Cava, G. 2014, *International trade costs, global supply chains and value-added trade in Australia*, Reserve Bank of Australia Discussion Paper 2014-07, Sydney.
- Lydon, J. David, D. and Bradley, C. 2014, *Compete to prosper: Improving Australia's global competitiveness*, McKinsey Australia, http://www.mckinsey.com/global_locations/pacific/australia/en/latest_thinking/compete_to_prosper [Accessed 25 July 2014].
- Scott, A. 2012, *A world in emergence: Cities and regions in the 21st century*, Elgar, Northampton MA.
- Spiller, M. 2012, *Regional Australia; drivers, prospects and policy directions*, SGS Economics and Planning, <http://www.sgsep.com.au/assets/downloads/Regional-Australia-drivers-prospects-and-policy-directions-MSpiller-paper-June-2012.pdf>, [Accessed 23 September 2014].
- State of Australian Cities (2012 SOAC) 2012, Department of Infrastructure and Regional Development, Canberra.
- State of Australian Cities (2013 SOAC) 2013, Department of Infrastructure and Regional Development, Canberra.
- United Nations Conference on Trade and Development (UNCTAD) 2014, *Value of exports and imports of services, annual, 1980-2013*, <http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=101> [Accessed 27 August 2014].
- World Shipping Council 2014, *World port ranking 2014*, <http://aapa.files.cms-plus.com/PDFs/WORLD%20PORT%20RANKINGS%202011.pdf> [Accessed 14 August 2014].
- Xing, Y. and Detert, N. 2010, *How the iPhone widens the United States trade deficit with the People's Republic of China*, ABDI Institute Working Paper no: 257, <http://www.adbi.org/working-paper/2010/12/14/4236.iphone.widens.us.trade.deficit.prc/how.iphones.are.produced/>. [Accessed 4 August 2014].

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