SOUTH AUSTRALIA

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Department of State Development

Attributing employment to exports

A sectoral analysis of the South Australian economy

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Attributing Employment to Exports- A Sectoral Analysis of the South Australian Economy

ALL ENQUIRIES

Zara Shroff and Rob Esvelt-Allen
Department of State Development
Level 4, 11 Waymouth Street
GPO Box 320, Adelaide, SA 5001
T 08 8303 2957
E Rob.Esvelt@sa.gov.au

PURPOSE

The South Australian Government understands the importance of our overseas exports, and utilises a number of data sources to capture and report on the value and volumes of our internationally traded commodities and merchandise. However, limited available data is ever cited to quantify the impact of exports, particularly in respect to employment. Indeed, most overseas export statistics reveal values measured in fob (free on board) or turnover terms, which are difficult to relate to traditional measures of economic contribution or 'value add'. Indeed, no available statistics regularly define the contribution of exports to Gross State Product or levels of employment, because the nature of employment makes this difficult to count or estimate by survey.

This paper, therefore, uses indicative measures (principally derived demand) to estimate how employment may flow (or be attributed) to exports at a sectoral level.

The approach taken to derive employment allocations to the four segments of the economy (local, tourism, interstate and overseas exports) is based on a key assumption that employment corresponds to the share of derived economic demand. While intuitively this assumption makes sense, market outputs may be the result of various firm based decisions, including finding suitable markets for residual (non-local) production. To this end, the approach is not without limitations and requires careful assessment of its limitations.

In 2012/13, 28.5% of South Australia's final demand came from overseas exports, interstate exports and tourism (excluding intrastate tourism)[1] activities. This share was 4.5% higher than Victoria and slightly lower than NSW.

The analysis provides a useful understanding of how to attribute employment by sector to the segments of the economy. This can be applied to several forms of analysis such as: the importance of South Australian exports to the Eastern States as part of any analysis of changing time zones; or even the comparative importance of overseas trade with China.

4 key data sources for the 12/13 period were used in this analysis: the SA input-output (I-O) table[2] covering 78 sectors; Australian Bureau of Statistics (ABS) detailed commodity and industry trade data, including services; data from the South Australian Tourism Commission (SATC); and detailed ABS product category data (covering 1284 categories) information for the 2012-13 year.

SUMMARY RESULTS

During 2012/13 an estimated 28.5% of SA employment (203,000 jobs) was attributed to activities outside the State (including overseas, interstate and tourism).

In summary:

- 65,200 (9.3%) jobs are related to overseas exports;
- 113,800 (16.2%) jobs are related to interstate exports;
- 24,000 (3.4%) jobs are related to interstate and overseas tourism; and
- 499,600 (71.1%) jobs are related to local, intrastate tourism consumption[3].

Note: These figures include both the initial (direct) jobs involved in the production or sale of a product or service, and all the production-induced (indirect) jobs, which is the sum of first-round impacts (estimates of the

[1] See Table 5 in Appendix for breakdown.

[2] A transactions table that illustrates and quantifies the purchases and sales of goods and services occurring in the economy at a given point in time. It provides a numerical picture of the size and shape of the economy and its essential features. Each item is shown as a purchase by one sector and a sale by another, thus constructing two sides of a double accounting schedule.

[3] SATC research, estimates 54,000 jobs in tourism. However, due to limited data in the I-O table, we were not able to estimate employment related to intrastate tourism. In this project, intrastate tourism is included in local demand. Given SATC estimates, approximately 30,000 jobs (4% of employment) was attributed to intrastate tourism.

requirement for or the purchases of goods and services from other sectors in the economy generated by the initial economic activity) and industrial support impacts (employment resulting second, third and subsequent rounds of spending by firms).

The I-O model was used to estimate the level of employment created by the chain of activities involved in producing a final 'traded' output. For example, the share of employment associated with typical input activities, such as transport and electricity supply, are included as part of the supply chain for most sectors, although these inputs may only be indirectly associated with an export.

Figure 1: Total SA employment (by segments)

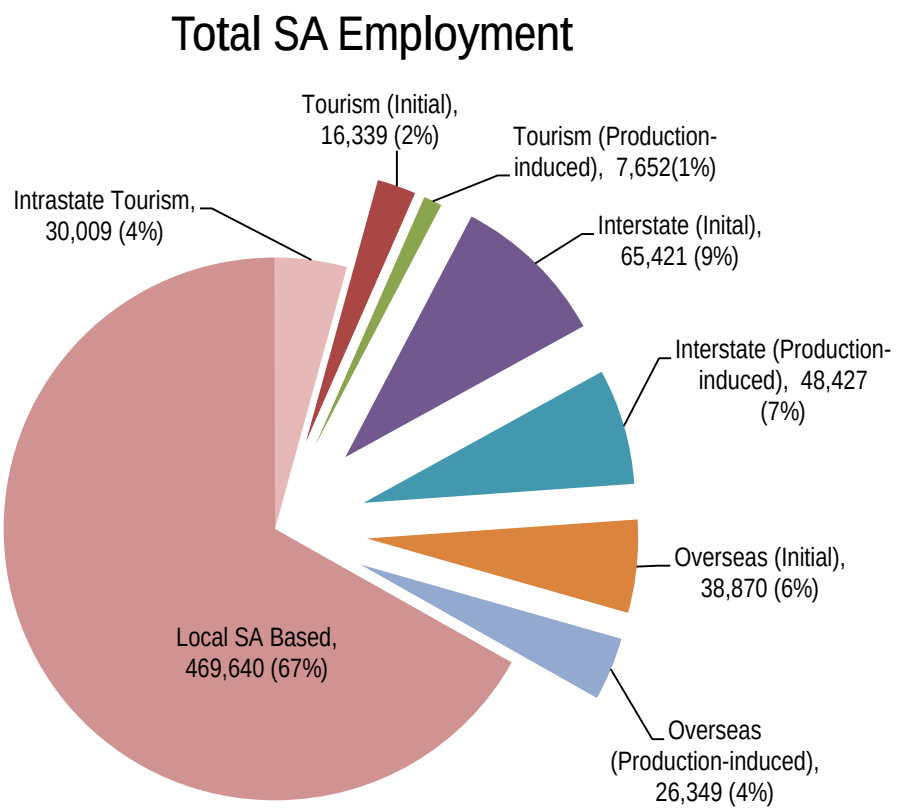


Figure 1 shows the level of employment and the share of total employment for each segment of the economy[4]. The majority of employment within South Australia (67%) is derived from local consumption. This includes household consumption expenditure, government consumption expenditure, gross fixed capital formation and changes in inventories.

Figure 2 shows the total level of employment (initial and production-induced summed) for each sector in the South Australian economy. Agriculture, forestry and fishing (66%), and mining (78%) are only 2 of 19 sectors in which the majority of employment is derived from overseas, interstate and tourism demand as opposed to local SA based demand (including intrastate tourism activity). The majority of jobs in overseas exports are from manufacturing, mining and agriculture.

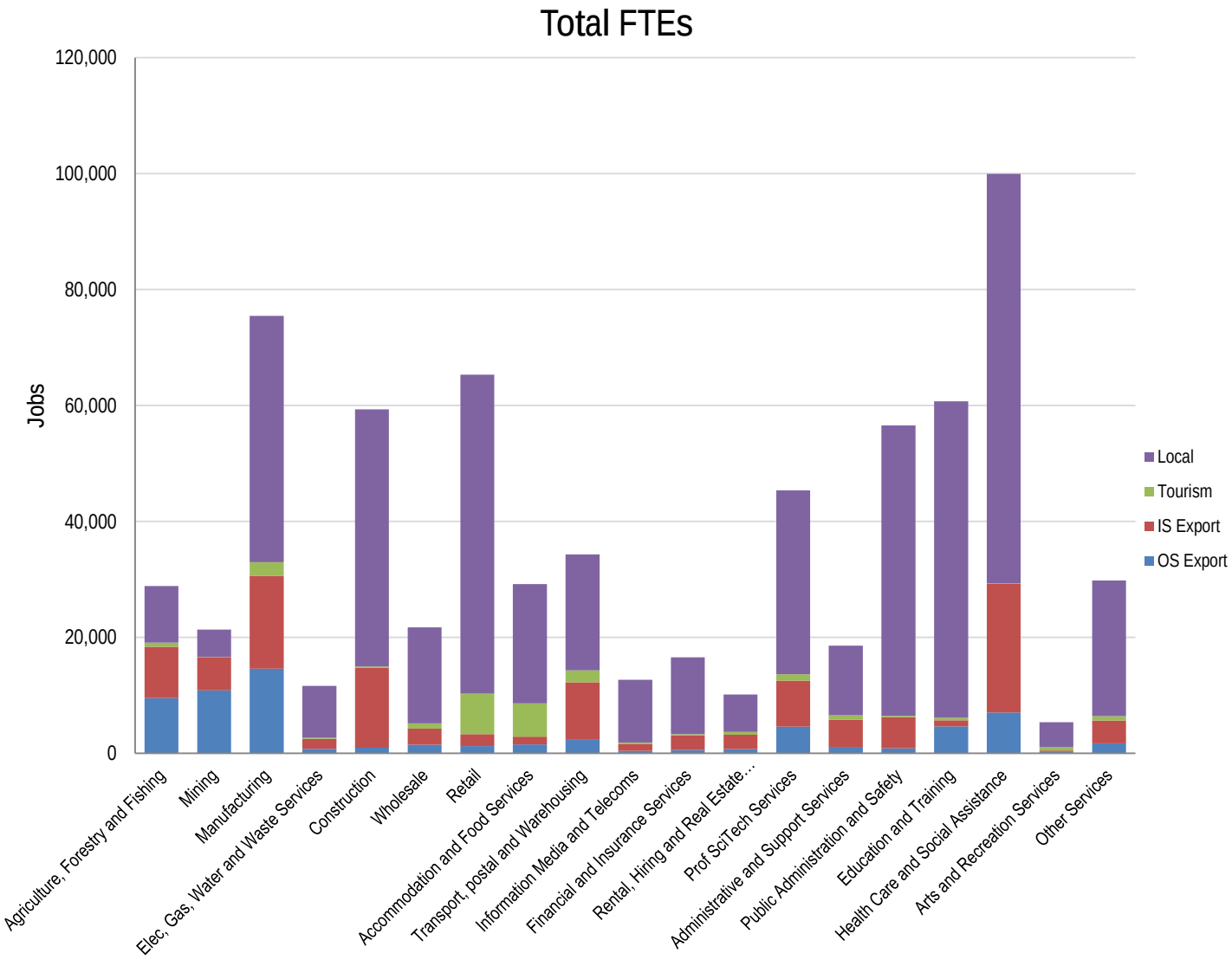
[4] Table 2 of the appendix provides a sectoral breakdown. Please note, intrastate tourism results are taken from SATC findings.

A significant proportion of initial jobs (31%) in health care and social assistance are derived from interstate exports. These exports are valued at over $2 billion, where 47% of this demand is attributed to hospital services (except psychiatric hospitals) and 13% of demand comes from residential care services for the elderly[5].

73% of employment in tourism (excluding intrastate tourism) is attributed to demand for accommodation and food services, and retail.

Most of the initial employment from overseas exports is derived from goods based trade and majority of production-induced employment is in services. For interstate trade the results are reversed. The majority of employment related to tourism is within services.

Figure 2: Total FTEs in SA



To determine the largest number of jobs by sector derived from all export activities, a relative ranking of the employment levels is shown in Table 1. It demonstrates that as industries vary in size and employment intensity, sectors with a relatively larger percentage of employment associated with overseas exports (those with an export focus) need not have the largest number of workers associated with an export activity as they are relatively less labour intensive.

[5] 7% from ACT.

Table 1: Sectors with highest levels of employment

Rank	Overseas Exports	Interstate Exports	Tourism
1	Health & Community Services	Health & Community Services	Retail Trade
2	Iron & Non- ferrous Ore Mining	Professional Scientific Tech Services	Food & Beverage Services
3	Education & Training	Road Transport	Accommodation
4	Professional Scientific Tech Services	Construction Services	Professional Scientific Tech Services
5	Exploration & Mining Services	Residential Building Construction	Road Transport

The top 5 sectors contribute approximately 39% (25,400 jobs) of the total employment in overseas exports which accounts for 4% of the total share of employment in South Australia.

Other key findings are:

- Sectors with the largest percentages of employment associated with overseas export activity (relative to interstate exports and domestic consumption) include; coal & other ndf mining (80%), basic non- ferrous metals manufacturing (81%), iron & non-ferrous ore mining (62%), and fishing (57%). These sectors hire fewer workers relative to other sectors and therefore only one of them rank among the Top 5.
- Sectors with the largest percentages of employment associated with interstate export activity include; pig production (70%), rail transport (61%), Forestry (66%), and sawmill products (58%).

Refer to Table 4 of the appendix for employment shares by sector.

METHODOLOGY

The first step included gathering data on total output, full-time employment, total exports, tourism and domestic consumption from the I-O table for the 78 sectors of the South Australian economy. To determine the share of employment across the four segments, 'total exports' (provided by I-O tables) was categorized into overseas exports and interstate exports.

The ABS database provided information on South Australia's overseas goods exports[6] in 'free on board' (FOB) values using ANZSIC (Australian and New Zealand Standard Industrial Classification) codes. Data for services exports such as education was also taken from the ABS website[7]. This data was matched to the 78 sector code. Tourism data was taken from the I-O table excluding intrastate tourism[8].

Once overseas trade for the 78 sectors was determined, this value was subtracted from the total exports (obtained from the I-O table) to provide total interstate trade.

To remove double-counting, intermediary demand is excluded from final demand which is based on overseas and interstate exports, tourism, household consumption expenditure, government consumption expenditure, gross fixed capital formation and changes in inventories.

The I-O table provided total full-time jobs by sector. However, for our purpose, we needed to determine the level of initial and production-induced employment associated with output for each sector.

To calculate employment for the four segments, we conducted a final demand impact analysis by using demand (or total output) for each trade segment. From this we were able to derive initial and production-induced

[6] Table 12a ABS cat. No 5368.0, International Trade in Goods and Services, Australia, Jun 2013, ABS Website.

[7] ABS cat. No. 5368.0.55.003, International Trade in Services by Country, by State and by Detailed Services Category, Financial Year, 2013-14, via ABS Website.

[8] In other words, if a tourist consumes a product containing ingredients that were produced in say Victoria, then these are not included in the impact on the economy or jobs in SA. In value terms these intermediary imports make up almost 25% of the total value of tourism consumption.

employment impacts of these activities. The residual employment for each sector gives employment associated with local SA based demand and intrastate tourism.

The next step involved finding the share of employment attributed to the four segments for each sector. To compute the share of employment in overseas exports, the value of total employment in overseas exports (for each sector) was divided by total employment in the sector. For example, it was found that 81% of the total people working in non-metallic mining are attributed to overseas exports. The same calculations were applied to determine share of employment in interstate trade, tourism and local consumption. Total employment levels for each segment were divided by total SA employment to give a broader understanding of their employment shares[9].

LIMITATIONS

As with any approach, the limitations depend on the strength of the assumptions. The key assumption is that the share of employment is directly proportionate to the share of total demand for each of the four segments.

The intension of the exercise was to provide a structural sense of the distribution of employment and hence cannot be used to determine changes in employment attributed to monthly trade or demand movements.

FOB values have been used in this data hence there could be an issue of double counting.

If a sector were trying to enter the export market it may be that a larger percentage of employment would be allocated to overseas exports, however, this would not be reflected in the data.

SATC research states that 58,000 jobs were derived from tourist activities. In the National Accounts, tourism demand is principally defined as overseas and interstate tourism and it excludes intrastate tourism. Therefore, the SA I-O model excludes around 50% of the consumption value of tourism when compared to the SATC results. This remaining 50% is still included in the I-O table, however, is not allocated to tourism as defined by SATC and is captured within local demand. In effect, this means that for most economic impact purposes, tourism in the I-O table will underestimate initial and production-induced employment when compared to SATC findings. For example: the I-O estimates 23,990 total tourism jobs, whereas the SATC estimates 54,000 jobs.

References to initial and production-induced employment for the defence sector are not accurate due to limited data.

Stated are a number of important assumptions in the I-O model that are relevant in interpreting the analytical results:

- Industries in the model have a linear production function, which implies constant returns to scale[10] and fixed input proportions;
- Firms within a sector are homogeneous. This implies they produce a fixed set of products that are not produced by any other sector and that the input structure of the firms are the same; and
- The model is a static model that does not take account of the dynamic processes involved in the adjustment to an external change, such as a permanent change in natural resource management.

[9] See Table 4: Share of Employment table in Appendix.

[10] A production function exhibits constant returns to scale if changing all inputs by a positive proportional factor has the effect of increasing outputs by that factor (only valid for firms with no market power).

APPENDIX

The following tables are listed by ANZIC division.
Tourism includes interstate and overseas tourism only. Intrastate tourism is included in Local.

Table 2: Initial and Production-induced Employment Levels (FTEs) by Sector

SECTOR	OVERSEAS EXPORTS		INTERSTATE EXPORTS		TOURISM EXPORTS		TOTAL EXPORTS EMP	TOTAL SA EMP
	Initial	Production induced	Initial	Production induced	Initial	Production induced		
Manufacturing	11,655	2,950	9,110	6,925	1,313	1,022	32,974	75,450
Health Care and Social Assistance	6,839	183	21,946	304	-	31	29,304	99,957
Agriculture, Forestry and Fishing	6,437	3,077	6,680	2,193	-	705	19,092	28,828
Mining	8,252	2,620	4,468	1,263	-	31	16,634	21,329
Construction	-	958	8,374	5,421	-	236	14,989	59,325
Transport, postal and Warehousing	-	2,436	5,683	4,128	1,376	677	14,301	34,291
Prof SciTech Services	943	3,642	1414	6,555	-	1,079	13,633	45,358
Retail	-	1,245	-	2,032	6,567	417	10,262	65,294
Accommodation and Food Services	503	1,026	-	1,344	5,437	277	8,587	29,199
Administrative and Support Services	-	1,075	1,876	2,843	-	752	6,546	18,570
Public Administration and Safety	52	813	3,333	1,993	-	271	6,463	56,535
Other Services	-	1,730	-	3,911	119	649	6,410	29,790
Education and Training	4,083	557	-	1,070	212	198	6,120	60,736
Wholesale	-	1,488	188	2,556	535	390	5,157	21,729
Rental, Hiring and Real Estate Services	-	714	912	1,574	239	240	3,679	10,142
Financial and Insurance Services	11	557	853	1,687	-	189	3,297	16,532
Elec, Gas, Water and Waste Services	-	736	314	1,451	-	153	2,654	11,627
Information Media and Telecoms	9	401	270	928	-	239	1,846	12,676
Arts and Recreation Services	86	140	-	250	541	94	1,110	5,337
Total	38,870	26,349	65,421	48,427	16,339	7,652	203,058	702,706
Initial + production induced		65,218		113,848		23,991		
Share of Total Employment		9.3%		16.2%		3.4%	28.9%	

Table 3: Employment Breakdown for SA Goods and Services

SECTOR	OVERSEAS EXPORTS		INTERSTATE EXPORTS		TOURISM EXPORTS		TOTAL EXPORTS	
	FTEs	Share of Total EMP	FTEs	Share of Total EMP	FTEs	Share of Total EMP	FTEs	Share of Total EMP
Goods	34,991	5.0%	30,638	4.4%	3,071	0.4%	68,700	9.8%
Services	30,228	4.3%	83,210	11.8%	20,920	3.0%	134,358	19.1%
Total	65,219	9.3%	113,848	16.2%	23,991	3.4%	203,058	28.9%

Table 4: Employment Shares by Sector

SECTOR	OS EXPORT	IS EXPORT	TOURISM	TOTAL EXPORTS	LOCAL
Mining	51%	27%	0%	78%	22%
Agriculture, Forestry and Fishing	33%	31%	2%	66%	34%
Manufacturing	19%	21%	3%	44%	56%
Transport, postal and Warehousing	7%	29%	6%	42%	58%
Rental, Hiring and Real Estate Services	7%	25%	5%	36%	64%
Administrative and Support Services	6%	25%	4%	35%	65%
Prof SciTech Services	10%	18%	2%	30%	70%
Accommodation and Food Services	5%	5%	20%	29%	71%
Health Care and Social Assistance	7%	22%	0%	29%	71%
Construction	2%	23%	0%	25%	75%
Wholesale	7%	13%	4%	24%	76%
Elec, Gas, Water and Waste Services	6%	15%	1%	23%	77%
Other Services	6%	13%	3%	22%	78%
Arts and Recreation Services	4%	5%	12%	21%	79%
Financial and Insurance Services	3%	15%	1%	20%	80%
Retail	2%	3%	11%	16%	84%
Information Media and Telecoms	3%	9%	2%	15%	85%
Public Administration and Safety	2%	9%	0%	11%	89%
Education and Training	8%	2%	1%	10%	90%
Total EMP share by segment	9%	16%	3%	29%	71%

Table 5: Share of Final Demand and Employment

Segment	Demand ($m)	Share of Final Demand	Employment Share
Overseas Exports	11,980	11%	9%
Interstate Exports	20,265	18%	16%
Tourism	3,477	3%	3%
Local	78,215	69%	71%
Final Demand	113,937	100%	100%

Table 6: Sectors with highest levels of employment in each category

Rank	Overseas (Initial)	Overseas (Production induced)	Interstate (Initial)	Interstate (Production induced)	Tourism (Initial)	Tourism (Production induced)
1	Health & Community Services	Professional Scientific Tech Services	Health & Community Services	Professional Scientific Tech Services	Retail	Professional Scientific Tech Services
2	Iron & Non-ferrous Ore Mining	Road Transport	Residential Building Construction	Construction Services	Accommodation	Admin Support Services
3	Education & Training	Personal Services	Other construction	Personal Services	Food & Beverage Services	Personal Services
4	Wine Production	Exploration & Mining Services	Public Admin & Regulatory Services	Road transport	Road transport	Road Transport
5	Sheep Production	Wholesale	Road Transport	Admin Support Services	Cultural & Recreational Services	Retail Services

Figure 3: Total FTEs in SA (initial+ production-induced employment)

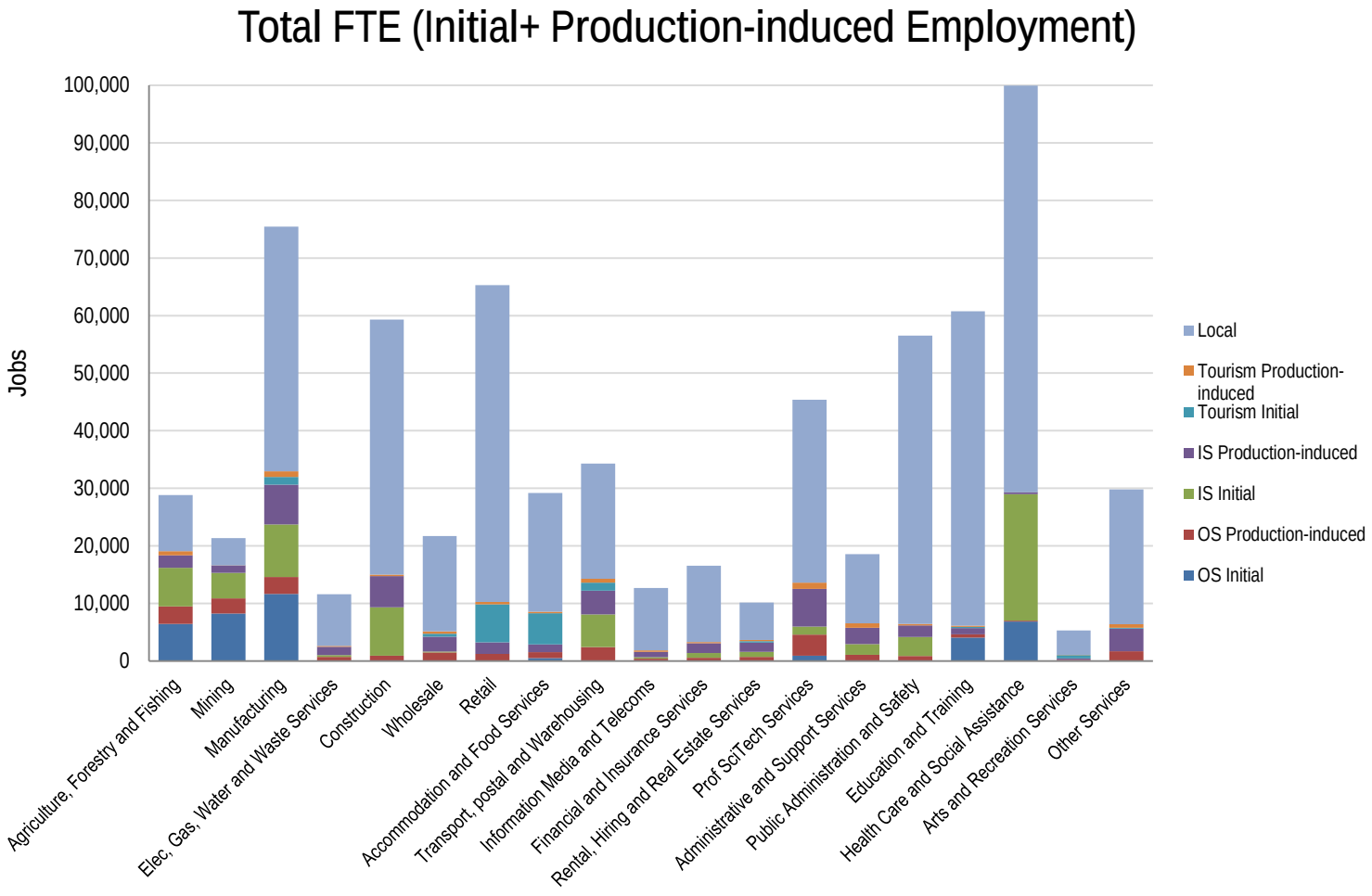


Figure 4: Total FTEs in Overseas Exports

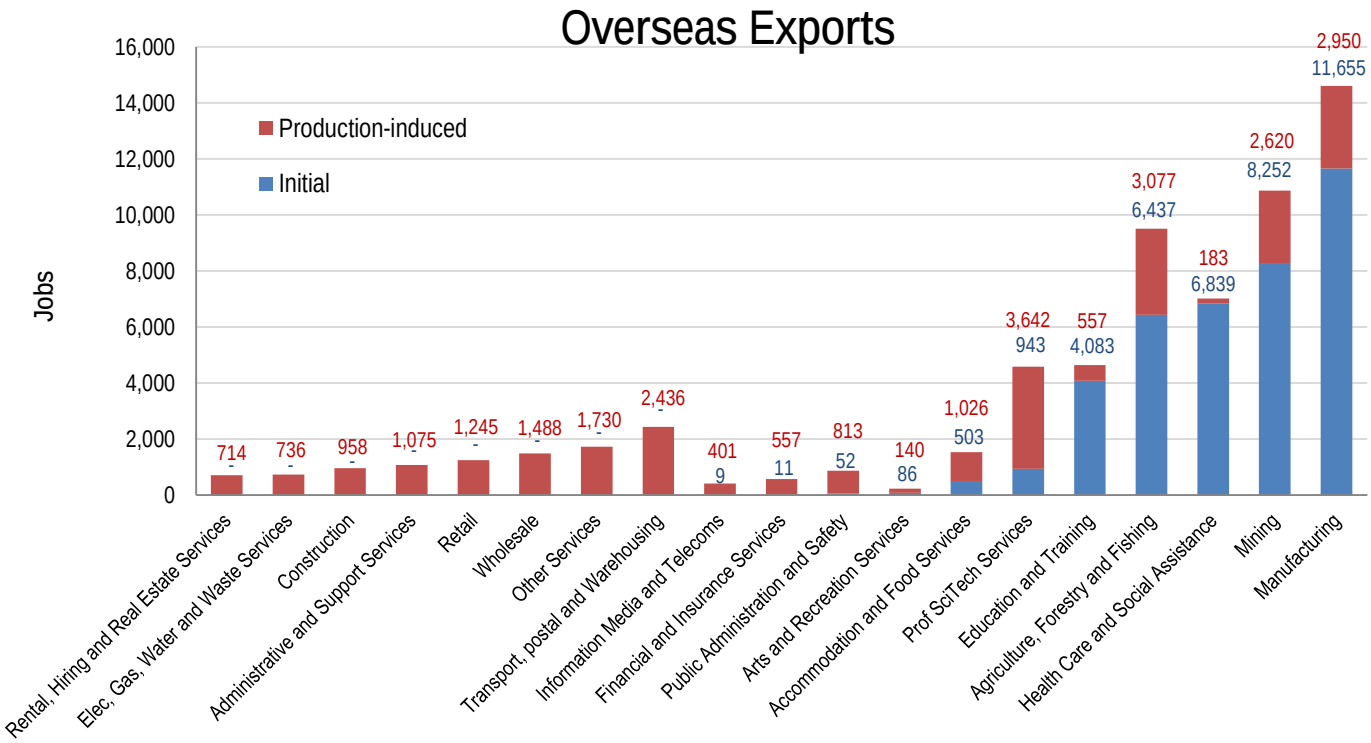


Figure 5: Total FTEs in Interstate Exports

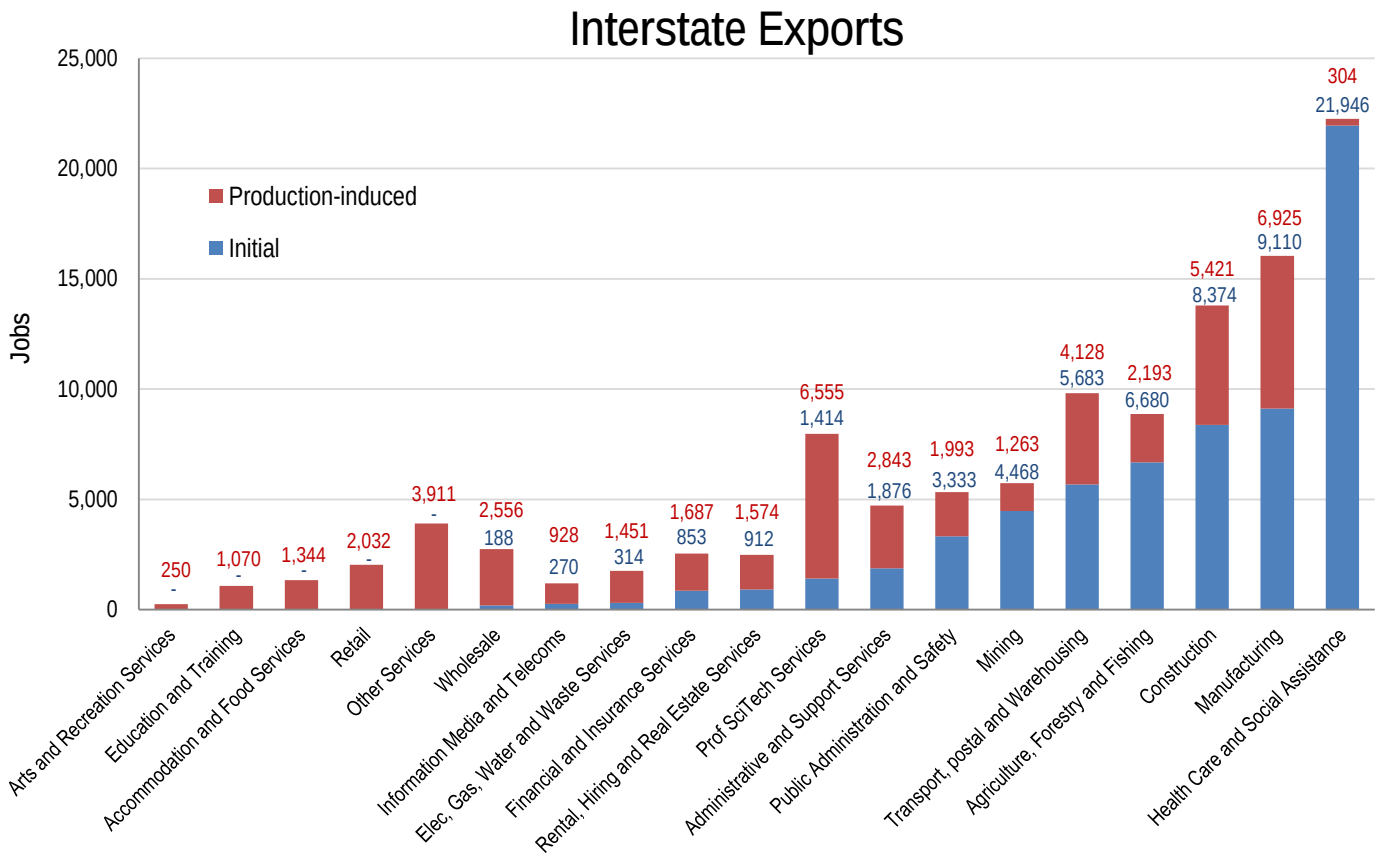
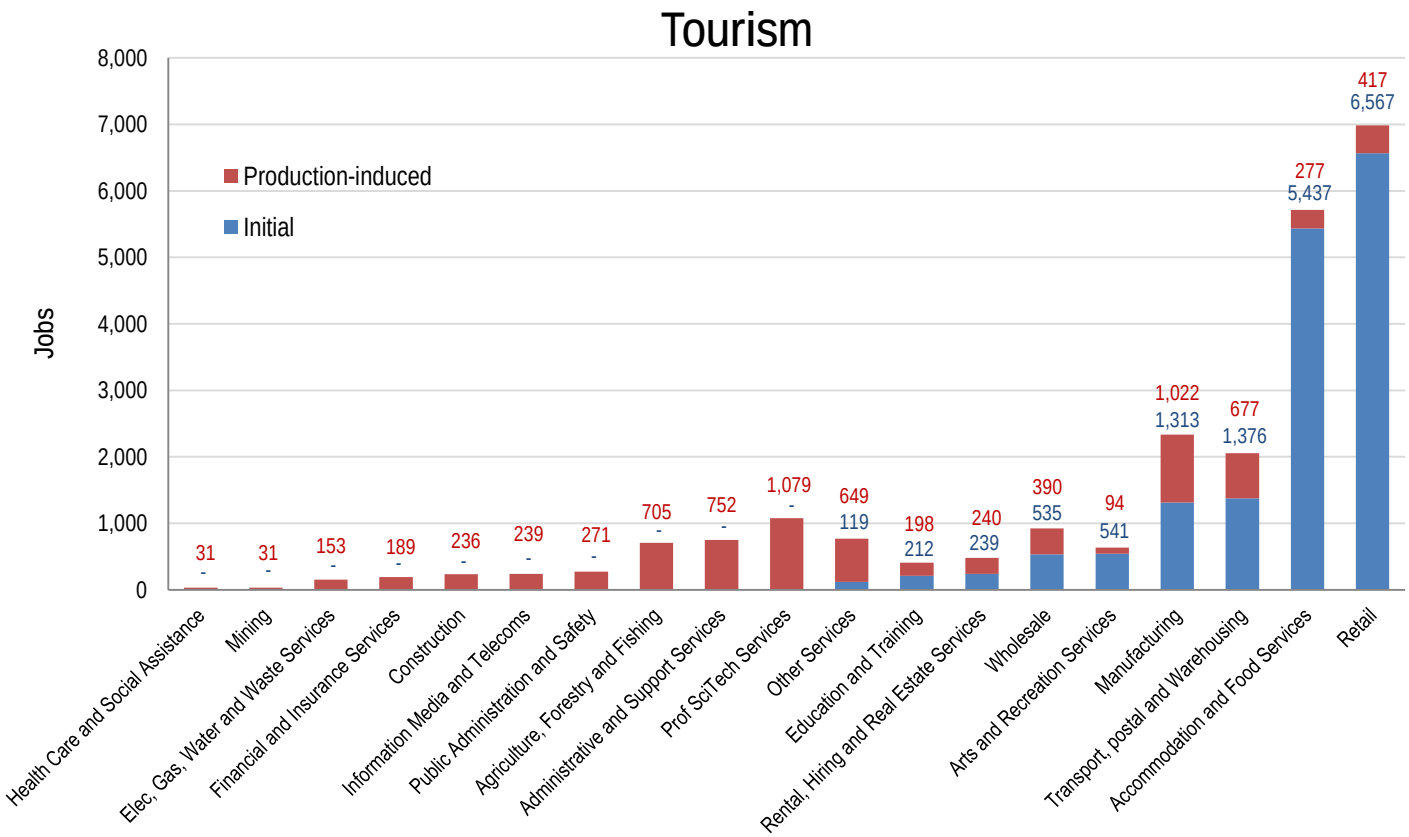


Figure 6: Total FTEs in Tourism



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