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New Zealand's land based sectors' relative export performance 1990-2004 – a shift share analysis.

Darran Austin and Peter Gardiner

Monitoring and Evaluation, MAF Policy, 25 The Terrace, Wellington, New Zealand.

Contact email: darran.austin@maf.govt.nz

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Between 1990 and 2004 the value of world trade increased by 110% whereas the value of exports from New Zealand's land based sectors expanded by only 51%. This paper examines New Zealand's performance using shift share analysis. According to this framework, the main cause of this slow export performance is that international trade in agricultural and forestry commodities has been growing slowly. Countering this, New Zealand has been improving its competitiveness within these commodities, especially since 2000.

Key Words: Trade performance, New Zealand, shift-share, productivity.

Introduction

That over two thirds of New Zealand's merchandise exports come from the land based sectors illustrates clearly where one of New Zealand's comparative advantages lies. If the New Zealand economy is to outperform other economies a crucial element will be for New Zealand's land based exports to outperform other countries' exports. Whether New Zealand's comparative advantage in land derived products is ideal for a country with these ambitions is a point that has been debated (Skilling and Boven, 2005).

In this paper shift share analysis is used to examine New Zealand's land based sectors' export performance in this paper. This methodology breaks changes in export value down into three parts: changes due to growth in world trade, changes due to commodity composition and changes due to changes in competitiveness. This research forms part of a larger growth and productivity project at MAF policy (see Cao, Forbes and Gardiner(2007) for more research from this project).

Literature Review

The first analysis of New Zealand's trade performance using the shift-share methodology was performed by Brownie and Dalziel (1993). They analysed data from 1970 and 1984 broken down into 54 product categories covering all exports. Brownie and Dalziel concluded that "…New Zealand's slow [export] growth was due entirely to the country's concentration on primary commodity exports in 1970". Countering this, New Zealand exports had grown faster than world imports within most product groups over this period. So New Zealand exporters had performed well within commodities that had performed poorly but overall the net performance was below par relative to the rest of the world.

Extending the coverage to more recent years, Ballingall and Briggs (2004) do a shift share analysis for New Zealand and Australia. Similarly to Brownie and Dalziel they conclude that New Zealand's (along with Australia's) exports are concentrated in slow growing commodities. From 1985 to 1999 however New Zealand has been losing ground within product groups as well.

Skilling and Boven (2005) also analyse New Zealand's recent export performance using a shift-share methodology as a part of their series of prescriptions to improve New Zealand's international engagement. They diagnose a major cause of New Zealand's slow export growth as due to "…a large presence in slower growing markets such as those based on the primary sector".

A significant problem with all of the papers mentioned here is that they arbitrarily pick two years for comparison. If trade in a commodity in one of the two years chosen is unusual for some reason then the subsequent results are biased by this. Another shortcoming when comparing only two points in time is the inability to track developments through time and relate changes in shares specific developments. Although Ballingall and Briggs (2004) partially address this when they break their 1970-1999 analysis into three sections to get some flavour of how the relative performance of New Zealand exports has changed over these three time periods.

Shift Share Methodolody

The shift share methodology as used in Brownie and Dalziel (1993) and Ballingall and Briggs (2004), applied to the export of commodity i from New Zealand can be represented as follows:

$$NZ_{i,2004} - NZ_{i,1990} = \left[NZ_{i,1990} \times \frac{\sum_{i=1}^{n} world_{i,2004} - \sum_{i=1}^{n} world_{i,1990}}{\sum_{i=1}^{n} world_{i,1990}} \right] +$$

$$\left[NZ_{i,1990} \times \frac{world_{i,2004} - world_{i,1990}}{world_{i,1990}} - NZ_{i,1990} \times \frac{\sum_{i=1}^{n} world_{i,2004} - \sum_{i=1}^{n} world_{i,1990}}{\sum_{i=1}^{n} world_{i,1990}} \right] +$$

$$\left[(NZ_{i,2004} - NZ_{i,1990}) - NZ_{i,1990} \times \frac{world_{i,2004} - world_{i,1990}}{world_{i,1990}} \right]$$

Where $NZ_{i,t}$ represents New Zealand's export value of commodity i in year t and $world_{i,t}$ is total world imports of commodity i in year t. There are n commodities in total of which this paper only considers a subset. This equation breaks the change in exports of commodity i, from 1990 to 2004, into three parts.

The first part (the first square bracket) is the change in exports due to *change in world trade*, that is, the growth in the trade in commodity i if that commodity had grown at the same rate as total world trade.

The second part (the second square bracket) is the change in exports due to *commodity composition*. This is the difference between the growth in exports if the commodity had grown at the same rate as world trade in that commodity and if it had grown at the same rate as total world trade. A positive value indicates that growth in world trade in that commodity has outstripped growth in total world trade.

Finally the third part (the third square bracket) is the change in exports due to *change in competitiveness.* This compares the actual New Zealand growth in trade of a commodity with the growth in world trade of that commodity. A positive value indicates that New Zealand exporters have gained market share within trade in that commodity.

To obtain a time series of this shift share analysis it can be done for annual changes over all of the years and then graphed.

$$NZ_{i,t} - NZ_{i,t-1} = \left[NZ_{i,t-1} \times \frac{\sum_{i=1}^{n} world_{i,t} - \sum_{i=1}^{n} world_{i,t-1}}{\sum_{i=1}^{n} world_{i,t-1}} \right] +$$

$$\left[NZ_{i,t-1} \times \frac{world_{i,t} - world_{i,t-1}}{world_{i,t-1}} - NZ_{i,t-1} \times \frac{\sum_{i=1}^{n} world_{i,t} - \sum_{i=1}^{n} world_{i,t-1}}{\sum_{i=1}^{n} world_{i,t-1}} \right] +$$

$$\left[(NZ_{i,t} - NZ_{i,t-1}) - NZ_{i,t-1} \times \frac{world_{i,t} - world_{i,t-1}}{world_{i,t-1}} \right]$$

Data

The data used in this paper come from the United Nations Commodity Trade Statistics (Comtrade) database. Using the SITC revision 2 dataset, twenty one agricultural and forestry commodity groups were defined. Together these commodity groups cover New Zealand's land based exports. Annual data was obtained for the period 1990 to 2004.

Table 1: Commodity groups

	SITC Revision 2 Codes
Apples	574
Other Food Products	09+048
Other Fruit	0571+0572+0573+0575+0576+0579+058
Vegetables	054+056
Wine	11212
Beef	111
Hides & Skins	211+611
Sheep & Goat Meat	112
Wool	2681+2682
Butter	230
Casein	59221
Cheese	240
Other Dairy	0223+02241+02249
SMP	2242
WMP	2243
Logs and Chips	246+247
Other Forestry Products	245+635+642
Panels	634
Paper	641
Pulp	25
Timber	248

World trade in a commodity was calculated by summing the value of all imports of a commodity excluding intra-EU trade. Intra-EU trade was excluded because for the most part it is not contestable for countries outside of the EU such as New Zealand and since prices for trade within the EU are significantly higher (due to the trade protection) than prices for trade outside the EU increases in New Zealand's trade will tend to get undervalued relative to increases in intra-EU trade.

One drawback with the UN Comtrade database is that its coverage can be uneven. Generally, in more recent years coverage has became more complete. The effect of this is to bias calculations of world trade in a commodity upwards as data from more countries is added over time. Figures 1 and 2 illustrate the extent of this problem.

Figure 1 UN Comtrade Database (SITC rev.2) Coverage.

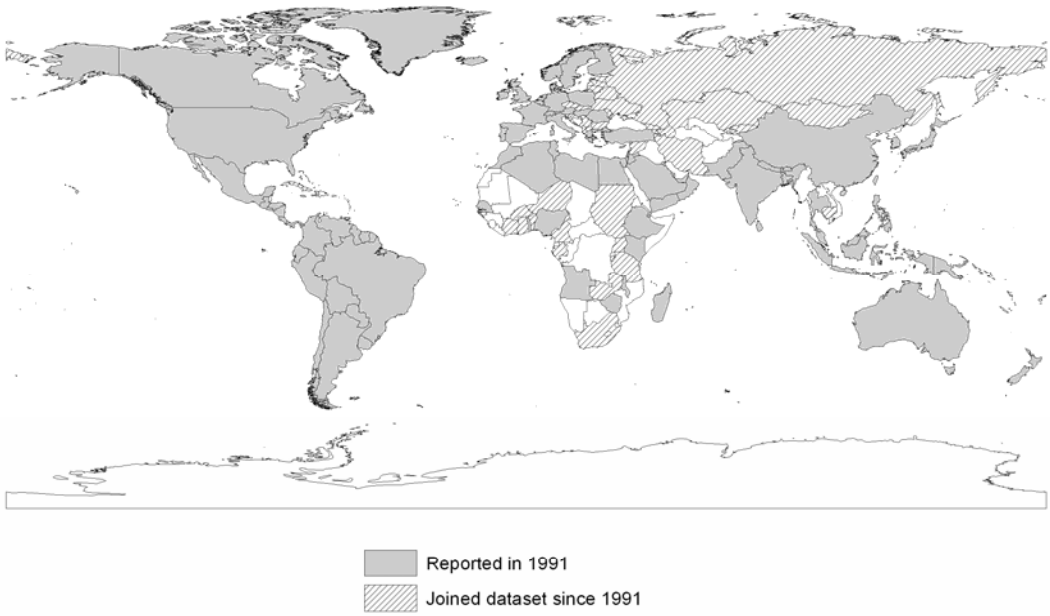
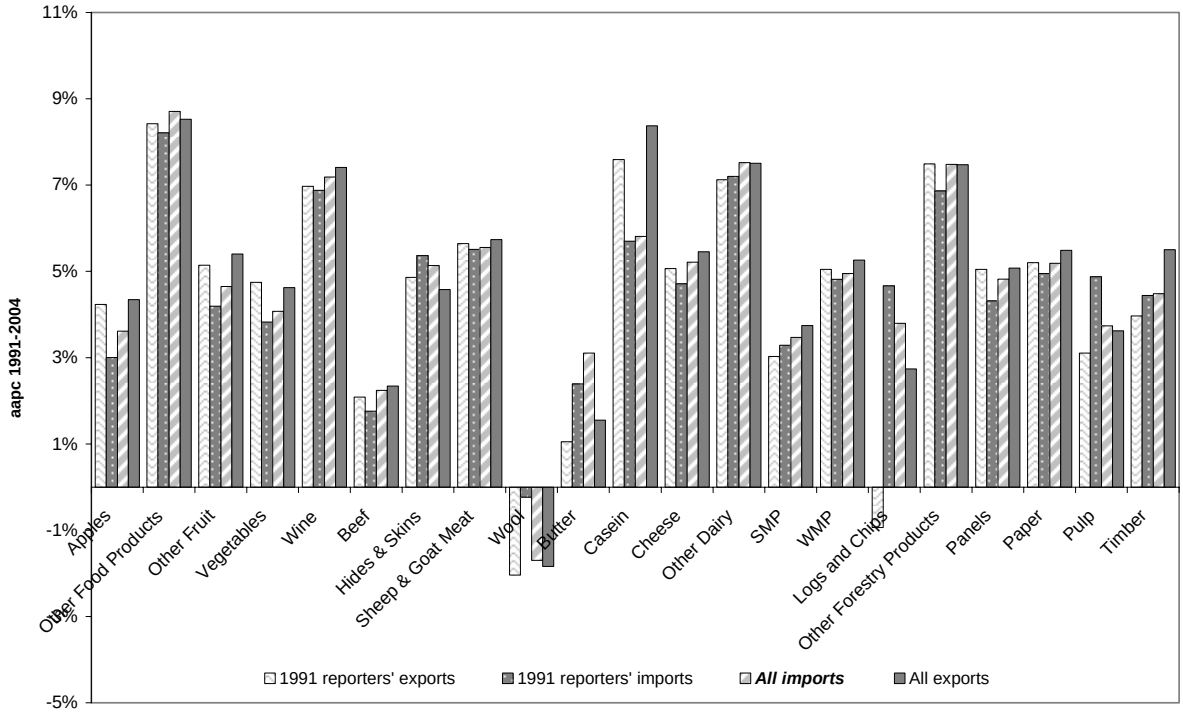


Figure 2 Growth in world trade by dataset.



This paper uses the sum of all reported imports which has generally grown faster than the imports of just those countries that reported over the entire dataset; however the sum of all reported imports doesn't grow as rapidly as the sum of all reported exports so it seems the appropriate measure to use here.

Finally, the values are converted into 2004 US dollars using the US GDP deflator.

Shift Share Results

A shift share analysis of New Zealand's land based sectors' over the period from 1990 to 2004 yields the following results.

Table 2: Detailed shift share results 1990-2004

(millions 2004 USD)	1990 exports	Change in exports	Due to:	Change in world trade	Commodity composition	Change in competitiveness
Apples	170	143		187	- 102	59
Other Food Products	71	466		78	45	343
Other Fruit	567	98		622	- 352	- 172
Vegetables	177	120		194	- 139	65
Wine	18	227		20	12	196
Horticulture and Food	1 003	1 054		1 100	- 335	289
Beef	956	306		1 048	- 878	136
Hides and Skins	496	- 154		544	- 355	- 343
Sheep & Goat Meat	916	573		1 005	- 385	- 47
Wool	899	- 430		986	- 1 412	- 3
Meat and Wool	3 267	295		3 582	- 2 953	- 334
Butter	522	114		572	- 348	- 111
Casein	363	105		398	- 306	13
Cheese	280	408		307	- 132	233
Other Dairy	75	175		82	74	18
SMP	339	133		372	- 204	- 34
WMP	470	776		515	- 319	581
Dairy	2 049	1 711		2 246	- 936	401
Logs and Chips	273	60		299	- 259	19
Other Forestry Products	37	114		41	7	66
Panels	37	188		41	- 31	178
Paper	372	- 40		407	- 345	- 102
Pulp	340	19		373	- 367	12
Timber	166	448		182	- 180	446
Forestry	1 225	788		1 343	- 1 000	445
Total Land Based	7 544	3 848		8 271	- 5 129	706

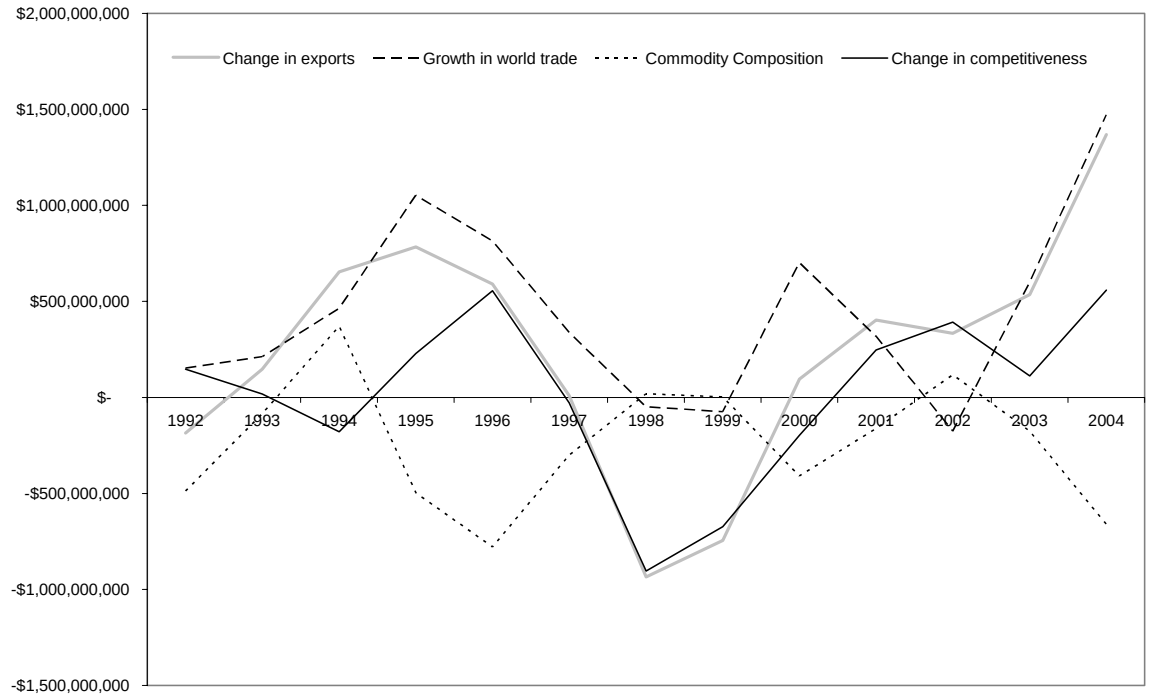
These results support the conclusions reached by Brownie and Dalziel (1993) and Ballingall and Briggs (2004). That is, New Zealand exporters from the land based sectors performed well within commodities that themselves performed poorly. Overall, the export performance of New Zealand's land based sectors has been poor compared to the growth of world trade generally.

Looking at the individual commodities, world trade in very few of them actually increased as a share of total world trade, just wine, other food products, other dairy, and other forestry products, which all have a relatively high added value component.

The export performance of dairy products compared to meat and wool mirrors changes in land use in New Zealand over the same period. Even within dairy products and shift of resources away from butter and skim milk powder (which are manufactured together) towards whole milk powder (which uses all of the milk solids) is evident.

Figure 3 charts the shift share analysis performed in Table 2 recalculated on an annual basis from 1990 to 2004. A two year moving average is used to smooth out some of the annual variation.

Figure 3: Total land based sectors



In figure three, the impact of the Asian crisis in 1998 and 1999 is striking. World trade contracted slightly and New Zealand exporters also lost ground to their international competitors. There were two years of drought in 1998 and 1999 that especially affected the meat sector (see figure four) and this would have played a major part in New Zealand's land based sectors' loss of competitiveness in these years. New Zealand forestry exports suffered disproportionately during the Asian crisis as they relied on Asian markets much more than agricultural exporters.

Figure 4: Dairy

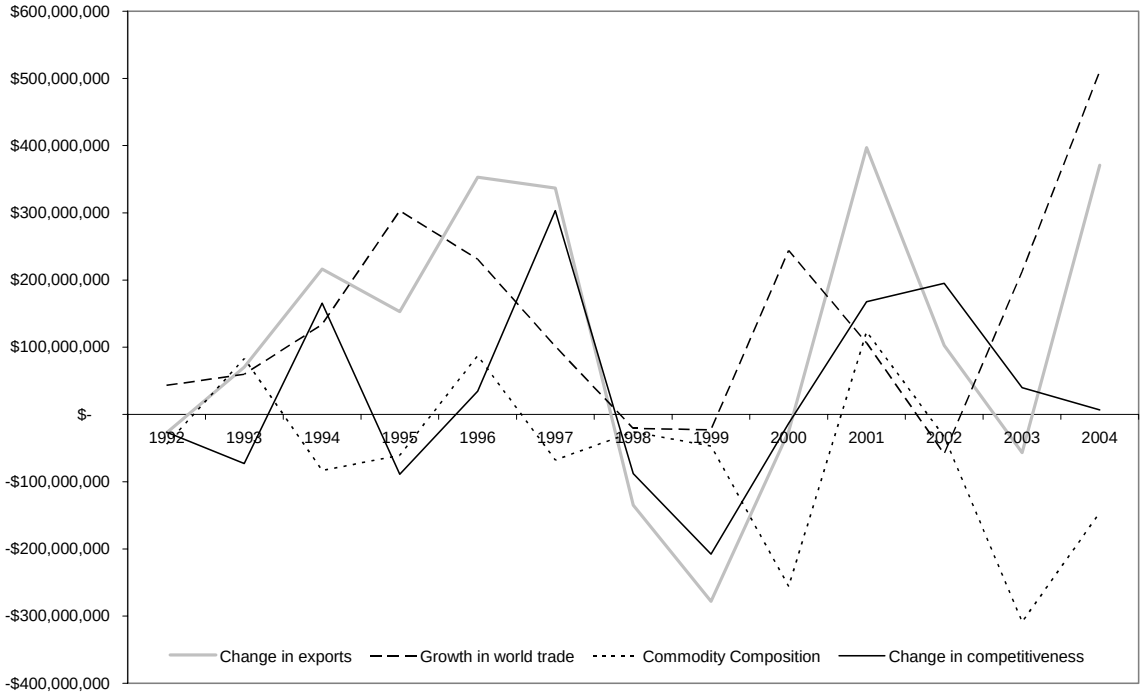


Figure 5: Horticulture and Food

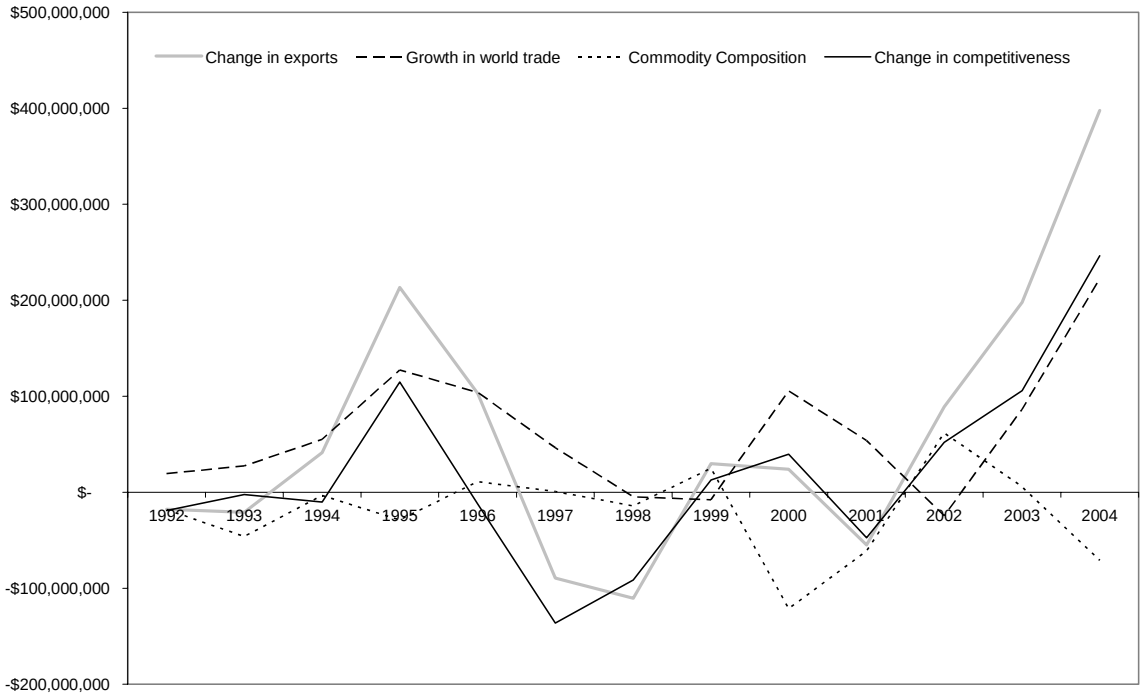


Figure 6: Meat and Wool

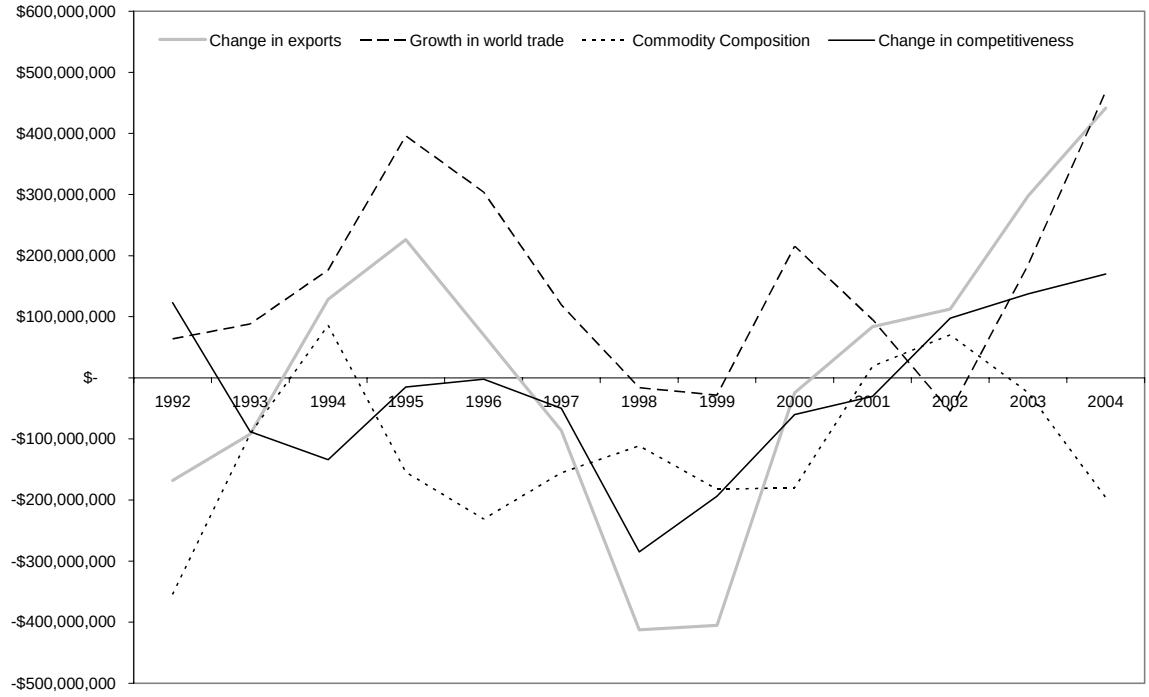


Figure 7: Forestry

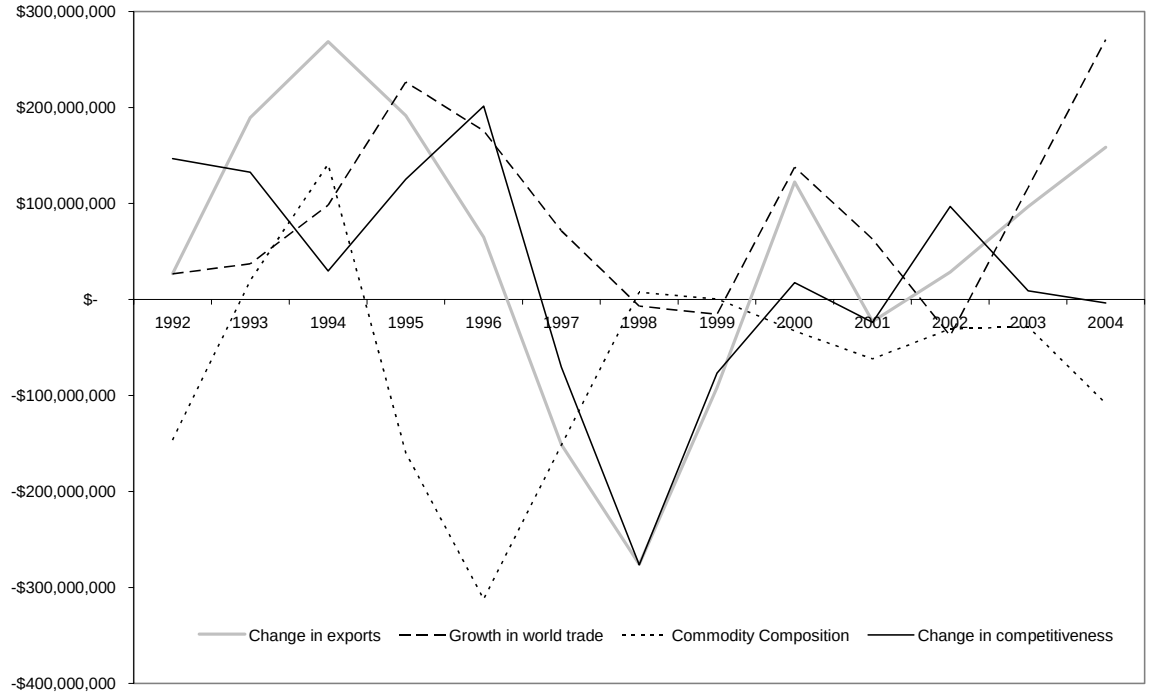


Table three applies the shift share methodology to some other major exporters of temperate zone agricultural and forestry products.

Table 3: International shift share comparison.

(millions 2004 USD)	1990 exports	Change in exports	Due to:	Change in world trade	Commodity composition	Change in competitiveness
New Zealand						
Horticulture and Food	1 003	1 054		1 100	- 335	289
Meat and Wool	3 267	295		3 582	- 2 953	- 334
Dairy	2 049	1 711		2 246	- 936	401
Forestry	1 225	788		1 343	- 1 000	445
South America						
Horticulture and Food	5 853	3 868		6 417	- 1 956	- 592
Meat and Wool	3 034	3 311		3 326	- 2 742	2 727
Dairy	266	691		292	- 122	520
Forestry	3 920	6 991		4 297	- 3 199	5 892
Australia						
Horticulture and Food	1 073	2 488		1 176	- 359	1 670
Meat and Wool	6 970	- 177		7 641	- 6 299	- 1 519
Dairy	720	1 076		789	- 329	616
Forestry	670	892		734	- 547	705
EU-15 external						
Horticulture and Food	11 894	12 078		13 039	- 3 976	3 015
Meat and Wool	6 438	440		7 057	- 5 818	- 799
Dairy	5 930	554		6 501	- 2 709	- 3 238
Forestry	18 148	17 638		19 896	- 14 811	12 553
USA						
Horticulture and Food	8 684	5 686		9 520	- 2 903	- 932
Meat and Wool	5 310	- 1 966		5 822	- 4 799	- 2 988
Dairy	353	670		387	- 161	445
Forestry	21 161	- 1 851		23 198	- 17 269	- 7 779

From table three, for horticulture and other food, New Zealand, Australia and the EU have gained ‘competitiveness’ over the US and South America.

Within meat and wool trade South America has gained ‘competitiveness’ over New Zealand, Australia, the US and the EU. Much of this is driven by dramatic growth in South American beef exports to transition and lower income countries and hides and skins exports to Asia. The US suffered when BSE was discovered in its beef herd (the impact of this is visible in the New Zealand beef time series in the appendix).

New Zealand, Australia and South America have improved their competitiveness in trade in dairy products at the expense of the EU and the US.

Discussion

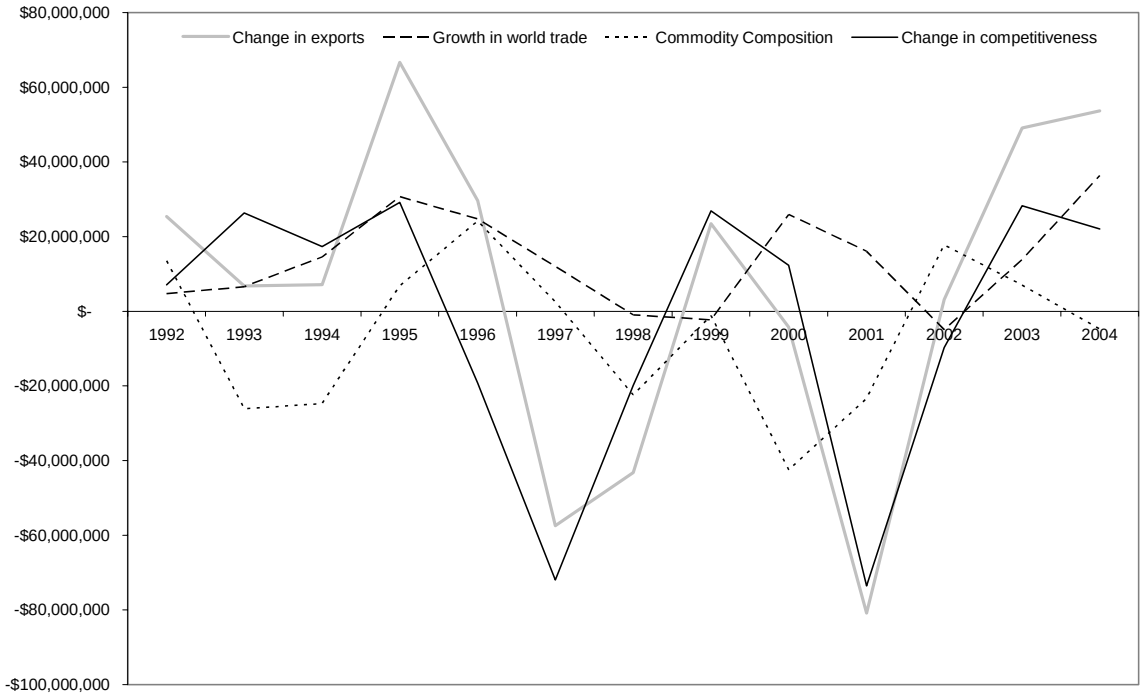
Broadly, the findings of this research support the conclusions reached by Brownie and Dalziel (1993) and Ballingall and Briggs (2003). That is, the agricultural and forestry products that form such a large part of the composition of New Zealand's exports have, at a global level, been growing much more slowly than total trade. But within trade in these commodities New Zealand has performed reasonably well and increased its 'competitiveness' or market share.

This shift-share analysis is descriptive only however. It analyses change in value of exports without looking at whether these changes in value have been caused by volume or price changes. In this way shift-share does not identify likely causes of the relative export performance it describes. Trade barriers and subsidies to agricultural and forestry products must play a role since across the world agricultural products face higher barriers to trade than manufactured products. Also changes in demand for the different products as competing products emerge and incomes around the world rise could have played a significant role.

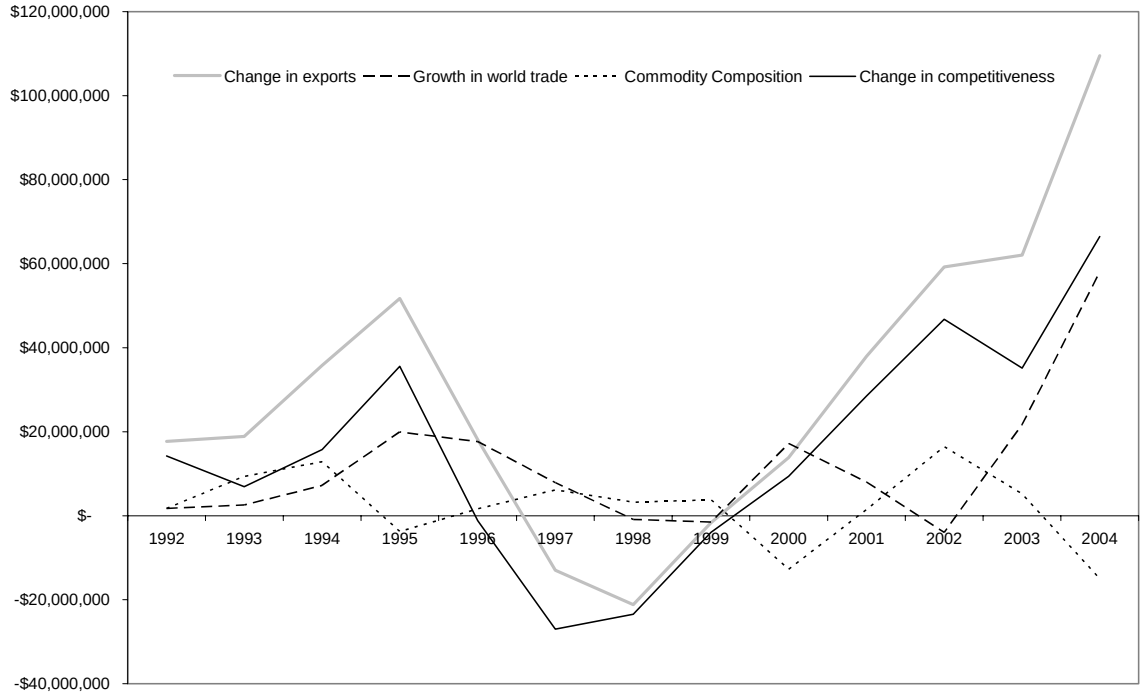
Relative productivity growth between countries within a commodity potentially also play a role in determining. Ludena and Hertel (2005) and Rae and Hertel (2000) use the GTAP model to look at the impact of relative productivity levels and growth rates on trade in agricultural products. These papers point to a possible methodology to tease out the various factors identified here.

Appendix

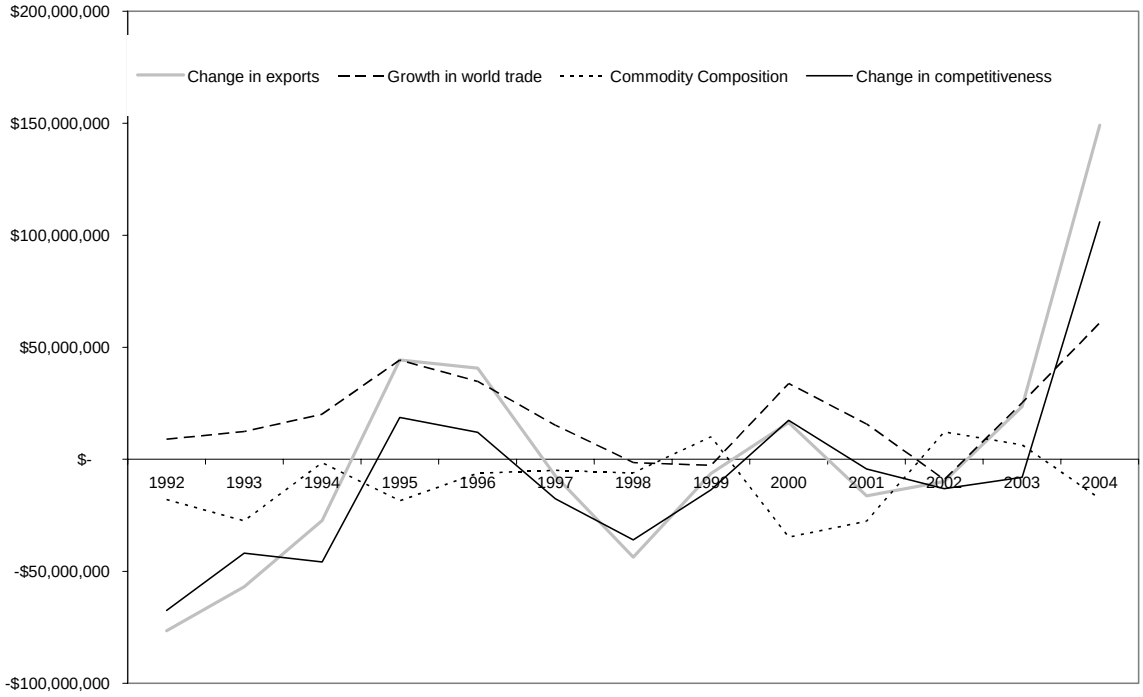
Apples



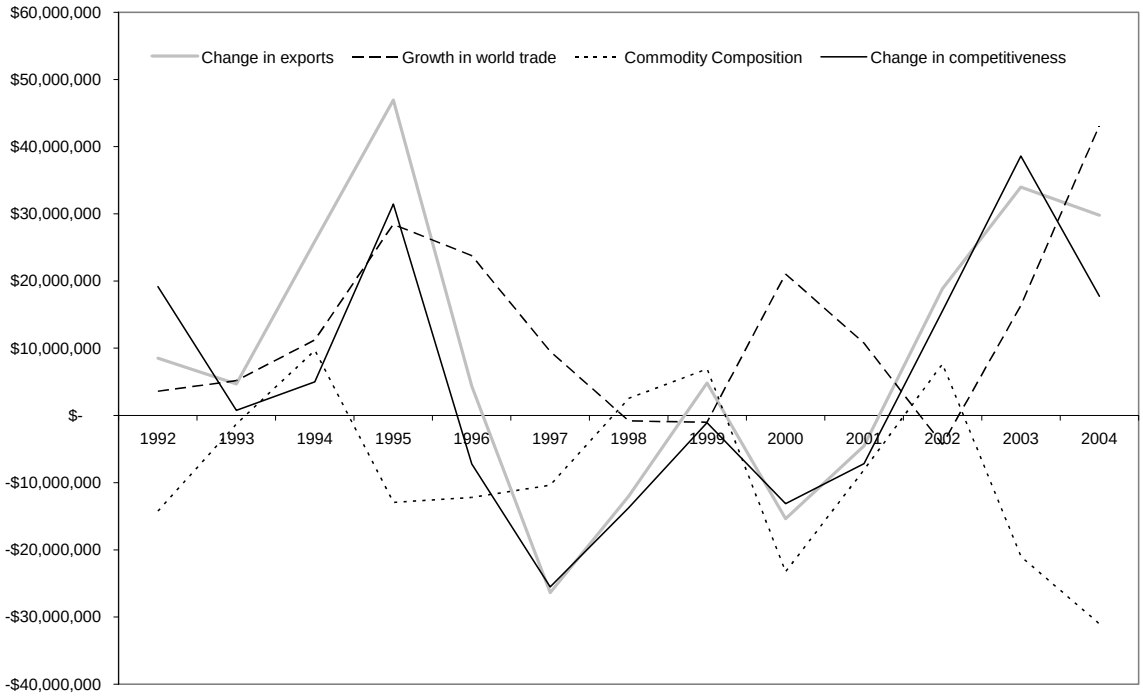
Other food products



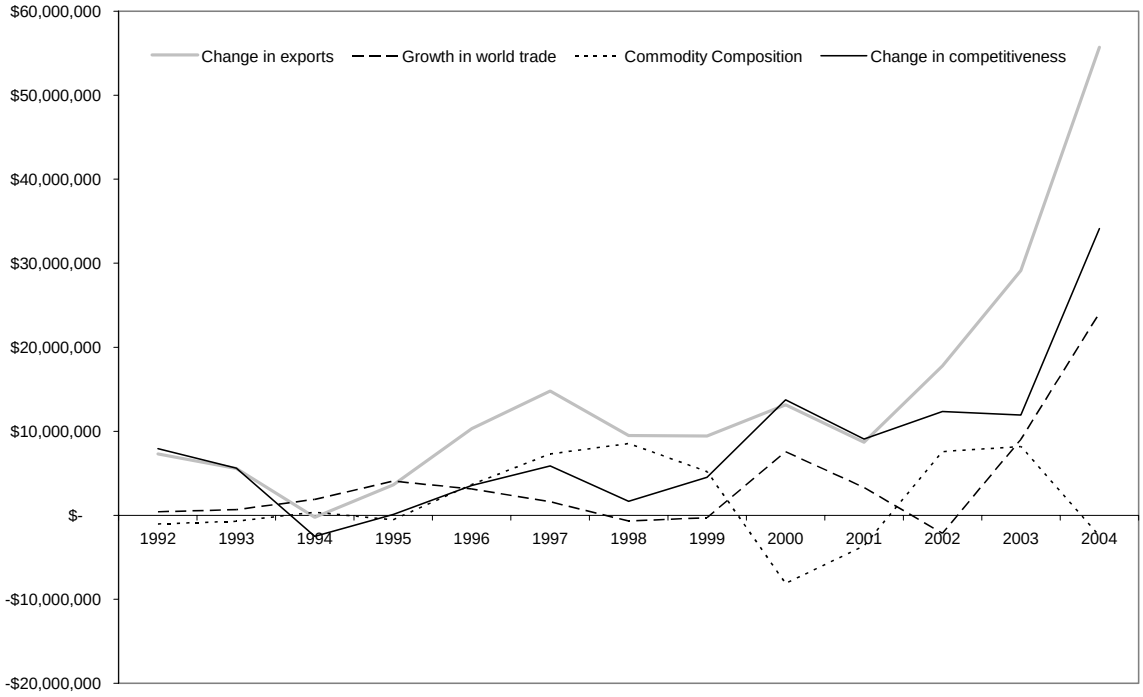
Other fruit



Vegetables



Wine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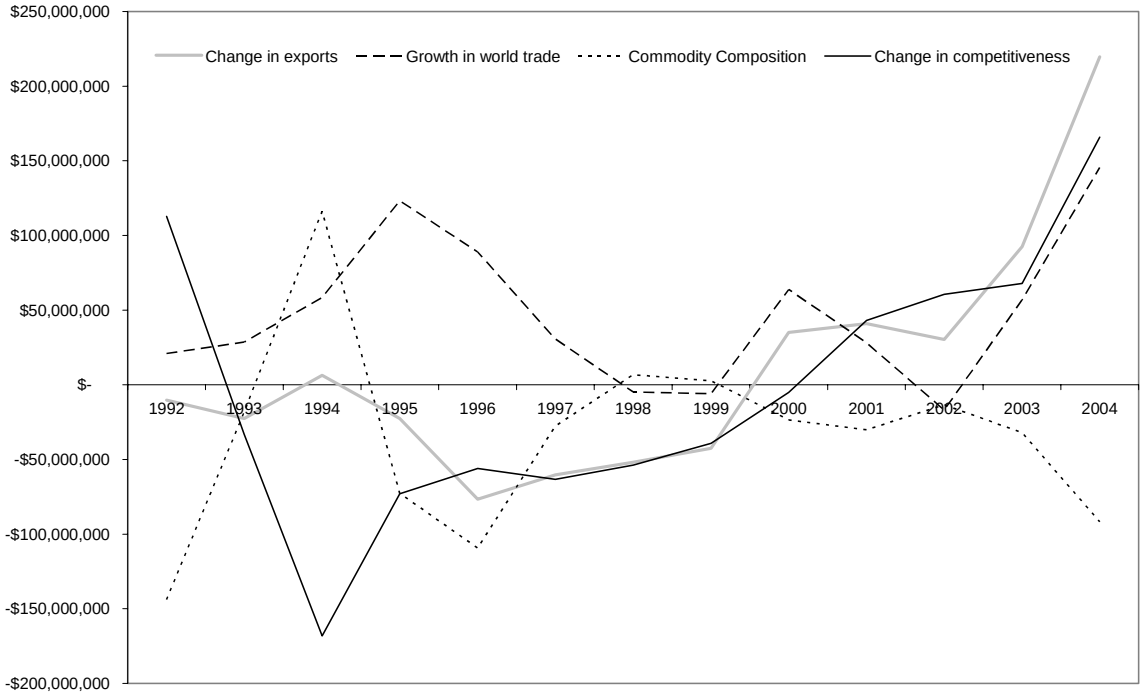
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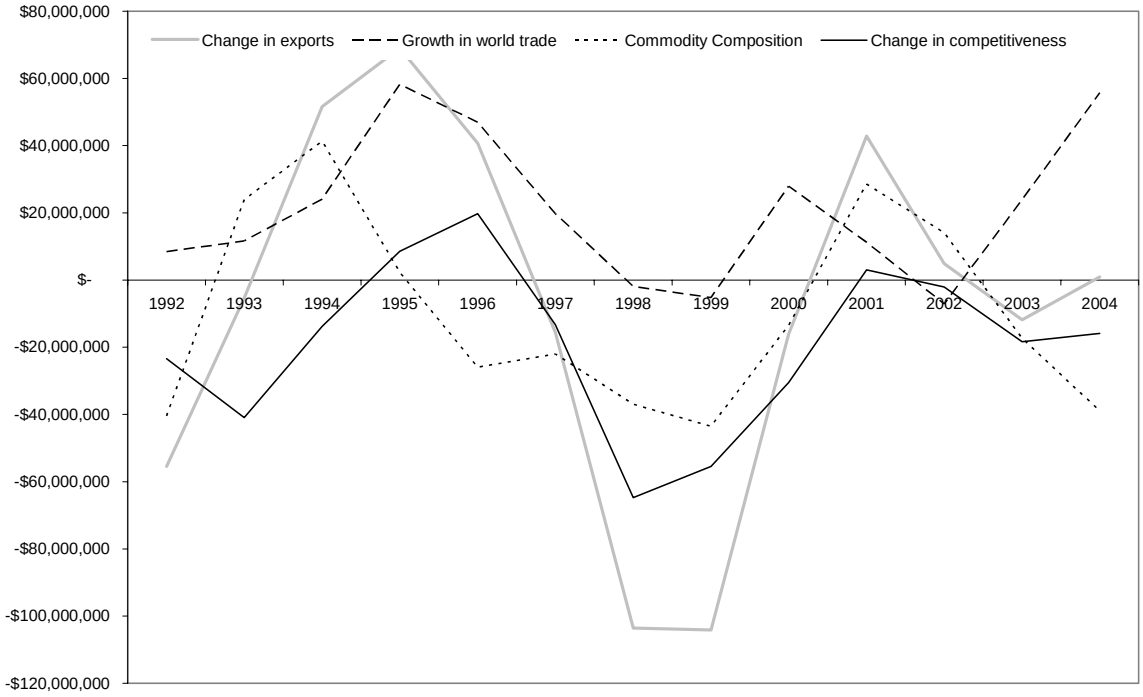
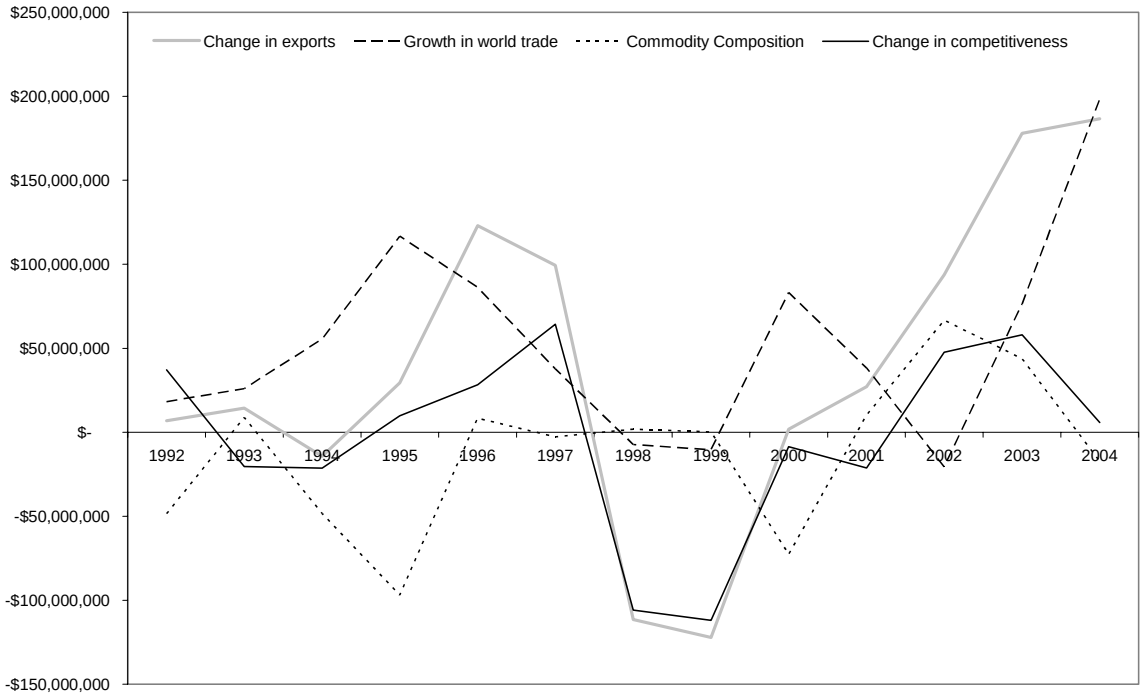
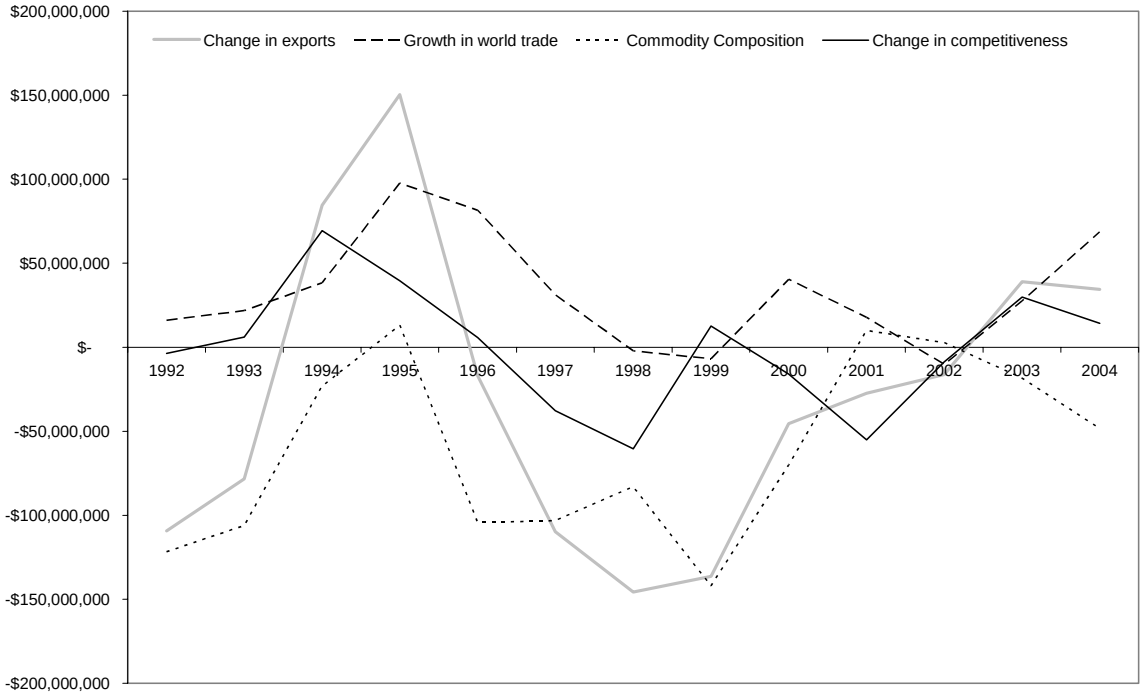
Hides and Skins



Sheep and Goat meat



Wool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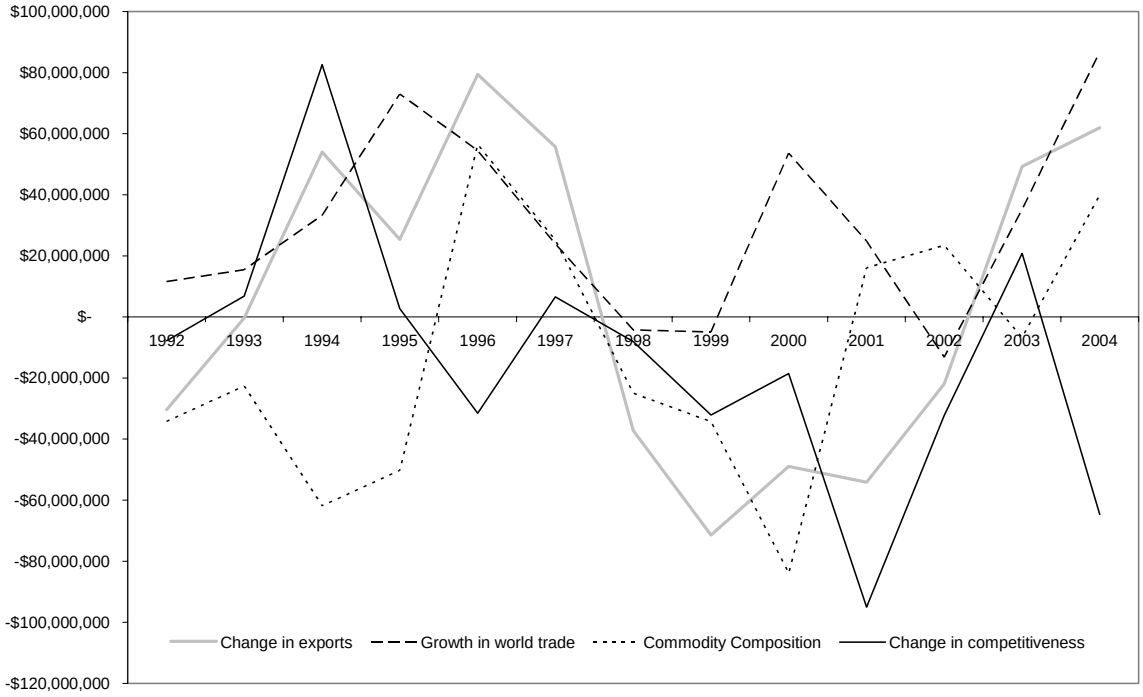
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Change in exports
Growth in world trade
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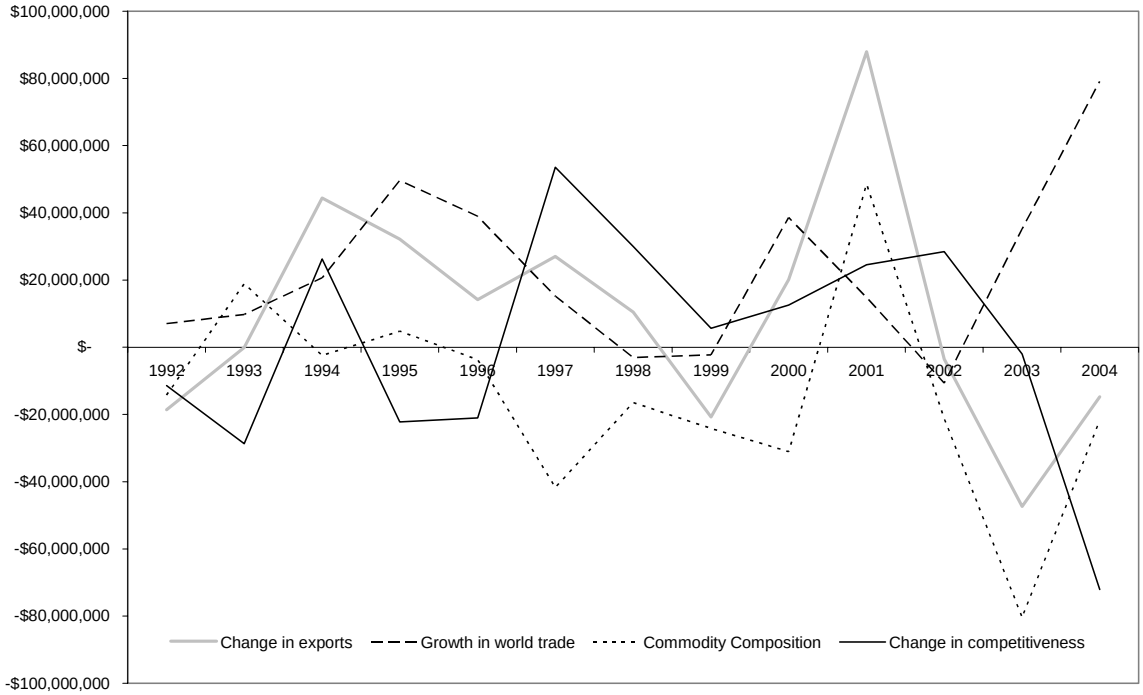
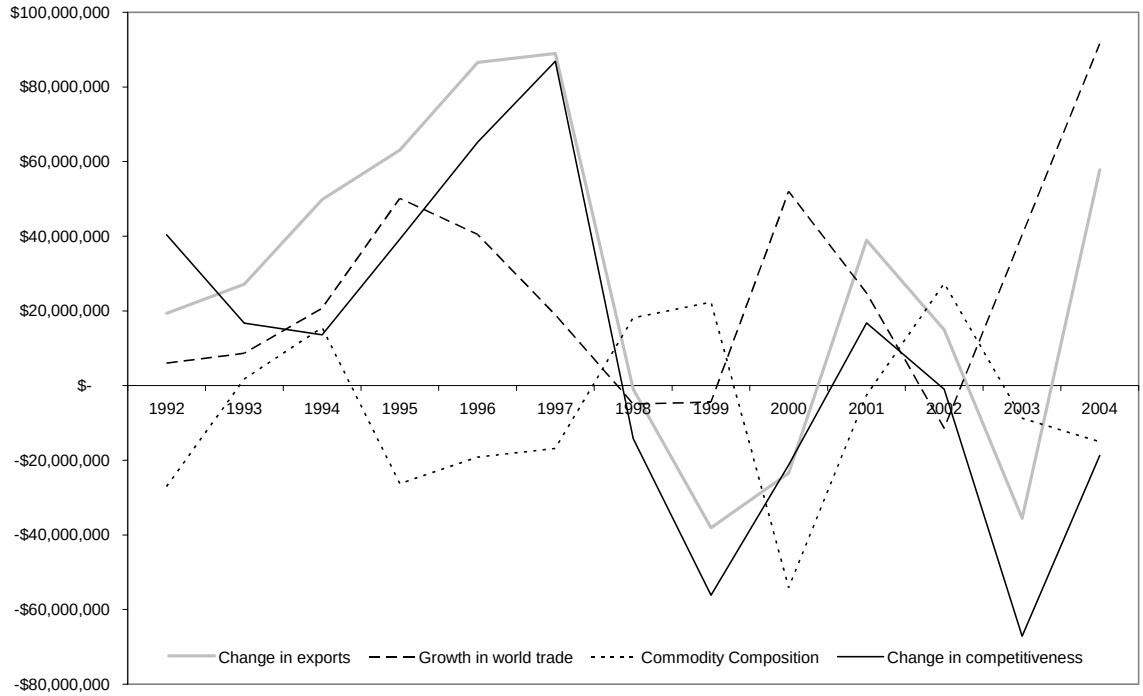
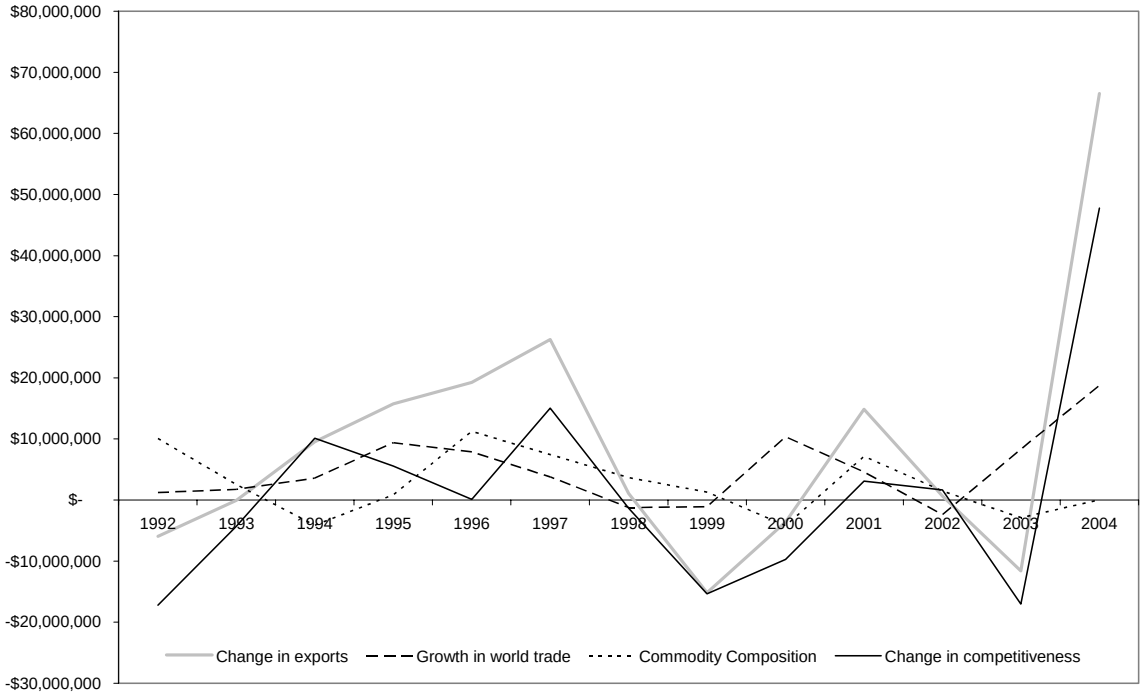


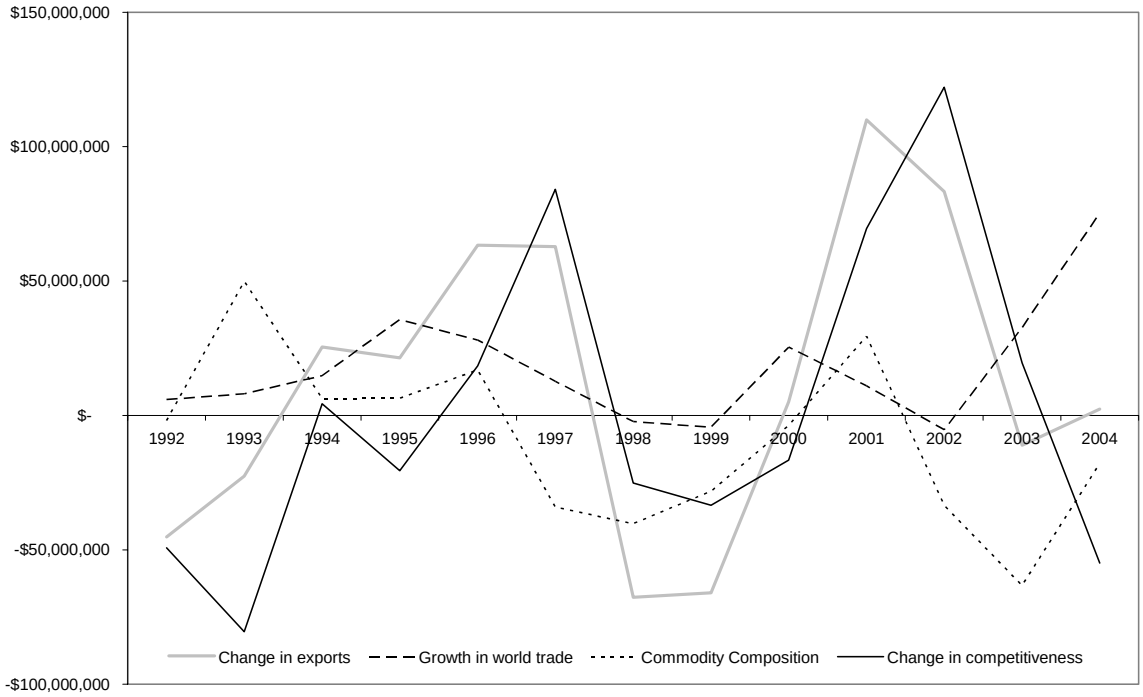
Cheese



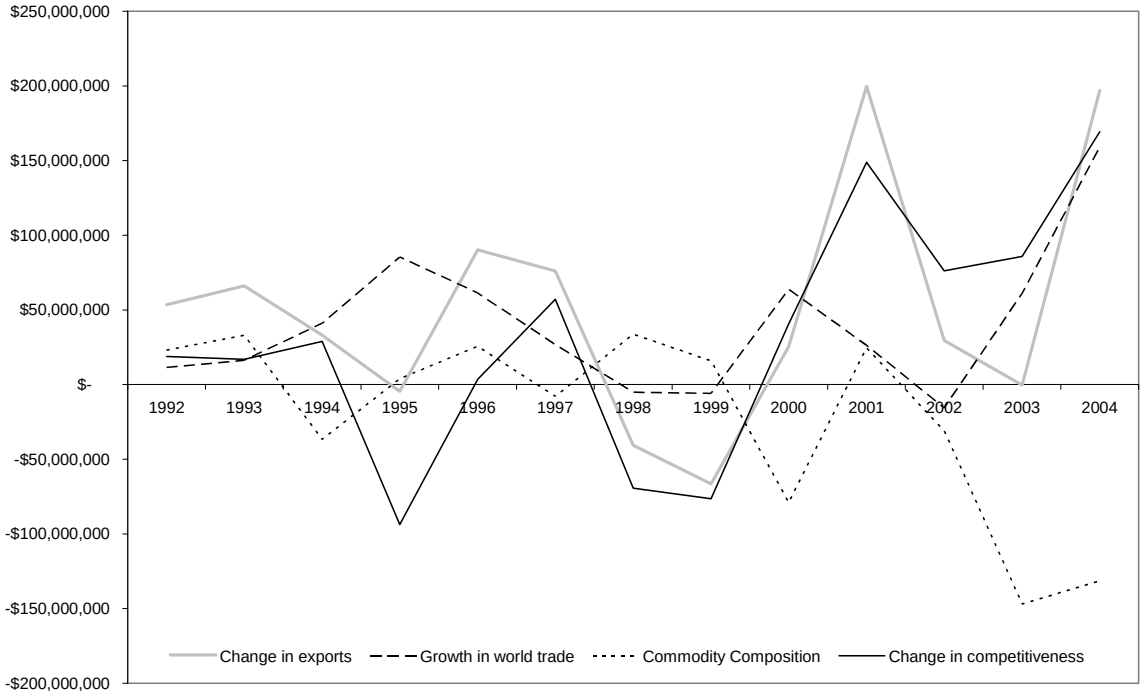
Other dairy



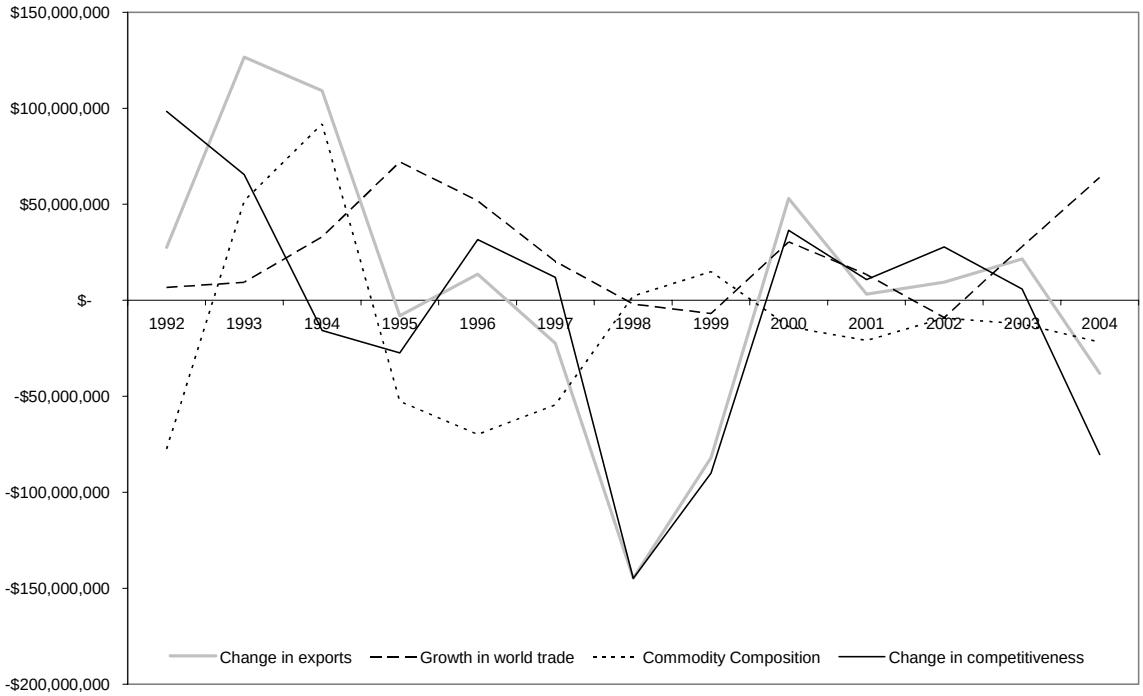
SMP



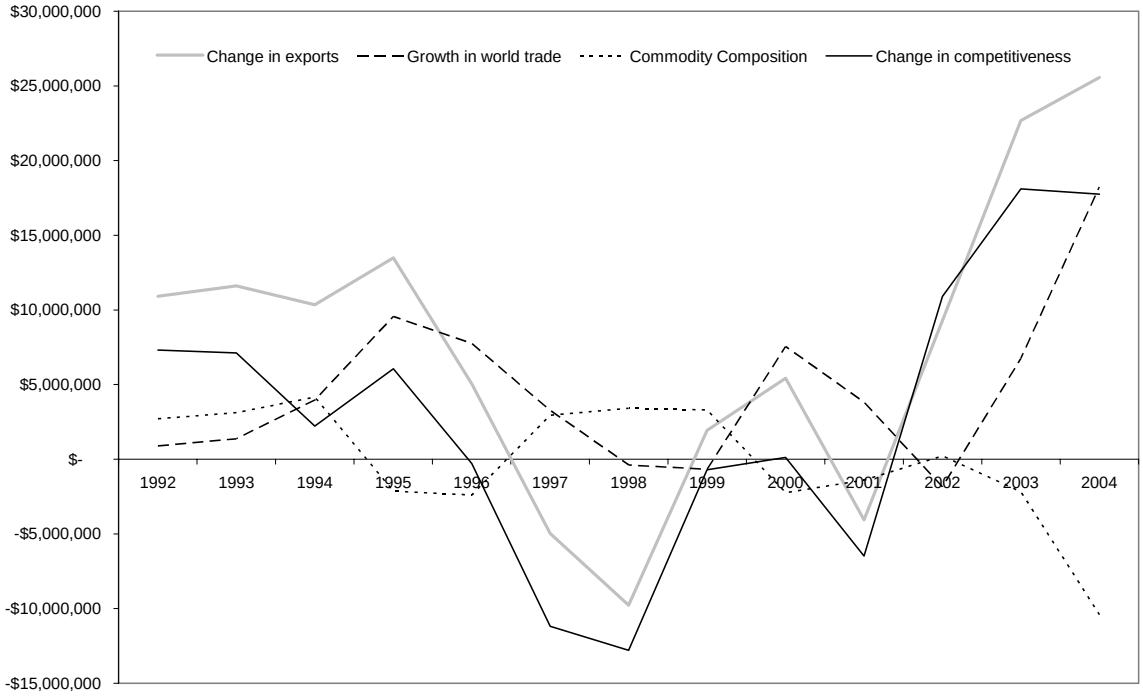
WMP



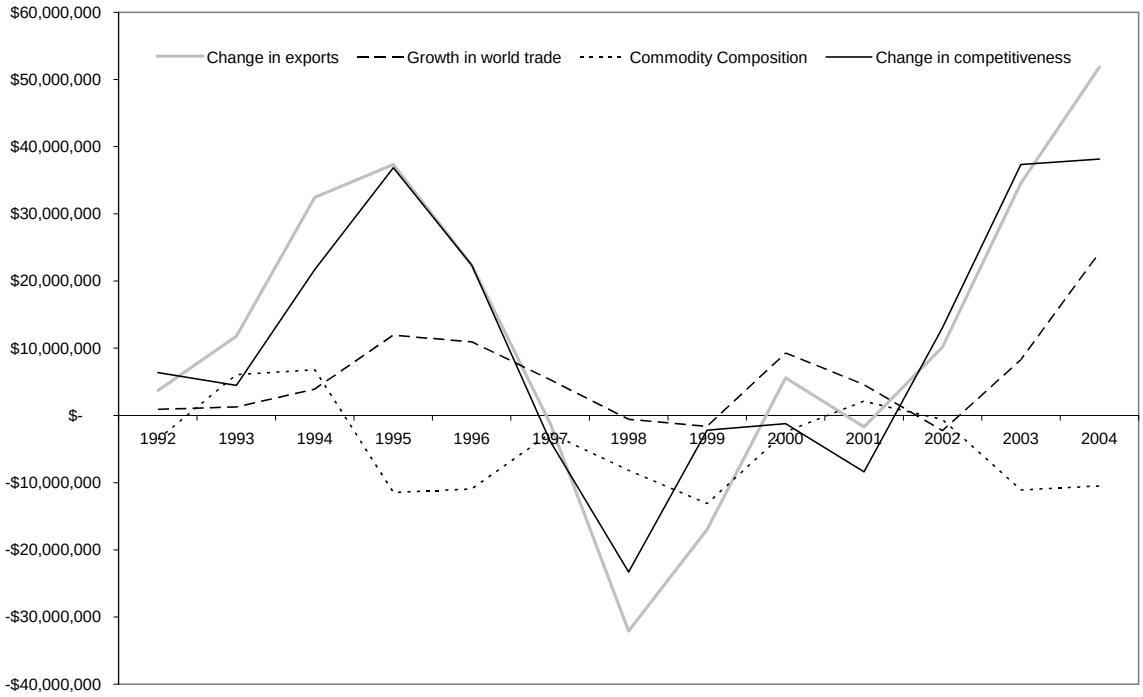
Logs and Chips



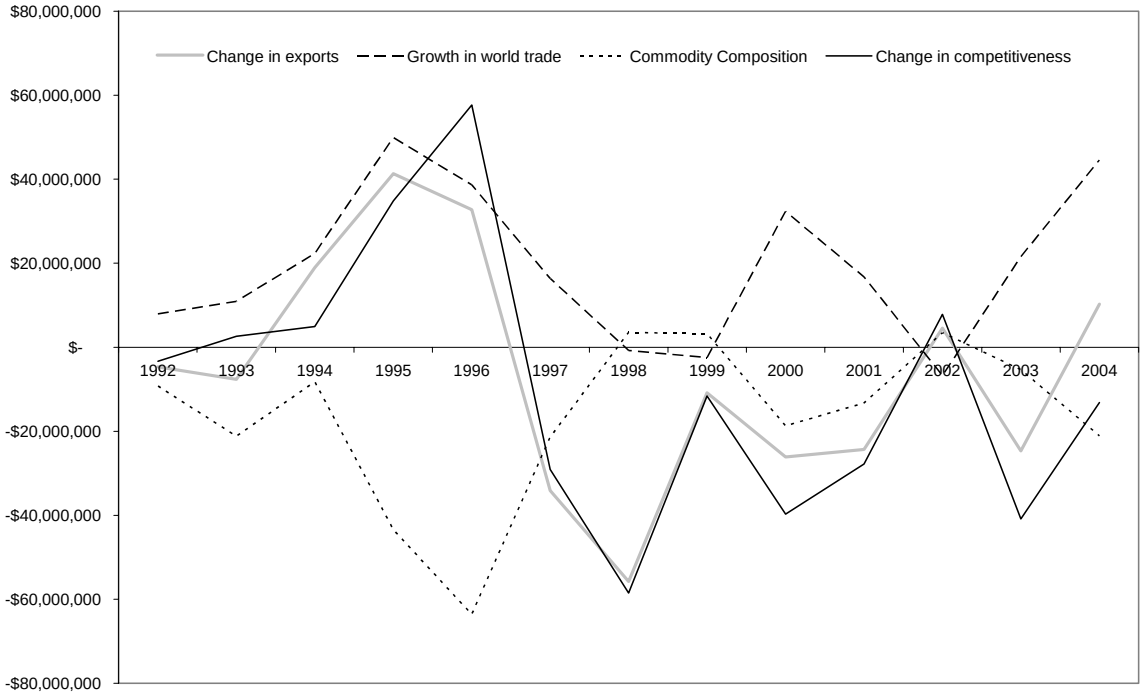
Other forestry products



Panels



Paper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Change in competitiveness
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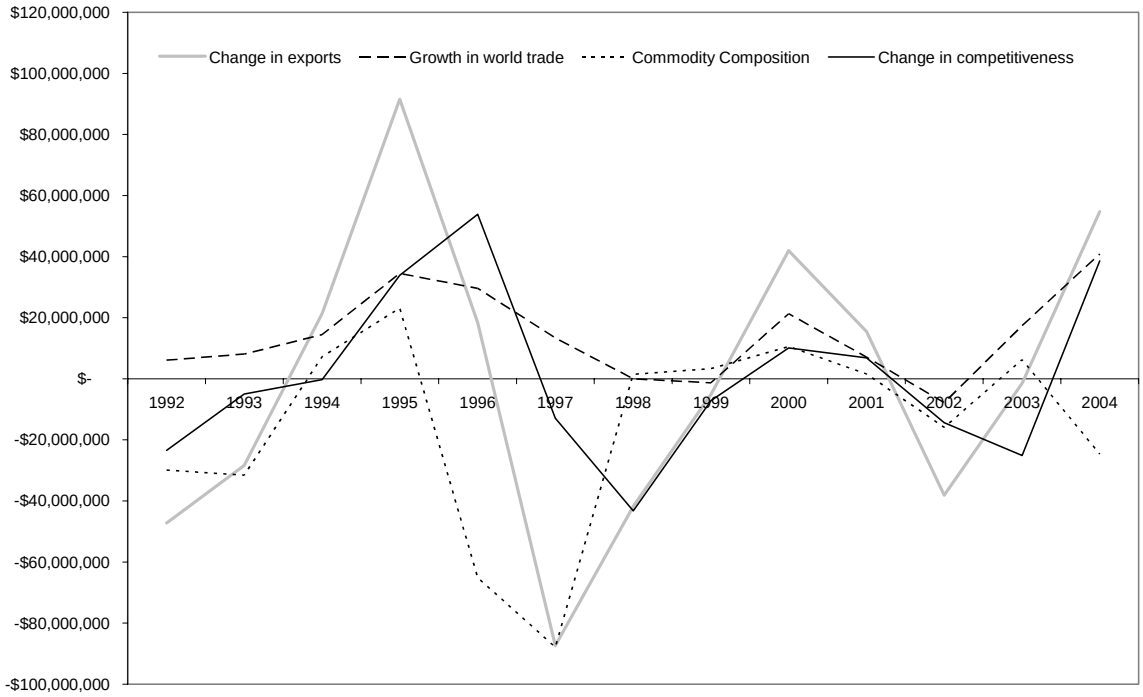
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Growth in world trade
Commodity Composition
Change in competitiveness
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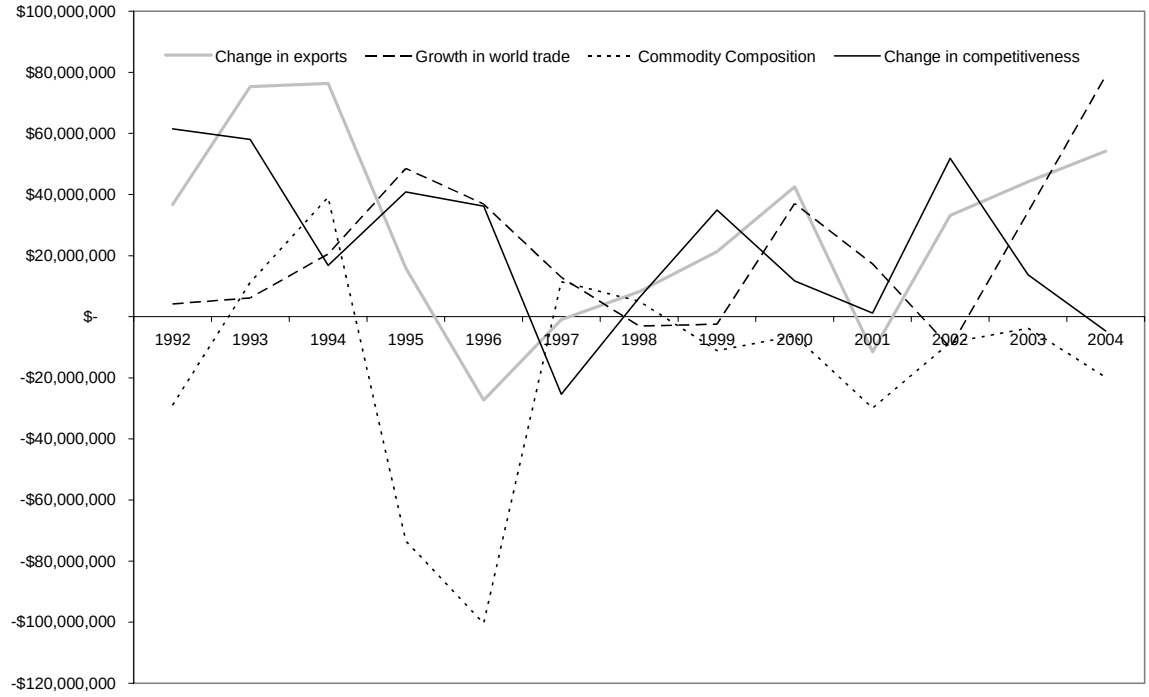

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