3. Structural change

Key points

- Change in the industrial composition of the economy (‘structural change’) has implications for a wide range of policy areas. Structural change influences economic growth, labour market outcomes, infrastructure demand, trade policy and spatial policy.

- The impacts of structural change vary across regions. Some regions benefit from it, particularly when it is driven by growth in important local industries. Conversely, some regions are negatively influenced by it, particularly when they bear the cost of industrial decline.

- Between 2001 and 2011, major trends at the national level include growth in the Mining, Construction and Health Care and Social Assistance, with a declining reliance on Agriculture, Forestry and Fishing, Retail Trade and Manufacturing industries.

- These national trends are amplified in regional Australia. The mining boom has had a strong employment impact in regional and remote areas. Declines in agricultural employment are also concentrated in regional and remote areas.

- Analysis of sub-state regions (SA4s) shows that regions with small populations, low average incomes and a relatively concentrated industry structure were more likely to have experienced high rates of structural change over the period 2001 to 2011.

- Large regions with a diverse industrial structure were less exposed to volatile shifts in industrial composition over the same period.

3.1 Introduction

Structural change can be explained as the constant evolution of the economy as some industries grow and others decline. Over time, this results in changes to the industrial composition or ‘structure’ of the economy.22

For the most part, structural change is a necessary and beneficial aspect of a functioning market economy. It is a sign that businesses are responding to price signals to produce goods and services that are valued by the market. In a technical sense, it means that factors of production are being allocated to their most efficient uses and this ultimately contributes to improvements in living standards (OECD 2005).

However, high levels of structural change cannot be interpreted as being either unambiguously good or bad for a particular region, because change imposes costs on people and businesses that are affected by industrial decline. The impact on any individual region can be either positive or negative, depending on whether change in that area is

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22 Within regions, change can be gradual or sudden. An extreme example is the closure of a mine in a small town.
driven by industry growth or decline or a combination of the two. Further, a region can experience strong economic growth in the absence of structural change if most industries grow at a similar rate.

Understanding historical and prospective trends in structural change is a priority for formulating policy across a range of domains. Structural change influences labour market outcomes (including skills demand and educational requirements), infrastructure demand and trade policy. It also has implications for spatial policy: particular industries tend to cluster in specific locations; this means that the impacts of industrial growth and decline tend to be geographically concentrated.

At the national level, Australia has experienced some well documented trends in structural change. However, the focus of this chapter is to examine how structural change has unfolded at lower spatial levels.

This chapter is organised into two main sections. The first analyses a headline indicator—the structural change index—which measures the general rate of structural change occurring within regions. It draws on data from Yearbook 2014 and covers the most recent intercensal period of 2006 to 2011.

The second section provides a more detailed analysis spanning a longer time period. It also focuses on the structural change index but looks more deeply into the relationship between structural change and other economic variables at the sub-state region.

The analysis focuses mostly on labour force data—namely, the share of employment by industry. Labour market data does not entirely explain industrial performance because improvements in productivity can reduce employment in an industry even while its output is growing. Structural change can also be measured in terms of the distribution of investment across industries. For example, in Australia the rate of structural change in investment picked up markedly from 2007–08, reflecting a major shift in investment into resource projects (Department of Industry 2014). However, investment and industrial output data (gross value added) is not available below the state level. Labour force data is therefore the best available indicator that can be disaggregated across both geography and industry and represents the most appropriate measure to be used in a regional analysis of structural change.23

Part of the analysis focuses on Remoteness Classes. These allow high-level trends that vary across major cities, regional and remote areas to be summarised. More specific trends are analysed using SA4s, which are designed ideally to correspond with functional economic zones. Accordingly, the geography is reasonably good for isolating industry-level trends that affect specific sub-state regions.

SA4 boundaries are informed by labour market catchment areas. For most non-metropolitan SA4s, the majority of people who live within a given SA4 will also work there. However, metropolitan SA4s are less self-contained, as large cities comprise multiple SA4s within easy commuting distance of each other.24 Nonetheless they have been included in the analysis where appropriate to provide a basis for comparison against non-metropolitan SA4s.

### 3.2 Headline indicator

#### 3.2.1 Structural change index

The structural change index is a measure of the extent of structural change that occurs in a region based on the change in the industry mix of employment between two points in time. The index can be thought of as the total number of percentage points of employment that has moved between industries within a given time period (Productivity Commission 2013b). This particular analysis looks at movements between the 19 employing industries...
Chapter 3  Structural change

that are defined at the 1-digit level of the Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006.25

The data presented in Table 3.1 below illustrates that structural change can have either a positive or a negative effect on economic outcomes at the regional level. The two Remoteness Classes that experienced the strongest employment growth, major cities and very remote, also experienced the most divergent trends in structural change.

Table 3.1  Structural change index by Remoteness Class, 2006–2011

<table>
<thead>
<tr>
<th>Remoteness Class</th>
<th>Structural change index</th>
<th>Employment growth</th>
<th>Employment growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(index)</td>
<td>(persons)</td>
<td>(%)</td>
</tr>
<tr>
<td>Major cities</td>
<td>3.6</td>
<td>809,785</td>
<td>12.7</td>
</tr>
<tr>
<td>Inner regional</td>
<td>4.1</td>
<td>73,690</td>
<td>4.4</td>
</tr>
<tr>
<td>Outer regional</td>
<td>4.3</td>
<td>48,093</td>
<td>5.8</td>
</tr>
<tr>
<td>Remote</td>
<td>6.2</td>
<td>6,565</td>
<td>4.8</td>
</tr>
<tr>
<td>Very remote</td>
<td>15.5</td>
<td>15,482</td>
<td>24.3</td>
</tr>
<tr>
<td>AUSTRALIA</td>
<td>3.8</td>
<td>954,138</td>
<td>10.5</td>
</tr>
</tbody>
</table>

Note:  Structural change index based on methodology used in Productivity Commission (1998).

Major cities had the lowest rate of structural change between 2006 and 2011, echoing previous findings that populous regions with a diverse economic base are less prone to volatile movements in industry share (BTRE 2003).

Very remote areas also experienced strong employment growth. However, unlike major cities, growth was based on significant shifts in industrial composition. In part, this reflects that very remote areas have a more concentrated industry base and are subject to volatile change caused by booms and busts in key industries. The main contributors to structural change in very remote areas were a marked decline in the employment shares of the Agriculture, Forestry and Fishing, and Public Administration and Safety industries. Figure 3.1 below shows that this decline was more than offset by a very steep increase in the employment shares of Mining and to a lesser extent Construction.

ANZSIC is a classification structure that is used to compile and analyse industry statistics in Australia and New Zealand. It describes industries using a hierarchical structure of four levels. The broadest level refers to industry divisions (also known as 1-digit industries). The next level splits the 19 industries further into sub-divisions (also known as 2-digit industries). While ANZSIC describes industries down to a finer level of detail, this publication focuses only on 1-digit and 2-digit industries. For further information see ABS 2013e.
State of Regional Australia 2015  Progress in Australian Regions

Figure 3.1 Change in employment share for selected industries by Remoteness Class, 2006–2011

Source: ABS (2006a, 2011a) accessed via TableBuilder.

It is important to note that, in regions affected by the mining boom, employment opportunities in the Mining industry do not necessarily flow to the same people who are affected by decline in Agriculture, Forestry and Fishing. Analysis by the Department of Industry (2014) shows that disenfranchised Agriculture, Forestry and Fishing workers most commonly move into Manufacturing and Construction jobs. Interestingly, new jobs in Mining most commonly went to people moving out of Manufacturing and Construction. This may be indicative of churn in the Manufacturing and Construction workforce—that is, skilled workers who are attracted into high-paying Mining jobs being replaced by people moving out of Agriculture, Forestry and Fishing. It may also indicate that Manufacturing and Construction act as bridging industries that allow people to build the skills required in Mining jobs.

Structural change in inner regional, outer regional and remote areas followed similar trends to those in major cities—namely, declining shares for Manufacturing and Retail Trade, with an increase in the employment share for Health Care and Social Assistance. However these regions also experienced large shifts in Agriculture, Forestry and Fishing and also Mining. This resulted in a higher rate of structural change than in major cities and also in lower employment growth, because job gains in Mining were offset by losses in Agriculture, Forestry and Fishing.

Table 3.2 below lists the five sub-state regions with the highest rate of structural change between 2006 and 2011. These results again illustrate that remote regions with smaller populations tend to experience more volatile change in industrial composition. All five regions cover relatively large and sparsely populated geographic areas. The top three regions (Queensland – Outback, Western Australia – Outback and Northern Territory – Outback) cover huge areas of northern Australia that are classed as either very remote or remote. The other two regions of interest (Western Australia – Wheat Belt and Darling Downs – Maranoa in Queensland) are also relatively large and (comparatively) sparsely populated but incorporate more agricultural areas and farming communities that are classed as outer and inner regional areas.

The ‘Other Territories’ SA4 was excluded from the analysis, as it has a significantly smaller population than any other sub-state region and is prone to extreme variance in employment statistics by industry.
### Table 3.2  Structural change index, top five sub-state regions, 2006–2011

<table>
<thead>
<tr>
<th>Sub-state region</th>
<th>Structural change index (index)</th>
<th>Population 2006 (persons)</th>
<th>Employment growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queensland – Outback</td>
<td>10.5</td>
<td>81,082</td>
<td>2.6</td>
</tr>
<tr>
<td>Western Australia – Outback</td>
<td>9.1</td>
<td>199,302</td>
<td>25.3</td>
</tr>
<tr>
<td>Northern Territory – Outback</td>
<td>8.8</td>
<td>95,596</td>
<td>7.7</td>
</tr>
<tr>
<td>Western Australia – Wheat Belt</td>
<td>6.8</td>
<td>128,927</td>
<td>5.0</td>
</tr>
<tr>
<td>Darling Downs – Maranoa</td>
<td>6.6</td>
<td>117,110</td>
<td>5.3</td>
</tr>
<tr>
<td>Average of top five</td>
<td>8.4</td>
<td>124,403</td>
<td>9.2</td>
</tr>
</tbody>
</table>


To some extent, trends by industry were similar across the top five regions (Figure 3.2). In each case, the shares of Agriculture, Forestry and Fishing, Manufacturing and Retail Trade fell, while the shares of Mining and Construction increased. In most cases, this resulted in below average employment growth.

However, the magnitude of these trends varied between regions, reflecting some fundamental differences in their initial industrial composition.

Western Australia – Wheat Belt and Darling Downs – Maranoa are predominantly agricultural regions that saw a sharp decline in both the share and total number of jobs in Agriculture, Forestry and Fishing. This was offset to some degree by growth in the share and number of Mining and Construction jobs, although overall employment growth was below average (around five per cent compared with the national figure of 10.5 per cent).

By comparison, the Northern Territory – Outback covers a larger and more remote area, spanning the entire Northern Territory apart from Darwin. It mostly comprises remote communities and has relatively small Agriculture, Forestry and Fishing, and Mining industries, with a large proportion of employment in government and social service related industries. Structural change in this region can be attributed to a reduction in the share of Public Administration and Safety industries and a rise in Education and Training, and Other Services.

*Figure 3.2  Change in employment share for selected industries in high-change regions, 2006–2011*
The shift from government to private sector jobs may reflect policy changes that have affected the way in which employment services are delivered in remote areas. In particular, the Community Development Employment Projects (CDEP) initiative was phased out from 2007 onwards. This programme had previously employed a large proportion of the Indigenous labour force in the Northern Territory, which was classed as employed in Public Administration and Safety. At the 2006 Census, there were 11,661 Indigenous people employed in the Northern Territory and 8,846 participated in the CDEP programme (Department of Finance and Deregulation 2009).

In 2007, the programme was wound down in urban and regional areas and participants were moved to general welfare and unemployment benefits. Further changes were made in 2009 that affected the way CDEP was administered in remote areas. In established job markets, it was replaced with the Job Services Australia programme and the focus shifted away from providing direct employment and towards building workforce skills (Department of Finance and Deregulation 2009).

The impact of the mining boom is clearly evident in the Western Australia – Outback region. Geographically, this region covers the majority of Western Australia (excluding the south-west corner) and incorporates key mining areas and towns including the Pilbara, the Kimberley, Kalgoorlie–Boulder and Geraldton. Growth in the Mining and Construction industries added close to 13,000 jobs between 2006 and 2011. This more than offset a decline in Agriculture, Forestry and Fishing employment of around 1,000 jobs. As a result, Western Australia – Outback is the only region on the list in Table 3.2 that recorded above average employment growth.

Queensland – Outback also benefitted from growth in Mining and Construction. However it had a much greater reliance on Agriculture, Forestry and Fishing, and Public Administration and Safety at the beginning of the period. Both of these industries contracted in line with trends seen elsewhere.

Table 3.3 below shows that in contrast with regions with high structural change, which tended to be in regional and remote areas, the five sub-state regions with the lowest rate of structural change were all large residential regions in and around Sydney. As discussed in the introduction to this chapter, large metropolitan SA4s are less contained than non-metropolitan regions, as people can commute to jobs in other parts of the city. As such, trends in these SA4s may be more reflective of trends in the Sydney Greater Capital City Statistical Area more generally, and data for this is included for comparison. As might be expected, the rate of structural change in the wider area is also very low and actually matches the average rate of change across the bottom five regions.

The main employing industries in the low structural change group were Retail Trade, Professional, Scientific and Technical services, and Health Care and Social Assistance. Structural change in these regions involved moderate shifts away from Manufacturing and Retail Trade, coupled with rising employment in Health Care and Social Assistance. Note that employment growth for these regions tended to be below average, similar to the top five regions.

Table 3.3 Structural change index, bottom five sub-state regions, 2006–2011

<table>
<thead>
<tr>
<th>Sub-state region</th>
<th>Structural change index (index)</th>
<th>Population 2006 (persons)</th>
<th>Employment growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney – Baulkham Hills and Hawkesbury</td>
<td>2.6</td>
<td>204,320</td>
<td>4.2</td>
</tr>
<tr>
<td>Sydney – North Sydney and Hornsby</td>
<td>2.6</td>
<td>367,060</td>
<td>5.6</td>
</tr>
<tr>
<td>Sydney – Outer West and Blue Mountains</td>
<td>2.7</td>
<td>285,376</td>
<td>3.7</td>
</tr>
<tr>
<td>Sydney – Inner West</td>
<td>2.8</td>
<td>252,768</td>
<td>10.3</td>
</tr>
<tr>
<td>Sydney – Ryde</td>
<td>2.8</td>
<td>160,049</td>
<td>6.3</td>
</tr>
<tr>
<td>Average of bottom five</td>
<td>2.7</td>
<td>253,915</td>
<td>6.0</td>
</tr>
<tr>
<td>Sydney Greater Capital City Statistical Area</td>
<td>2.7</td>
<td>4,256,161</td>
<td>8.4</td>
</tr>
</tbody>
</table>

3.3 Current issue: trends in structural change between 2001 and 2011

This section presents a more detailed analysis of major trends in structural change over a longer time period. Nationally, structural change tends to be a gradual process and data spanning a longer time period can more clearly illustrate important long-run shifts that have shaped the Australian economy. Much of the data is taken from the ABS Census, which provides the best geographic coverage of industrial data. As a result, the analysis generally focuses on the period 2001 to 2011, spanning the most recent and longest period over which comparable industry data is available. Data over a longer time period is provided for a small number of charts as available.

This section begins by setting the scene at the national level before looking more deeply into the way that structural change has varied across regions. The section includes an analysis of structural change by Remoteness Class and also by sub-state region.

3.3.1 National context

At the national level, the Australian economy has been subject to a number of well-documented trends in structural change that have mirrored those in other advanced industrial economies. Over the very long run, these are a declining share of employment in the Agriculture, Forestry and Fishing and Manufacturing, coupled with persistent growth in the share of service industries.

These trends fit within a well-accepted theoretical narrative describing stages of economic development (Soubbotina and Sheram 2000). In undeveloped economies, agriculture tends to be the major industry. But, as economies progress and incomes grow, domestic demand for agricultural output grows at a slower rate than demand for other goods and services given that there is a natural limit to how much food a household needs. Employment also shifts out of agriculture as improved technology and farming practices lift productivity. The combined effect is for greater industrialisation or growth in manufacturing. Later on, productivity growth in manufacturing combined with continued growth in demand for services also leads to a declining employment share in heavy industries and growing share in services. This happens because service jobs generally require more human input and are less easily replaced by technology. As service industries become more advanced, they tend to demand workers with higher skills and education.

The industrial composition of developed countries is now heavily weighted towards services. Developing economies, on the other hand, are currently going through a period of industrialisation, in which the relative importance of Manufacturing is rising and Agriculture still accounts for a large share of the economy. Figure 3.3 below illustrates these trends by comparing the industrial composition of employment in Australia, France and China.27 It uses the broad categories of primary industries (Agriculture), secondary industries (Mining, Manufacturing, Construction and Utilities) and tertiary industries (Combined/Service Industries).28

27 The choice of comparison countries was based on both data availability and stage of development. Like Australia, France is a developed economy with a large proportion of employment in services. It is also one of the only developed countries for which comparable data is available. China, on the other hand, is a developing country that is currently shifting into greater manufacturing and service production.

28 Note that some industrial classification systems describe mining as a primary industry. In this case it is included in the secondary industry group to allow for consistency in comparison with Chinese labour force statistics, which classify mining as a secondary industry.
A closer examination of Australian data further illustrates how productivity improvements have contributed to structural change.

Data on Agriculture, Forestry and Fishing is most telling. Over the past few decades, output has risen, although its share of gross value added has remained roughly constant (Figure 3.4). Its share of employment on the other hand has steadily declined. This reflects improved labour productivity in the industry. The Productivity Commission
attributes this to a number of developments, including a trend towards larger-scale production through increased farm size and the exit of smaller businesses, increased mechanisation and advances in farm practices related to planting, feed management and breeding (Productivity Commission 2014).

**Figure 3.4  Agriculture, Forestry and Fishing, employment vs. gross value added, 1986–2013**

The story for Manufacturing is more complex. While it is true that a declining employment share can be partially attributed to productivity improvements, certain sub-divisions have declined markedly in real terms, having lost market share to low-cost international competitors. Manufacturing sub-divisions that are relatively labour intensive and reliant on low-skilled workers have generally relocated to countries with lower labour costs. A commonly cited example is the Textile, Leather, Clothing and Footwear Manufacturing industry, which has seen a decline in the share and real values of employment and gross value added (Figure 3.5).

**Figure 3.5  Textile, Leather Clothing and Footwear Manufacturing, employment vs. gross value added, 1986–2013**

Sub-divisions that use high-skilled labour have fared better, as have those that process raw materials – for example, the Metal and Mineral Product Manufacturing sub-division. The Machinery and Equipment Manufacturing sub-division, has shown a similar trend to the Agriculture, Forestry and Fishing sub-division, with a relatively stable share of gross value added coupled with declining employment. This suggests that the industry has been able to compete through productivity improvement (Figure 3.6). This comes despite the highly publicised decline of auto manufacturing.

Figure 3.6  Machinery and Equipment Manufacturing, employment vs. gross value added, 1986–2013


To remain competitive, Australian manufacturers are increasingly focusing on high-value-adding functions—for example, research, design, management, marketing and after-sales support—in which labour costs are less of a determining factor in competitiveness (Department of Industry 2014). Manufacturing businesses often split their activities across different countries. Anecdotal evidence suggests that even small manufacturing businesses are outsourcing the physical production of goods to low-cost countries while retaining the intellectual property and knowledge-based functions within Australia. As a result, manufacturing businesses in Australia are tending to employ fewer and more highly-skilled workers than in the past.

The growing focus on niche sectors, in which Australia has a resource or knowledge-based advantage, is reflected in various policy documents. For example, both the Australian Government and a number of private institutions have identified advanced manufacturing (such as pharmaceuticals, chemical products, medical devices, mining equipment and aeronautical structures and systems) and food processing as areas in which Australia can compete internationally (Department of Industry 2014; Department of the Prime Minister and Cabinet 2014; Business Council of Australia 2014; Deloitte 2013).

In contrast, the general trend in most service industries has been for growth in the share of both employment and gross value added, demonstrating that services are less prone to the substitution of capital for labour.

3.3.2  Industry structure and Remoteness Class

The industrial composition of major cities, regional and remote areas has always varied, reflecting regional specialisation in particular types of activities. Certain industries, such as Agriculture, Forestry and Fishing and Mining, are at least partially tied to location. These industries generally need to be located alongside physical
resources, which means that activity is dispersed across regional and remote areas that encompass agricultural land, forests, mineral deposits and so on. The Electricity, Gas, Water and Waste Services industry also tends to locate in inner regional areas that are close enough to major cities and regional centres to supply energy and water to large populations.

Industries that cater directly to households and businesses are distributed more or less according to population. These include certain types of Construction, Retail Trade, basic business services such as administrative and support services, and social services such as Education and Training, and Health Care and Social Assistance.

More complex business services tend to cluster in major cities where they benefit from agglomeration effects, such as having access to large networks of customers (which often include other large businesses), specialist human capital, and large markets for business inputs. These include information media and telecommunications, financial and insurance services, and professional, scientific and technical services. A large proportion of manufacturing also tends to cluster on the fringes of major cities, which offer access to a large workforce and trade markets.

The resulting distribution of industries by Remoteness Class is presented in Figure 3.7 below. Notably, tertiary (service) industries account for the largest share of employment in all Remoteness Classes, although they are most dominant in major cities.

Figure 3.7 Employment share by industry and Remoteness Class, 2011

Source: ABS (2011a), time series profile, second release.

In addition to the tendency towards regional specialisation, there has been a long-run trend of increased centralisation of population and businesses in major cities and regional centres. The forces driving centralisation are discussed in detail in The Evolution of Australian Towns (BITRE 2014a), which describes the process by which geographic ties between industries and workforces were transformed through advancements in transport technology and productivity growth in Agriculture, Forestry and Fishing.

Australia’s population was much more dispersed in the early 20th century because people were required to live and work in towns that were co-located with agricultural and mining businesses. As transport technology improved and was more broadly adopted, the effective distance between locations fell and people had greater opportunity to travel for work and more choice when shopping for goods and services. Combined with reduced labour requirements in primary production, this led to a gradual agglomeration of households, retail businesses and services within larger population centres, where businesses could grow through economies of scale.
These patterns are evident when comparing the industrial composition of major cities against urban areas in regional and remote Australia, and non-urban areas. As shown in Figure 3.8 below, urban areas both in major cities and elsewhere share key similarities. Both have a low proportion of employment in the Agriculture, Forestry and Fishing industry and the Mining industry, combined with a relatively high proportion of employment in the Retail Trade industry and in government-related services.

Major cities differ from other urban areas by having a clear specialisation in more complex services. These figures confirm the historical account provided in The Evolution of Australian Towns (BITRE 2014a). They also illustrate that, while there is variation between major cities and other Remoteness Classes, there is also significant variation within regional and remote areas, reflecting the structure of urban and non-urban areas in each class.

**Figure 3.8** Employment share for selected industries, 2011

![Bar chart showing employment share for selected industries, 2011](chart.png)

Source: ABS (2011a), time series profile, second release.

Interestingly, the forces that have traditionally driven centralisation of services in cities and regional centres (such as advances in transport technology and agglomeration benefits) may now be interacting with a more recent trend that also affects location choices for businesses and households: the widespread adoption of information and communications technology (ICT). ICT further weakens the link between economic activity and the places where people live. This has the potential to both exacerbate and alleviate centralisation for different industries. The impact of ICT on structural change is discussed in more detail in section 3.3.3 below.

### 3.3.3 Trends across Remoteness Classes

Given the notable differences in the industrial structure of Remoteness Classes, it is no surprise that trends in industrial growth and decline also vary across Remoteness Classes. Developments in major industries such as Agriculture, Forestry and Fishing, Mining, Manufacturing, Construction and various service industries have quite different effects on changing the industrial make-up of each class.

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29 To compare urban areas with non-urban areas, employment data has been allocated into three categories. The first is major cities as defined by the Australian Bureau of Statistics Remoteness Structure. The second, urban areas, comprises all ABS Significant Urban Areas that are not part of a major city. ‘Non-urban areas’ captures all regions not classed as being in a major city or a Significant Urban Area.
Figure 3.9 below presents the change in both employment share and total job numbers for industries that made a notable contribution to structural change between 2001 and 2011. It is the change in share that determines changes in the proportional structure of the economy. The change in job numbers provides an important context for interpreting how large an impact structural change has made on overall labour market outcomes. Note that for most industries, the change in job numbers is largest in major cities, simply because the majority of Australians live and work in major cities.

Figure 3.9  Change in employment share and total jobs for selected industries, 2001–2011

For some of these industries, there are obvious differences in the impact across Remoteness Classes. Agriculture, Forestry and Fishing is a good example. Its employment share fell across all Remoteness Classes. This probably reflects the combined impact of productivity improvements and a shift between different sub-divisions within Agriculture, Forestry and Fishing, which led to overall job losses for the industry (Productivity Commission 2014). However, the impact in terms of reduced employment share was largest in regional and remote areas, where the bulk of agricultural employment is based.

Public Administration and Safety also shows a clear divergence across Remoteness Classes. Job numbers for this industry fell in very remote areas, in contrast with growth in job numbers for all other Remoteness Classes. This probably reflects the impact of the wind-down of the Community Development Employment Programme, which had previously employed a large number of Indigenous Australians in remote regions. The impact on employment share was a sharp decline in very remote areas and relatively little change in other Remoteness Classes.

Source: ABS (2011a), time series profile, second release.
The employment share for Manufacturing fell across all classes except for very remote regions, reflecting the loss of 78,000 jobs at the national level. However, the bulk of job losses (around 77,000) were in major cities. To some extent, this can be explained by the spatial distribution of different types of manufacturing, which has been subject to different trends (see Box 3.1).

However, Health Care and Social Assistance witnessed a consistent and significant increase in jobs and share across Remoteness Classes, leading it to become the largest employing industry in Australia as a whole. Growth in this industry can be attributed to:

- rising demand for health services related to population ageing, which increases general demand for health services;
- other trends such as demand for higher quality health services and new technologies; and
- a shift in attitudes that has seen Australians become more health conscious in general (Treasury 2010).

Box 3.1 Case study: Manufacturing in Australia’s regions

Perhaps one of the most visible impacts of structural change in Australia has been the long-run decline of employment in Manufacturing. In 1981, Manufacturing accounted for just over 16 per cent of employment. By 2013 this figure had dropped to roughly eight per cent (ABS 2014g).

The reasons for the decline are well documented. In an open global economy, Manufacturing businesses are internationally mobile and cost efficiencies play a major role in determining where businesses locate their production facilities. Australia is a relatively high-cost location for a number of reasons, including the small scale of local markets and the relatively high cost of labour. The recent and highly publicised decisions by Holden, Ford and Toyota to cease auto manufacturing in Australia are a pertinent example: all three companies cited the high cost of production as a determining factor in their decisions.

While conditions for Manufacturing have been challenging, not all sub-divisions and not all regions are struggling. Spatial analysis of employment data over the intercensal period shows that job losses have been concentrated in major cities. On the other hand, regions that have seen strong growth tend to be predominantly regional or remote.

These trends are linked to the way in which Manufacturing sub-divisions are spatially distributed. Major cities, for example, have borne the bulk of auto manufacturing job losses. Table 3.4 shows that the largest declines have all been in major cities. Note, however, that it is difficult to specify which particular SA4s have been most affected within major cities given that Manufacturing employees can live in one SA4 and commute to another for work. As a consequence, these figures should be interpreted as showing that there have been job losses in major cities, but these may have been distributed across a wider area than is actually captured by the five individual SA4s in Table 3.4 below.

Table 3.4 Regions with fastest rate of growth and decline in Manufacturing, 2001–2011

<table>
<thead>
<tr>
<th>Fastest-growing regions</th>
<th>Growth (%)</th>
<th>Fastest-declining regions</th>
<th>Decline (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mackay (QLD)</td>
<td>41.9</td>
<td>Adelaide – South</td>
<td>-29.6</td>
</tr>
<tr>
<td>Mandurah (WA)</td>
<td>35.5</td>
<td>Melbourne – Inner East</td>
<td>-28.4</td>
</tr>
<tr>
<td>Northern Territory – Outback</td>
<td>32.6</td>
<td>Sydney – Sutherland</td>
<td>-28.1</td>
</tr>
<tr>
<td>Bunbury (WA)</td>
<td>28.2</td>
<td>Sydney – Inner South West</td>
<td>-25.8</td>
</tr>
<tr>
<td>Western Australia – Outback</td>
<td>27.1</td>
<td>Australian Capital Territory</td>
<td>-25.6</td>
</tr>
</tbody>
</table>

Source: ABS (2011a), time series profile, second release.
In regional and remote areas, employment gains seem to have taken place in Manufacturing sub-divisions that are tied to the resources sector. For example, manufacturing activity in both Western Australia–Outback and Northern Territory–Outback is focused on the transformation of raw materials through activities such as aluminium smelting, gold refining and nickel smelting. In Mackay in Queensland, growth appears to have been concentrated in sub-divisions that cater to mining and agribusiness, including metal product manufacturing and specialist machinery and equipment manufacturing (Mackay Regional Council 2014). Manufacturing job growth in Mandurah is attributable to the Alcoa alumina refinery in nearby Pinjarra.

Growth in resource-related Manufacturing is also evident in the Bunbury region of Western Australia, which is located in the south-west corner of the state. It incorporates the regional cities of Bunbury and Busselton and the wine-producing Margaret River region. Manufacturing focuses on raw material processing, including alumina refining, wine making, meat processing and basic chemical manufacturing (South West Development Commission and RDA South West 2014). It also includes some machinery, equipment and metal fabrication. As shown in Map 3.1, growth over the period was concentrated in the SUA of Bunbury and nearby regional areas of Donnybrook and Collie. Some growth is also evident in Margaret River, reflecting growth in wine making. The Busselton SUA, on the other hand, had only moderate growth in Manufacturing. Conversely, the town of Manjimup saw a large decline in employment associated with poor outcomes in timber processing.

**Map 3.1  Growth in Manufacturing employment, Bunbury, 2001–2011**

Source: ABS (2011a), time series profile, second release.
Divergent experiences across the Remoteness Classes also highlight how the widespread adoption of ICT has influenced structural change in some industries. As outlined above, improvements in transport technology throughout the 20th century weakened the link between primary production and population centres, encouraging centralisation of service industries in cities and regional centres (BITRE 2014a). Over the past few decades, advancements in computer technology and internet access have also had a transformative impact on the way in which businesses operate.

ICT can weaken physical ties between economic activity and the places where people live. ICT allows services to be produced and traded from any location. It also allows for remote performance of functions involved in producing physical goods. This has the potential to both exacerbate and alleviate centralisation for different industries. For example, remote technology further reduces the need to co-locate labour with physical resources in agricultural and mining activities. Relevant practices include remote monitoring of soil conditions, electronic cattle tracking and the use of driverless trucks in mining.

Similar trends are at least partially evident in Mining employment over the past decade. Between 2001 and 2011, Mining employment grew by roughly 100,000 jobs. Almost 45,000 of these were recorded as being in major cities (based on place of enumeration data), with 24,000 in Perth and Mandurah. While some of the workers performing these jobs would be fly-in, fly-out workers whose jobs are physically located at remote mine sites, at least some of these jobs are actually located within city offices. This trend, which perhaps runs counter to some perceptions of Mining as being based almost entirely in remote areas, raised the proportion of Mining employment located in major cities to 39 per cent (up from 33 per cent in 2001). Looking forward, the Australian Workforce and Productivity Agency (2013) predicts that further automation of processes and implementation of remote workforce practices will mean that an even greater share of mining jobs will be located in cities.

At the same time, ICT allows people and businesses in service industries to locate outside of major cities while remaining connected to customers and suppliers. For example, Hippo Animation—a major Chinese animation studio—recently established a joint venture with local partners Vue Group to produce films in the regional city of Bunbury in Western Australia (McHugh 2013). The joint venture will focus on producing animated and computerised live-action films that make extensive use of computer-generated imagery. This is an illustrative example of high-tech and human capital dependent services being produced in a regional area for distribution to a global market.

For other service industries, ICT has spurred further centralisation in major cities. The Finance and Insurance Services industry has centralised much of its operations over the last 20 years due to the introduction of automatic teller machines, telephone banking and internet banking. This has reduced the need to maintain branches, which have gradually closed in regional areas from around 1993 onwards, meaning that the share of finance employees located in central offices grew.

ICT has altered the competitive landscape and business practices of Retail Trade. In 2006, Retail Trade was the largest employing industry in Australia. However, it has since been surpassed by Health Care and Social Services. Growth in Retail Trade employment was relatively slow between 2006 and 2011. This partially reflects reduced consumer spending during the Global Financial Crisis. However, slow employment growth also reflects a declining reliance on labour in this industry. This has resulted from technological advances such as the implementation of self-serve facilities in major retail outlets and the growth in internet shopping facilitated by greater internet access (Department of Industry 2014). Online retailing has also been encouraged by the high value of the Australian dollar over recent years, which has made international purchases more affordable.

In general, online retailers have been able to capture a growing share of the market by offering customers a convenient service and often at a reduced price compared with ‘bricks and mortar’ retailers (online retailers have lower wage costs and overheads because they do not need to invest as much in physical store space). Notably, domestic retailers, including major supermarket chains and department stores, have also moved into online retailing, offering a choice of delivery services or in-store pick-up (Department of Industry 2014). These trends are likely to continue in the future, with more retailers offering a mixed service that gives customers the option of visiting physical store fronts or ordering online. The implications of these developments are that there will be a continued decline in labour intensity in retail trade, and growth in demand for parcel and freight businesses.
3.3.4 Trends across sub-state regions

This section analyses trends in structural change across sub-state regions. Given the larger number of regions involved (there are 88 SA4s), the analysis focuses on summary statistics that allow us to compare general characteristics of regions that have high rates of structural change, with regions that have low rates of structural change. For example, it attempts to identify relationships between the rate of structural change and variables such as regional population, industrial diversity and main industry of employment. Case studies are also included to allow for a more detailed analysis of particular places.

Map 3.2 below provides a high-level overview of how trends in structural change have altered the industry mix for different types of region. One of the most obvious trends has been the growing dominance of Health Care and Social Assistance. In 2001 Agriculture, Forestry and Fishing was the top employing industry for much of inland Australia. The top employing industries in major cities and coastal areas, particularly along the east coast, tended to be either Manufacturing or Retail Trade. By 2011, Health Care and Social Assistance had become the top employer for many of these regions.

Another visible trend has been the emergence of Mining and Construction as the top employing industries in regional and remote areas of Queensland. Map 3.2 above also highlights the diversity of experience amongst regions within the broader Remoteness Classes. For example, a number of regional and remote SA4s have undergone a transition from being predominantly agricultural to having a greater focus on Mining and Construction. These regions can be characterised as being primary producers. Darling Downs – Maranoa is one such region, as discussed in detail in Box 3.2 below. Given the very large employment swings in these regions, they tend to rank highly on the structural change index and have a disproportionate impact on the statistical relationship between structural change and other descriptive characteristics, as discussed in more detail below.

Other regional and remote areas have seen a decline in Agriculture, Forestry and Fishing that was not offset by growth in Mining. This resulted in a greater reliance on service industries. These regions are shifting away from primary production and focusing on being service centres for regional populations. The Murray region of New South Wales is one such example, where Health Care and Social Assistance has replaced Agriculture, Forestry and Fishing as the main employer.
Further, other regional areas have seen trends that more closely mirror those in major cities in the sense that structural change has been dominated by experiences within regional centres. The Cairns and Townsville SA4s in Queensland, for example, both contain sizeable regional cities and have seen a shift from one service industry to another (that is, a shift out of Retail Trade and Public Administration and Safety respectively, into Health Care and Social Assistance).

As discussed above, structural change can have either a positive or a negative impact on individual regions, so it was not expected that the rate of structural change would necessarily correlate with measures of economic performance. However, it was expected that characteristics such as population size and industrial diversity may have a relationship with structural change given that previous research suggests that smaller and more concentrated economies are more vulnerable to volatile movements in industry composition (BTRE 2003).

A correlational analysis was conducted to test for relationships between structural change and other characteristics of regional economies. The statistic presented in Table 3.5—Pearson’s $r$—measures the strength of the linear relationship between two variables. In this case, it measures the linear relationship between the structural change index and each of the four variables listed in the first column. Pearson’s $r$ can take on any value from –1 to 1. Negative values mean that the relationship between variables is inverse—that is, as one variable rises, the other tends to fall. Positive values mean that the relationship between variables is positive—that is, higher values for the first variable are associated with higher values for the second variable. The closer the value is to either –1 or 1, the stronger the relationship. A value of 0 equates with no linear relationship.

Table 3.5  Correlations between structural change index and selected variables, 2001–2011

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation (Pearson’s-$r$)</th>
<th>Significance (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (2001)</td>
<td>–0.29</td>
<td>0.01</td>
</tr>
<tr>
<td>Industrial diversity (2001) (a)</td>
<td>–0.26</td>
<td>0.01</td>
</tr>
<tr>
<td>Median household income (2001)</td>
<td>–0.41</td>
<td>0.01</td>
</tr>
<tr>
<td>Business entry rate (2001–2011)</td>
<td>–0.28</td>
<td>0.01</td>
</tr>
</tbody>
</table>


Notes: (a) Diversity was calculated using the method presented in Jackson (1984). The raw figures were converted using the formula $(1 - \text{diversity})$ so that higher values relate to greater levels of diversity and vice versa. Correlation was calculated using data for all SA4s except for Other Territories (n = 87).

To illustrate, consider the relationship between the rate of structural change and population size at the beginning of the period. The correlation coefficient is –0.29, which means there is a mild negative relationship between structural change and population size. That is, regions with larger populations at the start of the period tended to have lower rates of structural change. This is also evident in Figure 3.10 below, which presents a scatter plot of structural change compared with population size.
Statistically significant relationships were also found between structural change and the other variables. The results suggest that high structural change regions tended to have a relatively concentrated industry structure and relatively low incomes at the beginning of the period. Further, high structural change regions tended to have a low rate of business entry over the period.

Note that the effect size for each variable is relatively small. In each case, the coefficient ranges from around 0.3 to 0.4, meaning that these variables have some association with structural change but do not explain the whole story. However, they do paint a picture that is consistent with the results discussed earlier—namely, small regions with concentrated industry structures and low starting incomes were more likely to have experienced high structural change.

It is possible that these results were largely driven by the experience in regions that were affected by the mining boom. The mining boom tended to have a large impact in regional and remote areas that began the period with a high reliance on Agriculture, Forestry and Fishing and associated low incomes. The finding that business entry rates were lower in regions with high structural change may also suggest that there was a movement towards larger average business sizes. That is, smaller businesses may have left the market and been replaced by a small number of large employers. This trend would be consistent with a switch between agricultural and mining businesses, with small farm businesses being aggregated into large agricultural producers, combined with the entry of large mining employers in rural areas.

Another way of analysing trends that may have influenced structural change is to divide regions according to their rank on the structural change index. The following analysis groups regions into quartiles. The first quartile comprises the top 25 per cent of regions as ranked on the structural change index. The second quartile comprises the next 25 per cent, and so on, in descending order.

Once again, this analysis highlights the impact of the mining boom between 2001 and 2011. As shown in Figure 3.11, regions in the first quartile (and to a lesser extent the second quartile) tended to have a larger reliance on Agriculture, Forestry and Fishing and Mining, and a relatively small population at the beginning of the period.
The first and second quartiles also tended to have lower industrial diversity in 2001, consistent with the correlational analysis. Interestingly, it appears that diversity remained stable in the first quartile, perhaps as one major employing industry (Agriculture, Forestry and Fishing) lost share to another (Mining). In the other quartiles, diversity fell, meaning that their industry structure became more concentrated. This is consistent with a trend of employment growth in industries that were already major employers, perhaps highlighting the impact of growth in Health and Social Services employment.
Darling Downs – Maranoa is an inland region of southern Queensland that has traditionally specialised in Agriculture, Forestry and Fishing. Like many regional and remote areas of Australia, Darling Downs – Maranoa is undergoing structural change characterised by a long run decline in Agriculture, Forestry and Fishing employment combined with a more recent spike in Mining and Construction activity (Map 3.3).

The region is located directly north of the border with New South Wales, west of the Great Dividing Range and adjacent to the city of Toowoomba. It encompasses large tracts of highly productive agricultural land that has traditionally supported a diverse range of activities, including wheat and other grain, cotton, egg, livestock and pig production, forestry and various types of horticulture (ABS 2008a).

Agriculture, Forestry and Fishing remains the largest employer in the region, although employment declined by 17.3 per cent between 2001 and 2011 (ABS 2011a). To some extent, this reflects the impact of extreme weather conditions over the period. An extended period of drought affected broad acre cropping throughout the middle of the period, while the combined impact of drought followed by flooding caused a drastic reduction in livestock production in 2011 (Australian Bureau of Agricultural and Resource Economics and Sciences 2011). Employment decline also reflects growing productivity through improved farming practices and technology.

The other key trend affecting Agriculture, Forestry and Fishing is competition for land use with a rapidly growing resources sector. The region contains deposits of thermal coal, coal seam gas and petroleum, including various gas fields within the Surat Basin. Parts of the region, particularly the north, have been subject to the rapid development of coal seam gas projects over the past decade (Department of State Development, Infrastructure and Planning 2013). This has contributed to a decrease in the land area dedicated to Agriculture, Forestry and Fishing. This is reflected in Map 3.3 below, which illustrates both a decline in Agriculture, Forestry and Fishing employment and rapid growth in Mining employment in most areas. The trend is particularly pronounced in regional towns in the north such as Dalby (within the SA2 of Wambo) and Chinchilla.

Conversely, the south of the region has been less exposed to growth in the resources sector. The SUA of Warwick is an interesting case in point. The region suffered a major decline in Agriculture, Forestry and Fishing employment, combined with relatively modest growth in Mining employment.

Note that while both Mining and Construction employment for the region grew significantly between 2001 and 2011, Agriculture, Forestry and Fishing is still the largest employing industry with a total of approximately 11,200 employees as of 2011 (compared with around 6,000 for Mining and Construction). The implication is that Agriculture, Forestry and Fishing is still extremely important for the local economy and that while job gains in Mining and Construction are a welcome development, they cannot be relied upon to fully replace job losses in the farming sector.
Map 3.3 Employment growth in Darling Downs – Maranoa, 2001–2011

Employment growth in Darling Downs – Maranoa, 2001-2011

CHIRCHILLA
WAMBO
WARWICK
ROMA

Employment growth (%)

-45 to -30
-30 to -15
-15 to 0
> 0

Source: ABS (2011a), time series profile, second release.
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3.4 Conclusion

In summary, while a high-level narrative can be constructed around major trends in structural change, experiences vary from region to region and this has implications for regional policy.

The mining boom was the major driver of structural change in remote and very remote regions over the latter part of the intercensal period. These regions tended to rank highly on measures of structural change. Remote and very remote regions are characterised by having small economies with a heavy reliance on a small number of industries. This makes them vulnerable to volatile swings in employment. Over the recent past, structural change was driven by rapid growth in Mining and Construction employment combined with decline in Agriculture, Forestry and Fishing employment.

Looking ahead, it is likely that remote and very remote regions will again be subject to volatile change. The Mining industry is transitioning from an investment phase to a production phase. This transition is characterised by an increase in the volume of production but a decrease in labour requirements. This is because the investment phase requires a large workforce to build resource projects, whereas production involves greater automation of processes and fewer workers. Therefore, the employment share of Mining is likely to drop and may create challenging labour market conditions in remote areas. This is likely to create challenges for regions and policymakers.

The advantage of the transition is that it will release workers, including both current Mining employees and Construction employees, who have the skills required to build infrastructure and housing. This may alleviate some of the cost pressures faced by construction businesses that were previously forced to compete with mining for skilled labour.

Inner and outer regional areas, on the other hand, appear to be transitioning towards a greater reliance on service industries. Traditionally, these regions have focused on Agriculture, Forestry and Fishing, and while agricultural output may continue to grow in the future, it is becoming less labour intensive and is unlikely to provide as many employment opportunities as it once did. Job growth in these regions is more likely to come from human services related industries, particularly Health Care and Social Assistance, as population ageing unfolds and drives demand for health and aged care. This will also have implications for population distribution given that service industries are more likely to cluster in regional centres than in smaller towns and rural areas.

Manufacturing in general will continue to operate in a highly competitive international market. These conditions will probably favour business that can create value by providing a unique product offering and after-sale services rather than competing on price (Department of Industry 2014).

At a regional level, the impact of change in Manufacturing is likely to be most concentrated in major cities. However, there are also businesses which specialise in the transformation of mineral products which fared relatively well between 2001 and 2011. Many of these types of businesses are concentrated in regional and remote areas close to resource projects. There are further opportunities for growth in this area, particularly if the volume of Mining output continues to grow. Interestingly, Manufacturing in regional and remote areas may provide employment opportunities for people leaving the Mining workforce, given that many Mining employees originally came from Manufacturing jobs (Department of Industry 2014).