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INCOME DISPARITIES AND TRENDS IN MANUFACTURED EXPORTS ACROSS THE STATES AND TERRITORIES OF AUSTRALIA: 1989/90 – 2000/01

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Abstract

This paper documents differences in the levels and growth rates of manufactured exports across the Australian states and territories over the period 1989/90 – 2000/01 and then re-interprets these differences using shift-share analysis. Our results suggest that the relative changes in state exports of manufactured goods have been substantial and seem in large part due to state specific characteristics that impact on state competitiveness.

I Introduction

A number of recent studies have highlighted the existence of large per capita income disparities across the states and territories of Australia[2] (see, for instance, Cashin and Strappazzon 1998, Neri 1998 and Lloyd et al. 2000). Table 1 highlights the magnitude of these disparities for the period 1989/90 – 2000/01, where we use real gross state product per capita (RGSPC) as a proxy for mean state per capita income. Table 1 also includes mean annual growth rates in real state per capita output for the period. Approximately, mean income in the poorest state in 1989/90 (Tasmania) was 64% of that in the richest, whilst by 2000/01 this income gap had increased with the relevant proportion falling to 57%[3].

What factors may be responsible for these rather large income disparities? Possibilities include differences across states in the stage of economic development, labour market conditions, demographic characteristics, political climate, remoteness, the

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[2] From here on we refer to the Australian states and territories as the Australian states.
[3] We have not investigated cross state differences in the cost of living over the study period and so the data in Table 1 may not accurately reflect disparities in material standards of living.

existence of rapidly growing centres and asymmetric impacts of national macroeconomic fluctuation (see, for instance, Maxwell and Peter 1988 and Harris and Harris 1991).

This paper draws attention to the possibility that state exports of manufactured goods may also be important drivers of state per capita incomes by documenting recent changes in state exports of manufactured goods[4].

Table 1. Real gross state product per capita (RGSPC) and mean annual growth rates in RGSPC for the Australian states: 1989/90-2000/01

State	RGSPC 1989/90 ($)	RGSPC 2000/01 ($)	Growth rate of RGSPC (%)	Aggregate change in RGSPC (%)
NSW	27366	34689	2.16	26.8
VIC	26295	34891	2.57	32.7
QLD	22293	29864	2.66	33.9
SA	22944	28944	2.09	25.9
WA	26995	35234	2.42	30.5
TAS	20933	23734	1.14	13.4
NT	30518	35491	1.37	16.3
ACT	32739	41366	2.13	26.3
AUST	25603	33337	2.40	30.1

Notes: NSW is New South Wales, VIC is Victoria, QLD is Queensland, SA is South Australia, WA is Western Australia, TAS is Tasmania, NT is the Northern Territory and ACT is the Australian Capital territory.
Data source: ABS, Australian national Accounts, State Accounts, 5220.0.

In many cross-country studies of income levels and/or economic growth rates, some measure of openness to the rest of the world has often turned out to be positively correlated with the relevant measure of economic prosperity (see, for instance, Winters 2004). This relationship has been emphasized by important world bodies such as the World Bank, whose report on the fast growing Asian economies emphasized the importance of trade in manufactured goods in particular as follows: "…manufactured exports…(have) provided a powerful mechanism for technological upgrading in

[4] Manufactured goods are defined as those described by ANZSIC codes 21-29, namely (in ascending code order) food and beverage, textile and clothing, wood and paper products, printing and publishing products, petroleum and coal products, non-metallic products, metal products, machinery, and other products.

imperfect world technology markets, …greater access to best-practice technology, (and hence) benefits to the enterprise and spillovers to the rest of the economy that are not reflected in market transactions. These information-related externalities are an important source of rapid productivity growth" (World Bank, 1993, pp.22-23).

If this is so across countries then perhaps this may also be so across states within a country. However, formally testing this hypothesis is beyond the scope of this paper given the large number explanatory variables that are likely to exist. Rather, we restrict ourselves in this paper to merely documenting the differences in the levels and growth rates of manufactured exports across the Australian states for the period 1989/90 to 2000/01. We then re-interpret these differences using shift-share analysis. Our results suggest that relative changes in state exports of manufactures goods have been substantial and seem in large part due to state specific but as yet unidentified characteristics.

This paper is organized as follows. Section II presents data on manufactured exports by Australian state. Section III briefly discusses the shift-share approach and applies the decomposition method to the Australian data. Finally, section IV concludes.

II Manufactured exports by Australian state

Australian manufactured exports as a share of national gross domestic product increased at a annual (geometric) rate of 6.45%, growing from about $22.4 billion and 10 percent of GDP in 1989/90 to $48.7 billion and 18 percent of GDP in 2000/01. However, the growth rates across the Australian states varied significantly over this period, as Table 2 indicates[5]. Exports from WA and SA enjoyed the highest growth rates over this period

[5] Data relating to manufacturing exports at the disaggregated industry level and by state for the period 1989/90 - 2000/01 were obtained from the ABS on request. Aggregate exports, gross state products and export destinations are from the DX database with the ABS being the original source.

of 10.3% and 10.0% respectively whilst NSW experienced the lowest (positive) growth rate of 4.0%. Manufactured exports from ACT contracted at an annual average rate of 9.55%[6].

Table 2. State manufactured exports: 1989/90 - 2000/01

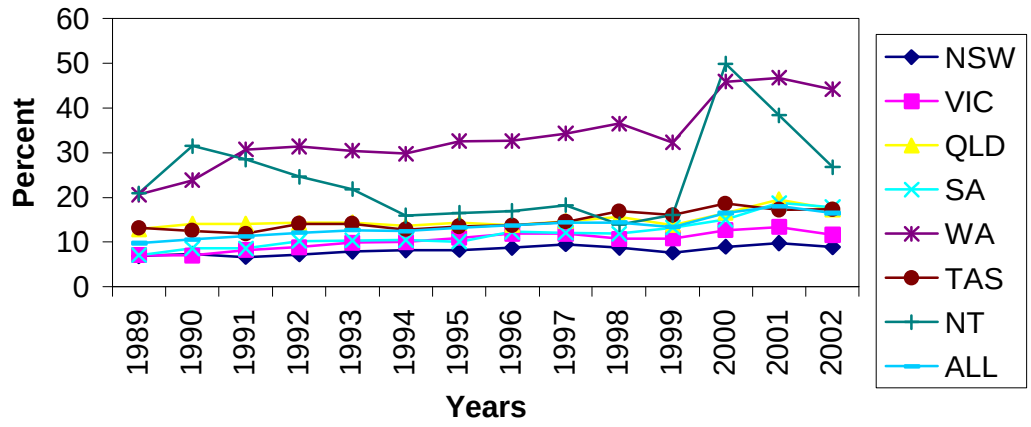
State	1989/90 Exports in $ (millions)	2000/01 Exports in $ (millions)	Annual Average Growth (in %)	Share of total Australian manufactured exports (in %)	
				1989/90	2000/01
NSW	6985	11308	4.0	31.1	23.2
VIC	6106	15351	7.7	27.2	31.5
QLD	4836	8010	4.2	21.5	16.4
SA	1554	5137	10.0	6.9	10.5
WA	2193	7584	10.3	9.8	15.6
TAS	704	1184	4.3	3.1	2.4
NT	45	82	5.0	0.2	0.17
ACT	3	1	-9.55	0.01	0.002
AUST	22426	48655	6.0	100	100

Notes: State totals may not exactly sum to the national total because of rounding errors.
Data source: see text.

These disparate growth rates resulted in significant changes in each state's share of national manufactured exports over the study period. For instance, the share for NSW fell from 31.1% to 23.2%. On the other hand VIC became the largest state exporter with its share increasing from 27.2% to 31.5%. WA enjoyed the largest proportionate increase in its share of national manufactures whilst TAS and NT experienced modest declines. The relative importance of this sector to each state's gross product also changed as Figure 1 illustrates. WA experienced the largest increase whilst NT experienced the greatest volatility.

[6] Given its very small (relative) output of manufactured exports, the remaining data and discussion in this paper ignores ACT.

Figure 1: State Manufactured Exports as a Share of State Final Demand



Further differences appear when we examine data on manufactured export growth by industry, presented in Table 3. It is clear that the increases over this period across the respective industry classifications were also not uniform. Exports of wood and paper based products enjoyed the highest growth rate (14%). Exports of machinery enjoyed the second highest growth rate (10.4%) such that by 2000/01 this industry had almost caught up to metal products as the second largest national exporter. Interestingly, whilst metal products and food and beverages both experienced solid growth rates, each of these industry's share of national exports actually declined over the period because they did not keep pace with the national average, spurred on by the even higher growth rates of machinery, petroleum and coal and wood and paper.

Table 3. Export growth by ANZIC code: 1989/90 - 2000/01

ANZSIC code	Industry descriptor	Annual Average Growth (in %)	Share of national manufactured exports (%) 1989/90	2001/02
21	Food and beverages	5.6	32.3	29.2
22	Textiles and clothing	2.9	5.2	3.4
23	Wood & paper products	14.0	0.9	2.2
24	Printing and publishing	6.9	0.8	0.9
25	Petroleum and coal products	8.0	10.6	12.8
26	Non-metallic products	6.4	0.5	0.5
27	Metal products	4.9	33.9	28.4
28	Machinery	10.4	13.3	21.3
29	Other	1.6	2.5	1.4
21-29	All	6.45	100	100

Data source: see text.

Other things being equal, these industry growth disparities would not have impacted on the relative economic performances of the states if the composition of manufactured export industries in each state were identical. However, this is not the case. Table 4 presents data on an export-similarity index that summarises the degree to which the manufactured exports of each state reflect those of the nation as a whole[7]. The index ranges from zero, indicating that a states' exports are completely dissimilar to the national distribution of exports, to 100 indicating complete similarity. We note from Table 4 that manufactured exports from NSW and QLD more closely reflected the national mix of exports by 2000/01 than they did in 1989/90, whilst the reverse is the case for the other five states. Particularly notable is the fact that the mix of exports from WA and especially NT appear to be somewhat 'unique' to those states. Hence not only did both of these states, and especially WA, experience substantial increases in their manufactured exports (see Table 2), by the end of the period both states were exporting a

[7] The construction method is as follows: for each state, calculate the share of total manufactured exports by industry for each of the 2-digit industry categories. Next, calculate the corresponding national share. For each 2-digit industry category, compare the state share with the national share, take the minimum, then sum these 12 values and multiply by 100. See Coughlin and Pollard (2001).

mix of manufactured products that was less representative of the overall national mix of manufactured exports.

Table 4. Export-similarity index by industry: 1989/90 - 2000/01

State	1989/90	2000/01	Difference
New South Wales	79	91	12
Victoria	92	88	-4
Queensland	69	80	11
South Australia	88	77	-11
Western Australia	69	65	-4
Tasmania	76	73	-3
Northern Territory	41	27	-14

Data source: see text.

Demand shocks could also help explain changes in state manufactured exports. Australian manufactured goods are exported to many countries, and Table 5 presents data on the annual export growth rates to some of the more important of these. We especially note the approximate quadrupling of manufactured exports to China over this period and the less rapid but nevertheless generally impressive increases to most of the other destinations.

Table 5. Australian manufactured export growth by destination: 1989/90-2000/01

Destination	Mean annual growth rate
China	14.6
Hong Kong (SAR of China)	8.2
Japan	4.4
Korea, Republic of	9.4
New Zealand	7.9
Singapore	6.5
Taiwan	7.5
United Kingdom	9.2
USA	5.6
ASEAN	7.9
EU	5.2
Mean for all destinations	6.6

Data source: see text.

If each state exported the same proportion of their manufactured goods to each foreign destination then, *ceteris paribus*, a demand shock in any particular destination country would affect the Australian macro economy but not differentially across the states. However, differential effects could occur if states were relatively more or less reliant on particular geographic destinations. For instance if manufactured exports from state *i* to destination *j* were in proportionate terms large (small) relative to the national figure then any substantial economic shock in destination *j* would have a disproportionately large (small) impact on state *i* relative to the overall impact it would have on the Australian economy.

So to what extent are individual Australian states disproportionately reliant on particular geographic destinations for their manufactured exports? Table 6 presents data on an export-destination similarity index constructed in a manner comparable to that used to construct the export similarity index data in Table 4. An index value of 100 indicates complete similarity with the national mix of export destinations whilst an index value of zero indicates complete dissimilarity. Once again the data suggest that, over the sample period, changes occurred in the degree to which the Australian states exported manufactured goods to particular destinations. Only NSW and QLD experienced positive changes between 1989/90 and 2001/02, implying that the destinations for manufactured exports from these states more closely resembled those for the nation as a whole by the end of the sample period than they did at the beginning. For all of the other states the changes were negative implying that the destinations became less similar compared to those for the nation as a whole by the end of the sample period.

Table 6. Export-destination similarity index: 1989/90 - 2000/01

State	1989/90	2001/02	Difference
New South Wales	88	91	3
Victoria	88	82	-6
Queensland	84	85	1
South Australia	81	73	-8
Western Australia	90	87	-3
Tasmania	89	78	-11
Northern Territory	75	58	-17

Data source: see text.

Clearly then, state exports of manufactured goods experienced substantial absolute and relative changes over this period, as did the composition of each state' manufactured exports and the relative importance to each state of particular export destinations. In the following section, we re-examine these state differences using shift-share analysis.

III Shift-share analysis

In this section we re-interpret the state differences in the export of manufactured goods highlighted above using shift-share analysis, a technique that decomposes the aggregate change in a state's exports into more meaningful components. We follow the approach in Coughlin and Pollard (2001) and define the differences that arise from the mix of manufactured exports originating from the Australian states as the *industry-mix* effect, the differences that arise from the particular destinations for manufactured exports by states as the *destination* effect, and the differences that arise from other factors we define as the *competitive* effect. We calculate the magnitude and direction of these three effects for each Australian state using the shift-share technique that begins by comparing each state's manufactured export growth rate to that of the nation as a whole.

States that outperformed (under performed) the nation have a positive (negative) net relative change. We decompose these positive and negative net relative changes into an industry-mix effect, a destination effect and a residual that is called a competitive effect. "A positive (negative) industry-mix effect indicates that a states exports were relatively more concentrated in industries whose exports expanded faster (slower) than the over all national average…(whilst) a positive (negative) destination effect indicates that a states manufacturing exports were initially relatively more concentrated in export markets that subsequently expanded faster (slower) than the overall national average" (Coughlin and Pollard, 2001, p.25). This leaves the (residual) competitive effect that is interpreted as the "…quantitative difference between a state's exports and those of the nation caused exclusively by the difference in the growth rate of that state's industries compared with that of the nation" (*ibid*, p.34).

These relationships can be expressed mathematically as follows[8]:

$$NRC^S = \sum_i X^s_{i,o}(x^n_i - x^n) + \left[\sum_i X^s_{i,o}(x^s_i - x^n_i) - \sum_j X^s_{j,o}(x^n_j - x^n)\right] + \sum_j X^s_{j,o}(x^n_j - x^n)$$

where NRC^s is the net relative change for state *s* over the study period. The remaining terms are defined as follows:

$X^s_{i,o}$ = the initial period (period *o*) dollar value of manufactured exports from state *s* (by ANZSIC code i)

x^n_i = the aggregate growth of national manufactured exports (by ANZSIC code *i*) over the period

[8] See Coughlin and Pollard (2001), equation (2).

x^n = the aggregate growth of national manufactured exports (summed across all codes) over the period

(x_i^s) = the aggregate growth of manufactured exports (by ANZSIC code *i*) from state *s* over the period

$X_{j,o}^s$ = the initial period dollar value of manufactured exports from state *s* to foreign destination *j*

(x_j^n) = the aggregate growth of national manufactured exports to destination *j* over the period

The first term on the right of the equality is the industry-mix effect, the last term is the destination effect, whilst the middle term in the square brackets is the (residual) competitive effect. Our decomposition results for the Australian states are presented in Table 7. The figure of -25.4 for NSW, the worst performing state, indicates that manufactured exports from NSW were, by the end of the period, 25.4% lower than they would have been had NSW manufactured exports grown at the national rate over the period. QLD, TAS and NT also performed below the national rate. The best performing state was WA followed closely by SA. The other state that outperformed the nation as a whole was VIC.

Table 7. Net relative changes and the shift-share results

State	Net Relative Change (NRC)	Industry Mix Effect	Competitive Effect	Destination Effect
NSW	-25.4	-1.0	-23.1	-1.3
VIC	15.9	5.9	2.9	7.1
QLD	-23.7	-5.9	-6.1	-11.6
SA	52.4	5.3	38.3	8.8
WA	59.5	-3.4	55.5	7.3
TAS	-22.5	-0.8	-8.5	-13.2
NT	-16.2	-16.9	-36.9	37.7

Notes: The sum of the industry-mix, competitive and destination effects may not equal the NRC because of rounding errors.

By disaggregating the net relative change into the 3 components defined earlier, we note that the industry mix effect was not the quantitatively most important driver of changes in manufactured exports in any state. On the other hand the competitive effect had by far the largest (positive or negative) impact in NSW, SA and WA whilst the destination effect was (more marginally) important for QLD, TAS and NT. These observations suggest that, overall, the competitive effect was likely most important. This is supported by the simple correlation coefficients between NRC and each of the three components. The coefficient (with t-statistics in parentheses) between NRC and the competitive effect is 0.92 (5.25), between NRC and the industry mix effect is 0.42 (1.04) whilst between NRC and the destination effect is 0.21 (0.49).

For all of the states except WA and NT, the three effects were complementary. For example, QLD's relatively poor performance was due to the existence of 'under-performing' industries and destinations and to other factors (presumable state-based in the main) that reduced QLD's competitiveness. On the other hand for WA, the existence

of under-performing industries was more than offset by relatively favourable export destinations and other factors that resulted in a large increase in competitiveness.

IV Concluding comments

This paper has documented the changes in state exports of manufactured goods over the 12-year period 1989/90 – 2000/01, which are substantial. We also decomposed the aggregate export changes for each state, calculated as the difference between a states' actual exports and what those exports would have been had that states' exports grown at the national rate, into an industry-mix effect, a destination effect and a (residual) competitive effect. The first two of these capture the extent to which a states' relative performance could be attributed to its particular sectoral make-up and its particular mix of export destinations. On the basis of this decomposition we found that, on balance, neither of these is the dominant explanation for the documented changes in the relative export performance of most states. Hence the main conclusion of this paper is that state specific factors that impact on a states' competitiveness appear to be the more important explanation for changes in the states manufactured export performance over the study period.

This paper began with observations on the level of, and changes in, per capita income disparities across the Australian states over the study period. Whilst we have not tried here to determine the important drivers of these income disparities across the states, the differences in the manufactured export performances of the states documented above, to the extent that these proxy for state differences in factors such as human capital accumulation and technology adaptation and absorption, could be part of the answer. Ongoing research seeks to construct a dataset of plausible explanatory variables,

including these disparities in manufactured exports, with which to investigate this question.

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