The Impact of Mining and Services Industries on the Structural Change of Australia

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Abstract

Both services and mining industries gained relatively more importance in the structural changes occurring, particularly in recent years, where the rate of structural change has increased. The study aims at defragmenting the mining and services industries, and analyses their impacts on structural change. VAR model, where activity is measured in terms of output, shows social and business services to have more forecasting abilities than other variables. On the hand, VAR model where activity is measured in terms of investment shows the mining industry to have relatively less Mean Absolute Errors forecasts. Results deteriorate as one moves from one step ahead to twelve step ahead forecasts, suggesting longer periods of one step ahead forecasting should be used to avoid cyclical fluctuations in activity variables such as output or investment for industries.

Keywords: Australia, mining, services, VAR, structural change

JEL classification: L16, N15, O11

1. Introduction and Background to Study

Structural change and economic development have always been part of the economics literature since Smith (1776). More recent research includes Silva and Teixeira (2008) and Krüger (2008) who survey previous literature on structural change at different aggregation levels. Structural change plays a critical role in the process of economic growth in raising standards of living for any economy. In the Australian context, the Productivity Commission is chartered by the government to facilitate adjustment within the economy by those individuals, firms and regions affected by economic change, by providing accurate information about structural change in Australia since the 1970s (Productivity Commission, 1998).

The framework of this study is based upon an extension of the traditional three-sector hypothesis, i.e. primary (agriculture and mining), secondary (manufacturing and

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construction), and tertiary sectors (private services) mostly affect economic growth, measured in terms of employment or output. Earlier contributions supporting this hypothesis are Fisher (1952), Wolfe (1955) and Fourastié (1969). Neoclassical growth as Solow (1956) as well as new growth theory like Lucas (1988) disregard such hypothesis by assuming sectoral composition to be constant such that there is no structural change. More recent research have tried to complement structural change with formal growth theory (e.g. Bonatti and Felice, 2008), but in these models causality between economic growth to structural change was simply assumed.

The aim of this study is to look at the structural change in Australia since the 1960s, with particular reference to the impact of the service and mining industries, where the country has experienced three mining booms over the 50 year period. The traditional three-sector hypothesis mentioned above will be extended to a four-sector hypothesis based upon using the United Nations (UN) International Standard Industrial Classification (ISIC) for agriculture, mining and market and non-market services industries. The study is broken down further to each Australian State level to allow an analysis of the trend in activity flowing from each state. This latter part of the study, which looks at the forecasting ability of activity in the service and mining industries, is beneficial especially due to recent regulatory barriers being lifted in Western Australia to allow for uranium mining and increasing iron ore trade with China. The rest of the paper looks at some literature review pertinent to the study, followed by some emphasis on data and research methodologies. Research findings are presented before giving some concluding remarks.

2. Literature Review

In an attempt not to duplicate the already replete literature on structural change, only those relevant to the study are reviewed. Meckl (2002) and Kongsamut et al. (2001) show that balanced growth is possible consistent with significant changes in the sectoral composition. Structural change theory literature is broadly divided into two arms, i.e. preference changes in demand and sectoral specific productivity gains. For the former arm, societies consume products and services according to their personal preferences and hence spend their income in a certain distribution for goods of the primary, secondary and tertiary sector. The distribution varies with increasing income. Supported by Engel's law, the share of basic needs as primary products decreases as income increases. Fourastié (1969) links this transfer of preferences with a hierarchy of needs associated with different saturation levels for the goods of the three sectors. He even postulates that the demand for goods and services in the tertiary goods will never drench. Rowthorn and Ramaswami (1999) support these views by providing evidence of different income elasticities among the three core sectors, where income elasticity in the service sector is above one. For the latter arm, the productivity hypothesis indicates that different levels of technical progress among sectors will shift the sector shares. Technical progress results in better production process, which means less input of employment is needed to produce one unit of output, which in turn

reduces prices of goods and services produced. Baumol (1967) and Meckl (2002) provide evidence that different productivity increases are responsible for economic development. Fourastié (1969) argue preference changes in demand is the driving force of structural change. Dietrich and Kruger's (2008) analysis of Germany's structural change provides additional support to the demand side perspective. No matter what perspective is taken, higher growth rates of any economy GDP in one period should lead, via rising income and changing demand to more structural change or to a higher speed of structural change in the following periods, measured either in terms of output or employment of core economic sectors.

Echevarria (1997) investigates the relations between sectoral structures and economic growth, and find a hump shaped relationship between economic growth (measured as growth rate of Real GDP per capita) and sectoral composition. The author provides views that sectoral composition plays a major role for the growth rate of GDP. Aiginger (2001) studies the relationship between economic dynamics and structural change of production by using the norm of absolute values (NAV) and a disaggregation of 23 sectors or 99 industries, and finds structural change has a more significant impact on growth than vice versa. Productivity Commission (1998) looks at the manufacturing sector and its structural change for 15 OECD countries, and finds considerable differences in both sector and industry specific growth rates. This paper contributes to existing literature by defragmenting the mining and services industries of Australia, and analyses how they affect the structural change in the Australian economy.

3. Data and Research Methodology

For the purpose of this study, structural change is measured by using a traditional method called the coefficient of compositional structural change or structural change index (SCI)[1]. The SCI for output can be defined as half the sum of the absolute value of the differences in value-added shares over a time period, and is calculated as follows:

$$SCI = \frac{1}{2}\sum_{t=1}^{N}\left(\left|\phi_{i,t} - \phi_{i,t-x}\right|\right) \tag{1}$$

where, and, $\phi_{i,t}$ and $\phi_{i,t-x}$ represent each industry's share of total value-added at time t and t-x. Absolute values guarantee negative and positive changes in industry shares do not annul each other when summed up across industries. The amount of structural change equals exactly the share of the movements of the sectors as a percentage of the whole economy. If the structure remains unchanged, the indicator is equal to zero and if all sectors change at its most, which means the whole economy has a total change, then the index is equal to unity (Dietrich, 2009).

[1] Earlier literature also called it the Norm of Absolute Values (NAV) Michaely Index (Michaely, 1962) or Stoikov Index (Stoikov, 1966).

Before conducting any structural change analysis, it is important that the data are comparable. Further, the SCI results are sensitive to the level of industry aggregation, price movements and time period, which need consideration before interpretation. Information on value-added, employment and investment for Australia within the mining sector was sourced from the International Economic Data Bank (IEDB) and cross checked out with the Australian Bureau of Statistics (ABS). While SCIs can be biased by the level of industry aggregation, results from De Laine, Lee and Woodridge (1997) find a similar result on Australian employment data for 11 and 54 industry disaggregations. To allow the possibility of future comparative studies among different countries, the United Nations (UN) International Standard Industrial Classification (ISIC) is adopted for agriculture, mining and market and non-market services industries. More importantly, five subdivision level industries (ISIC C 10-14) have been implemented for the Mining Industry[2], Business Services subdivided into 5 sublevels (ISIC K 70-74), and Social Services into 3 sublevels (ISIC 75, 80 and 85)[3].

Due to the sensitiveness of price movements over time, the distinction between using current and constant prices, when examining the changing share of output/investment accounted for by various industries, becomes important. Resources are transferred from one industry to another due to changes in demand and supply, which in turn are influenced by changes in relative prices and non-prices factors like quality, competition and government policies. By using current prices, SCIs captures the impact of all changes on the total value of goods and services produced (Productivity Commission, 1998). Current price data are preferred to constant price data, due to the sensitiveness of the base year when using constant prices, which requires rebasing of data series[4]. In choosing the time period for comparison, year-to-year comparisons have a tendency to exhibit significant variability which suggests the influence of temporary and cyclical fluctuations in activity. To ensure the effect of longer term changes in output and investment shares between industries, five years window periods were chosen. Five is substituted for x in equation 1 above. In line with the Reserve Bank of Australia (RBA) which identified three mining booms since the 1960s (see BIS 2010) the data is set from 1960 to 2010[5]. When conducting the same SCI analysis at State levels, Gross State Product (GSP) as opposed to Gross Domestic Product (GDP) is used. Due to little or no activity in the mining sector of New South Wales (NSW), it is combined with Australian Capital Territory (ACT).

[2] See, ISIC (2010) for ISIC classification codes.

[3] Only Business Services and Social Services are analysed due to their relative significance over other kinds of services.

[4] Clark, Geer and Underhill (1996) provide a good example of the need to rebase constant prices in the Australian agricultural sector.

[5] These booms were the 1960s/early 1970s mining and energy boom, the late 1970s/early 1980s energy boom, and the current (2010) mineral and energy boom.

4. Research Findings

4.1 Activity by Industry

Compared to the 19th century where Australia's agriculture accounted for about one third of output, the 20th century witnessed significant activity for the manufacturing and service sector. As it can be observed in Figure 1 below, by 1950, employment in the manufacturing sector rose to roughly 25 percent, compared to 15 percent at the start of the century. While the share of manufacturing has continued being dropped since the beginning of the mining boom in 1960s, service industries have emerged strongly to reach above 80 percent in 2010. A possible explanation to the decline of manufacturing and surge of service can be explained since in the 1950s services were closely linked to manufacturing, with whole trade and transport supporting the production and distribution of secondary goods. From then, the share of distribution services has dropped continually with the declining importance of manufacturing. On the other hand, the fastest growing service industries in recent years have been the business services, the social services and the personal services, as observed in Figure 2. Although not reported here, it is important to note that service industries tend to be more labour intensive than other sectors, with 85 percent of the Australian work force, but only 70 percent of investment.

More relevant to the study is the share of nominal output of the mining industry which has witnessed considerable volatility since the 1960s, but has drifted upwards to around 8 percent in the 2009-2010 period as shown in Figure 3. The first two peaks in the Investment Figure can be attributed to the early 1970s and early 1980s mining booms as reviewed by BIS (2010). Interestingly, investment in the mining industry in the 2009-2010 period has well exceeded those from the two previous mining booms, reaching 19 percent. The mining booms in recent years have also had positive effects on other industries in Australia. Figure 2 supports strong demand for mining related construction. Further, there has also been a shift in the composition of the manufacturing industry towards mining related manufacturing, and away from import competing manufactures. In spite of the increase in investment share, employment in the mining sector remains subdued, reflecting more concentration on capital intensive methods compared to the service sector.

While the service sector dominates the share of output and employment, Australia's exports are still led by the mining industry as shown in Figure 4, where mining exports were around half of the country's export revenues. It can also be observed that the shares of manufacturing and services exports rose through the 1990s, but declined in recent years. This can be attributed to the strengthening of commodity prices, and the demand of China for more Australian iron ore and other minerals.

4.2 Activity by State

Since activity is based on employment, a look at the Australian population movement across states is vital. From Figure 5, there has been a shift from South Eastern states like

Victoria, New South Wales (NSW), Australian Capital Territory (ACT), towards Western Australia (WA) and Queensland (QLD). The population in Victoria was the highest in the 1850s due to the gold rush, but since then it has dropped significantly due to the 1890 depression and migration towards Western Australia where mining booms occurred (Blainey, 1963). Compared to the 19th century, it can be seen that changes in the population shares towards WA and QLD have occurred smoothly with current mining trends being less labour intensive than their predecessors. Western Australia and Queensland have grown relatively strong, with their combined share of output and employment rising to over 30 percent recently, compared to 20 percent in the 1960s. Sturdy population growth has contributed to faster output growth in these states relative to the national average over the past two decades. These resource-rich states contributed more to the nation's investment as shown in Table 1.

4.3 Structural Change

Based on equation (1), SCI is calculated to measure the change of the share of different industries in total nominal output, employment and investment over five years. The same calculation is replicated to measure the change in economic activity across Australian states. These different indices help us to identify periods of high rates of structural change and periods of relative stability over the past 50 years. Results are reported in Figure 6.

Findings suggest that structural change was high from the late 1960s through to the late 1970s, from the late 1980s through to mid 1990s, and more so in recent times. The earlier structural changes can be attributed to investment booms in mining in the late 1960s and business services in the late 1980s. These led to rising output shares in these industries in the coming years. Resources have moved from agriculture and manufacturing towards more appealing industries, i.e. mining and services. In early 1990s, increase in structural change by industry and state were associated mostly with the recession, in which there was a sharp contraction in manufacturing output and employment. Although not reported here, Victoria and South Australia were the most affected due to their relatively large manufacturing industries. The mid 1960s and early 200s both experienced periods of solid economic growth and price stability.

The rate of structural change appears to have increased in recent years, partly led by the mining boom in WA and QLD. This can be noticed in the measure of nominal output, reflecting the sharp rises in commodity prices. The measure of investment across states also supports the relative increases in rate of structural change, although by industry, the measure remains well below the peak of the late 1980s[6]. Importantly too, structural change in employment has not picked up to the same extent as investment. This is backed by the fact that the mining industry is still a relatively more capital intensive industry, hence, a lower share of the total Australian work force. Although not reported here, changes in real output SCI remained low compared to investment SCI, suggesting the unavoidable lag

[6] This period was associated with the commercial property boom in Australia.

between investment and real output[7]. Moreover, the rate of structural change across all states has been the highest since the 1960s on most measures. This reflects that the current mining boom is larger and more geographically concentrated than the previous boom in the late 1960s and early 1980s. Nonetheless, the strong growth in WA and QLD has been quite broad across industries.

4.4 Factors driving Structural Change

4.4.1 Economic Development

Australian policy changes over the last 50 years are one of the major causes of structural change. These policy changes include deregulation of a broad category of service industries and a reduction in trade protectionist barriers imposed on goods producing industries. Forsyth (2000) shows that these policies have increased the relative share of services in Australia by enhancing competition. Particularly, the deregulation of the finance industry in the 1980s and the start of compulsory superannuation gave a big boost to the growth of funds management and banking. Reforms also include cuts in the protectionist trade barriers previously imposed in the manufacturing industry. Since the early 1970s, these barriers were gradually wound back. Productivity Commission (2010) support that the effective rate of assistance to manufacturing has dropped from 35 to 5 percent in the last 40 years. The agricultural sector has also witnessed drops in tax concessions and subsidies, which were particularly allocated during droughts or low commodity prices. Lower trade barriers have given households access to lower imported goods, hence benefiting from the comparative advantage of East Asia manufacturing goods. This is consistent to Dwyer and Fabo (2001) who also find that the removal of these barriers have led to the manufacturing sector being increasingly export oriented than before.

4.4.2 Increase in demand for services

With increases in Australia real income per capita, consumer demand for services has increased the share of services in the Australian economy. In fact, the share of consumption spent on services has risen from 40 to 60 percent over the last 50 years, reflected by upward trends in educational, health, and recreational expenditures. Similar trends of increasing share of services in output can be found in other economies as shown in Connolly and Lewis (2010). Most importantly, the increase of the share of services has coincided with increasing labour share as well. For instance, the increase in the proportion of working couples has led to more demand for services such as child care, pre schooling, house maintenance and aged care. These services were previously classified as households and thus not production. Similarly, more health services were demanded as a result of increase

[7] Real output is based upon choosing a base year for constant prices. The choice of base year affects the results as supported by Clark, Geer and Underhill (1996) and is not further pursued in that paper.

in prolonged existence. The service industries provide much more flexible working hours than traditional manufacturing or agricultural production, hence, its preference for the working class population.

4.4.3 East Asia Emerging Markets

Although Australia manufacturing and agricultural shares of the total output produced have decreased partly because of the shift towards services and mining industries, this was also due to the emergence of East Asia as fierce competitors of manufacturing goods globally. Having one of the lowest regional labour costs, East Asian economies' share of global manufacturing have more than doubled since the last 40 years. This process started by Japan in the 1960s, followed more recently by newly industrialized countries like China. While Australia share of global manufacturing fell consequently, China and Japan's need for mining resources as part of their production process meant a much more significant rise in Australia's exports, particularly in the iron ore and coal exports. On top of economic reforms mentioned earlier, adequate Australian government policies have also played a vital role in the rise of its mining industry. For example, to encourage mining activity, an embargo imposed on iron ore exports was lifted in the 1960s, together with the introduction of bulk carriers. This kept transportation costs at lower levels than previously held. A more recent important policy change is the removal of the 'no mining policy' in Western Australia in 2008 on the uranium industry. While almost 100 percent of the uranium is exported, such policy changes added value to the structural change of the economy towards the mining industry.

4.4 Robustness testing

From the above analysis so far, it can be observed that there has been structural changes from the traditional agricultural and manufacturing industries towards the services and mining industries. The increase in the rate of structural changes can also be found in more recent periods than earlier ones. However, it is also important to understand whether the mining or the services industry is leading those structural shifts in the Australian economy. While existing literature is full of granger causality testing, the latter allows only for *one step ahead* prediction in bivariate settings[8]. If all the above variables are considered simultaneously, there might be more benefits in the predictive power of the resultant equation. A vector autoregressive (VAR) model provides a solution to both of these issues[9] and can be generalized in matrix notation[10] as follows:

[8] See, Erdil and Yetkiner (2004) for review of granger causality tests between structural change and other variables.

[9] See, Webb (1988) on the forecasting reliabilities of VAR models.

[10] While (2) is for a 2 variable multivariate setting with two variables y_t and z_t, it can be expanded to accommodate for all the different independent variables used in traditional Granger causality tests.

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} a^y \\ a^z \end{bmatrix} = \begin{bmatrix} \beta^y & \gamma^y \\ \beta^z & \gamma^z \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} = \begin{bmatrix} \varepsilon_t^y \\ \varepsilon_t^z \end{bmatrix} \tag{2}$$

where $a'\ s$ and $\beta'\ s$ are parameters. The epsilons are white noise, i.e,
E (ε_t^i) = 0,
Var (ε_t^i) = σ^2,
Covar (ε_t^i , ε_s^i) = 0, where i, j = y, z and i ≠ j, t ≠ s.

To ensure that the vector of endogenous variables are stationary in our VAR models, stationarity testing using Augmented Dickey Fuller (ADF) tests is carried out to avoid spurious regression. All variables in the VAR models are found to be stationary in their levels. The optimal lag length is obtained by minimizing the Schwarz Information Criteria for the two VAR models and results are provided in Table 2. While there is no exact date for the start of the recent boom in Australia, 2007 is chosen as the time where the mining boom severely tested the productive capacity and flexibility of the Australian economy as per BIS (2010). This is supported by earlier findings in Figure 6, where SCI indices for both nominal output and investment increased significantly, at states and industry levels. Similar to Gurrib and Ahmad (2010), each VAR model is estimated using data through to January 2007 and forecasts were computed for each month through September 2008. The forecasts for February 2007 were compared with actual data and the resulting one-step ahead errors were recorded; forecasts for February were used for two-step ahead errors; and similarly, forecast errors up to twelve steps ahead were calculated. The process was then updated for one month, with the model estimated through February 2007 and forecasts made until February 2008. This process or estimation and forecasting was repeated each month through July 2010. Results of the forecast errors are reported in Table 3.

Findings support that both VAR models performed better than a naïve model with a no change forecast. In fact, values for Theil inequality statistics were less than unity, indicating that the VAR models forecasted outperformed a naïve no change forecast. The VAR 1 model which includes the structural change index at nominal output level ($SCIO_t$), shows that social services and business services had more significant forecasting abilities on Australia's nominal output due to their lower Mean Absolute Error (MAE) forecasts than in the VAR 2 model. On the other hand, the VAR 2 model which includes the structural change index at investment level ($SCII_t$), shows the mining industry had more forecasting ability than the services industry due to its lower MAE than VAR 1 model. These two findings support earlier results that social services and business services had some significant impact on the volatility of structural change over the last 50 years. Results also support the mining industry has gained more momentum in recent years due to the recent ongoing boom. However, in most instances, the relative accuracy decreases with the forecast window as we move from one step to twelve step ahead forecasts, suggesting that a longer time period forecast (say three years) compared to one month forecast is of more value, due to the influence of temporary and cyclical fluctuations in activity which can obscure the effects of longer term changes in output and investment shares between the two industries.

5. Conclusion

Structural change had a tendency to witness volatility over the last 50 years in Australia. Noticeable shifts from the traditional agricultural and manufacturing industries have been observed, with the services and mining industries capturing most of those structural shifts in the economy. These movements occurred not only due to Australia policy changes in regards of deregulation and removal of protectionism, rising demand for services and more trade with emerging markets, but also due to three mining booms that occurred in the last fifty years. The rate of structural change has increased, particularly in recent times, due to the ongoing mining boom where states like Western Australia and Queensland had larger shares of output and investment relative to others. While one Vector Autoregressive model supports social and business services to have some forecasting abilities when structural change is measured in terms of nominal output, the other VAR model suggests the mining industry have lower Mean Absolute Error forecasts, when structural change is measured in terms of activity in investment. Forecasts tend to deteriorate as data are regressed from one to twelve step ahead months. This suggests a need of longer forecast period for each step to avoid cyclical fluctuations when measuring structural change.

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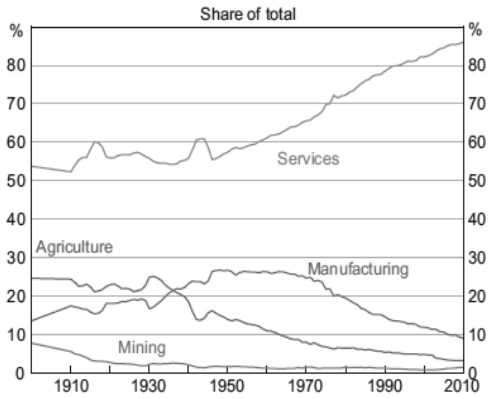
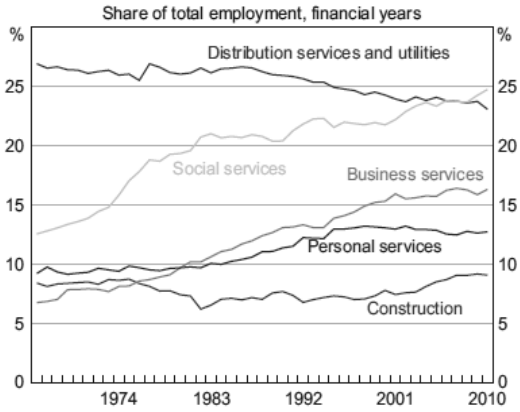
Appendix

Figure 1:
Employment by Industry



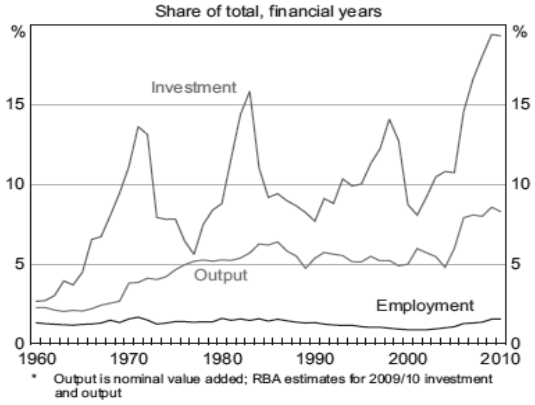
Source: ABS and RBA.

Figure 2:
Employment in the Service



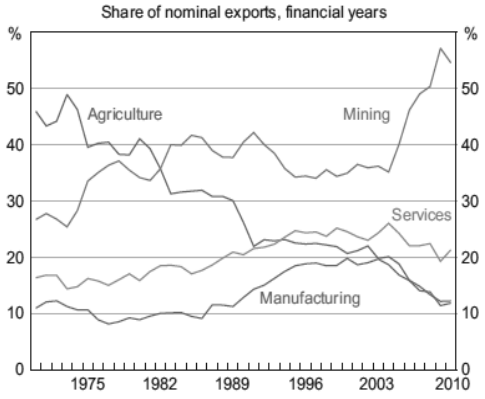
Source: ABS and RBA.

Figure 3:
Activity in the Mining Industry



Source: ABS and RBA.

Figure 4:
Australian Exports by Industry



Source: ABS and RBA.

Figure 5: Australian Population by State

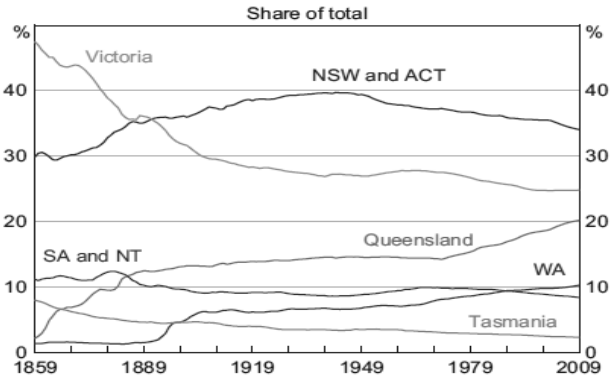
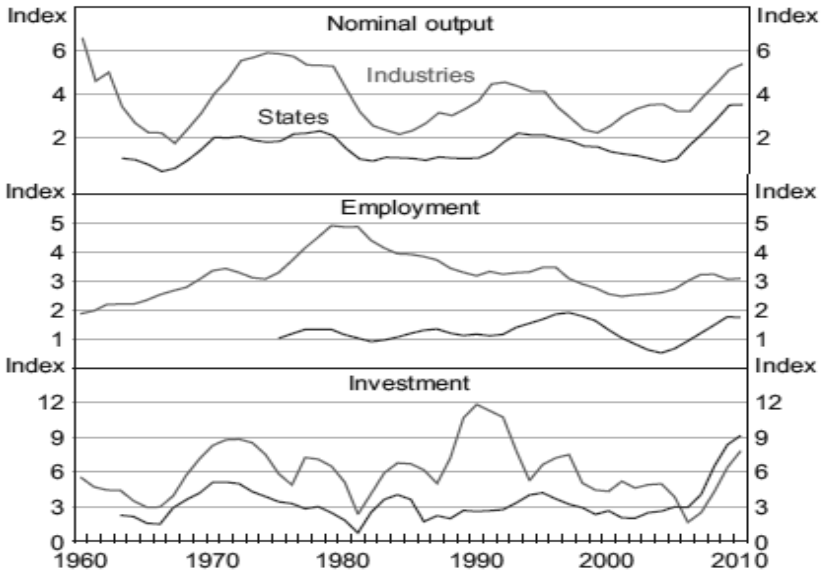


Figure 6: Structural Change Indices



Note: SCIs are calculated as half the sum of the absolute five-year change in five-year average industry shares or state shares. Data is set from 1960 to 2010. Output refers to value added by industry and gross state product (GSP). Investment includes business and public investment, but excludes dwelling investment and cultivated biological resources.

Table 1: Activity Share of States (per cent)

	NSW and ACT	Queensland	SA and NT	Tasmania	Victoria	WA
Output[a]						
– 1960s	38	13	9	3	32	6
– 1980s	35	15	9	3	30	9
– 2000s	35	18	8	2	25	12
Employment						
– 1960s[b]	38	14	10	3	28	8
– 1980s	36	16	10	3	27	9
– 2000s	35	20	8	2	25	10
Investment						
– 1960s	39	13	9	4	28	7
– 1980s	36	18	9	2	24	10
– 2000s	32	21	8	2	24	14

(a) Nominal gross state product
(b) 1966–1969

Source: ABS and RBA.

Table 2: Lag length of VAR models

This table reports the optimal lags for VAR models. VAR 1 model includes the structural change index ($SCIO_t$), mining industry activity variable (MIN_t), business services ($BSERV_t$) and social services ($SSERV_t$). VAR 2 model includes the structural change index ($SCII_t$), mining industry activity variable (MIN_t), business services ($BSERV_t$) and social services ($SSERV_t$). ($SCIO_t$) measures the change in the share of the different industries in total nominal output, while ($SCII_t$) measures the change in the share of the different industries in total investment. ($SCIO_t$) and ($SCII_t$) are calculated as half the sum of the absolute five year change in the five year average industry shares. Number of lags is optimized by minimizing the Schwarz Information Criteria (SIC).

VAR 1

	Independent Variable			
Dependent variable	$SCIO_t$	MIN_t	$BSERV_t$	$SSERV_t$
$SCIO_t$	1	1	1	1
MIN_t	1	1	_	1
$BSERV_t$	1	2	1	1
$SSERV_t$	1	2	_	1

VAR 2

	Independent Variable			
Dependent variable	$SCIIt$	MIN_t	$BSERV_t$	$SSERV_t$
$SCIIt$	1	1	1	1
MIN_t	2	1	2	_
$BSERV_t$	1	1	1	_
$SSERV_t$	1	1	1	1

Table 3: VAR Forecast Error Statistics

This table reports the Mean Absolute Error forecast (MAE) and Theil Inequality U statistics for VAR 1 and VAR 2 models. VAR 1 model includes the structural change index ($SCIO_t$), mining industry activity variable (MIN_t) and business services ($BSERV_t$) and social services ($SSERV_t$). VAR 2 model includes the structural change index ($SCII_t$), mining industry activity variable (MIN_t) and business services ($BSERV_t$) and social services ($SSERV_t$). $SCIO_t$ measures the change in the share of the different industries in total nominal output, while $SCII_t$ measures the change in the share of the different industries in total investment. $SCIO_t$ and $SCII_t$ are calculated as half the sum of the absolute five-year change in five-year average industry shares. Data is set from January 1960 to July 2010. These data are based on the International Standard Industrial Classification (ISIC). Results are reported for 1-step, 6-step and 12-step ahead forecasts.

VAR 1		**1-step**		**6-step**		**12-step**	
	Variables	MAE	Theil U	MAE	Theil U	MAE	Theil U
	SCIO	1.52	0.85	1.31	0.82	1.74	0.91
	MIN	2.3	0.95	2.54	0.94	2.36	0.98
	BSERV	1.76	0.82	1.81	0.84	1.92	0.89
	SSERV	1.3	0.81	1.51	0.83	1.68	0.86

VAR 2		**1-step**		**6-step**		**12-step**	
	Variables	MAE	Theil U	MAE	Theil U	MAE	Theil U
	SCII	1.66	0.87	1.76	0.92	1.95	0.95
	MIN	0.93	0.71	1.02	0.76	1.12	0.78
	BSERV	2.12	0.94	2.27	0.95	2.43	0.98
	SSERV	1.83	0.91	1.95	0.95	2.11	0.94

Note: MAE (Mean Absolute Error) has been annualized and reported in percentage points