Assessing Regional Labour Market Disruption from Competition Policy Reforms: A Dynamic CGE Approach

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Modelling regional labour market adjustment

- Significant structural adjustment pressure on rural and regional Australia.
- Policy makers need to assess impact of policies on adjustment problems.
- Economic modelling can provide information on adjustment costs.
- Computable General Equilibrium models (CGE) can look at the whole picture - not just the obvious direct effects.
- Constructed a regional labour market adjustment index (RELMAI). Adds regional dimension to Labour Input Loss Index (LILI). These measure the value of labour inputs that are lost as a particular policy or economic event alters the flow of people between different labour market categories. RELMAI is used as an extension to FEDERAL-F model.

An important policy example - National Competition Policy (NCP)

- NCP is widely perceived as being a major factor behind out-migration from parts of rural and regional Australia.
- "I believe the Hilmer competition policy . . . Acts like a giant vacuum cleaner sucking people out of the bush and putting them on the shores in the seaboard" (Senator Ron Boswell).
- We examine a major component of NCP, reform in the utilities (electricity, gas and water) sector, with the aid of FEDERAL-F and the RELMAI extension.

Approaches to Modelling NCP reforms

- Prior to COAG agreement on NCP a number of studies examining the long-run effects of the proposed policy were undertaken.
- Most comprehensive study by Industries Commission (1995). IC estimated a long-run increase in real GDP of 5.5 per cent.
- Other studies found higher GDP increases of microeconomic reform.
- Madden (1995) estimated impacts at the state level. For the country as a whole, he estimated an increase in GDP of 3.4 per cent.
- Criticisms of these estimates (see, for instance Quiggin, 1997) questioned the methods by which direct productivity improvements for the industries directly affected by the reforms were measured.
- In this study we use the dynamic properties of FEDERAL-F to undertake a new approach to uncovering the direct productivity improvements of NCP.

Presentation Outline

- Overview of the FEDERAL-F model
- Key features of the RELMAI model
- Brief description of the historical and forecast simulations
- An estimate of the direct effect of NCP on the Utilities sector
- Impacts of faster growth in productivity in Utilities sector on:
  - Key regional variables
  - The labour market adjustment index

FEDERAL-F

- FEDERAL-F is a dynamic version (Giesecke, 2000) of the FEDERAL model (Madden 1990).
- FEDERAL is a multiregional computable general equilibrium (CGE) model of the Australian economy. It is based on the modelling approach of the well-known CGE model of the national economy, ORANI. FEDERAL contains very detailed modelling of regional income, interstate trade and associated transport, trade and insurance margins, and two tiers of government.
- FEDERAL-F introduces modelling of interregional migration and keeps track of interstate capital ownership. It borrows from the MONASH model's theory to incorporate stock-flow dynamics and equations that allow for historical simulations as well as baseline and scenario forecasting.

Basic structure of FEDERAL-F

- Equations governing demands for commodities and factors
  - Demands for intermediate inputs, primary factors and inputs to capital creation(derived from constrained cost minimisation);
  - Household demands (derived from constrained utility maximisation);
  - Export demands and government demands.
- Zero pure profits

  Price equals cost.
- Rates of return, investment, and capital accumulation
  - Equations relating capital accumulation and investment to rates of return; changes in capital ownership related to saving.
- Market clearing

  Demand = supply in product and factor markets
- Miscellaneous equations
  - Stock flow relationships; Migration responses to interstate income differentials;
  - Facilitation of changes in model closure; Macroeconomic indices; Govt. accounts.
- ORES-style sub-regional extension
  - Tasmanian results from the CGE core decomposed down to five Tas. sub-regions.

REGIONAL LABOUR MARKET ADJUSTMENT INDEX (RELMAI)

- RELMAI:
  - ♦ uses employment results from FEDERAL-F to measure the labour input that is lost from people moving between various labour market categories.
  - ♦ computes an index for each region.
- RELMAI model is based on the LILI (labour input loss index) model of Dixon and Rimmer (1999). Both RELMAI and LILI use CGE model results for employment by sector, occupation and region. However, LILI computes just a single index for the nation, while RELMAI computes an index for each region in the model.

RELMAI is a share-weighted sum of the value of the lost labour input per worker associated with each labour market flow.

$$RELMAI(t,t+1) = (100/LF_r(t)) \Sigma_k w_{rk} M_{rk}(t,t+1)$$

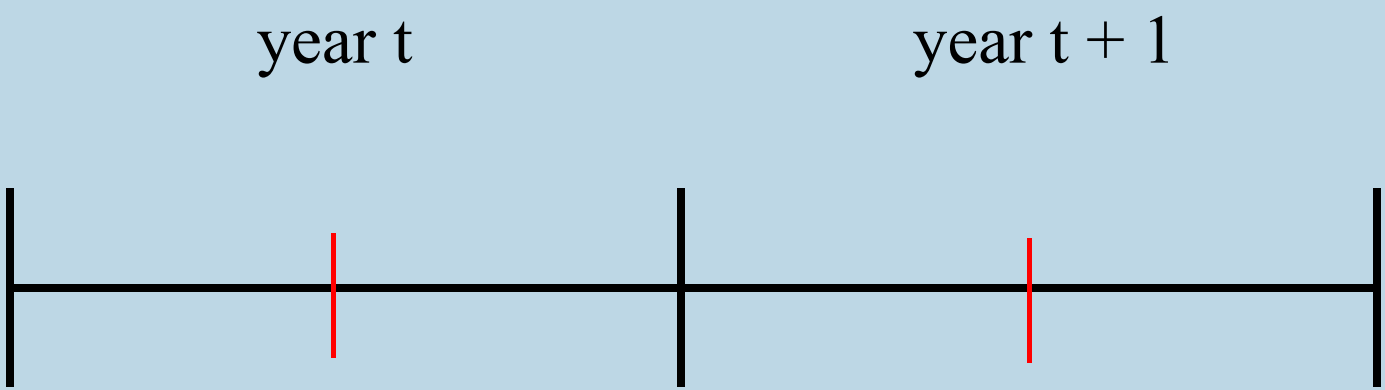
where

$LF_r(t)$ is the number of people in region r's labour force in year t,

the w_{rk}s are weights reflecting the costs in terms of lost labour of a particular labour market flow (type k) by residents (in year t) of region r, and

the M_{rk}s are the flows between regional labour market states.

Timing of Regional Labour Market Flows in Computation of RELMAI



Employed$_{ir}$ (t)	**Employed$_{ir}$ (t+1)**
Unemployed$_{r}$ (t)	**Unemployed$_{r}$ (t+1)**
Not in Labour Force$_{r}$ (t)	**Not in Labour Force$_{r}$ (t+1)**

Flows of persons who have a job in year t:

- Stay in same occupation and same industry in the same region (no adjustment cost - here $w_{rk} = 0$)
- Stay in the same region but switch industries or occupations (Assumed to require 3 months re-training - here $w_{rk} = 0.25$)
- Switch regions and possibly occupation or industry (0.25 years production loss per person)
- Become unemployed and either stay in the region or move ($w_{rk} = 0.5$, reflecting assumption that on average remain unemployed for 6 months)
- Leave the labour force and might also leave the region ($w_{rk} = 0.0$, as retirement is considered to be a decision made on the basis of other factors, e.g. age)

Flows of persons who were unemployed in year t:

- Don't find a job during the year - even if switch regions (w_{rk} = 1.0 reflecting loss of their potential labour for a full year)
- Get a job in their own region (w_{rk} = 0.75, Assumed to take six months to find a job and then require 3 months re-training)
- Switch regions and find employment (Again w_{rk} = 0.75)
- Leave the labour force (w_{rk} = 0.0, assuming a certain number of retirements inevitable)
- Leave the labour force and leave the region (Again w_{rk} = 0.0)

Flows of persons who weren't in the labour force in year t:

- Join labour force and move immediately into employment either in the same region or a different one ($w_{rk} = 0.25$ as it is assumed that they require retraining)
- Join labour force in their home region but can't find a job ($w_{rk} = 0.5$ as it is assumed that this flow of persons occurs evenly over the year)
- Switch regions and join labour force but can't find a job (Again $w_{rk} = 0.5$)
- Remain outside the labour force, either in own or another region ($w_{rk} = 0.0$ as not part of labour force and thus can't contribute to labour market adjustment costs).

Computation of Labour Market Flows (some examples)

Number of workers who remain employed in the same occupation in the same regional industry

- Assume that if there are sufficient jobs then all the people who want to continue in their jobs can do so. This is computed as employment in that occupation in that regional industry, less retirements and voluntary departures.

- However if there are less jobs of this category available than those wanting to stay on, some persons are assumed to be retrenched. (ie number who stay on = jobs available; retrenched = difference between jobs wanted by incumbents and jobs available).

Note people who switch regions but remain employed in the same occupation and industry are treated as voluntary departures.

Number of Vacancies in a Region

Equals the total jobs computed by FEDERAL-F for the region, less those taken by incumbents and voluntary movers.

Number of retrenched workers from region r who find re-employment

It is assumed that no more than half of those retrenched workers who remain in their region are re-employed. Otherwise it is assumed retrenched workers have twice the chance of finding a job as unemployed persons (and of people outside the labour force who might be looking to take up vacancies in the region).

A certain proportion of retrenched workers are assumed to switch regions. We assume that they have the same chance of success in the new region.

Voluntary Moves

This is computed by a system of simultaneous equations. Voluntary moves to a different occupation and/or industry and/or region is dependent on the number of jobs available in the destination category, the similarity of the new job to the person's existing one, and the proximity of the new region.

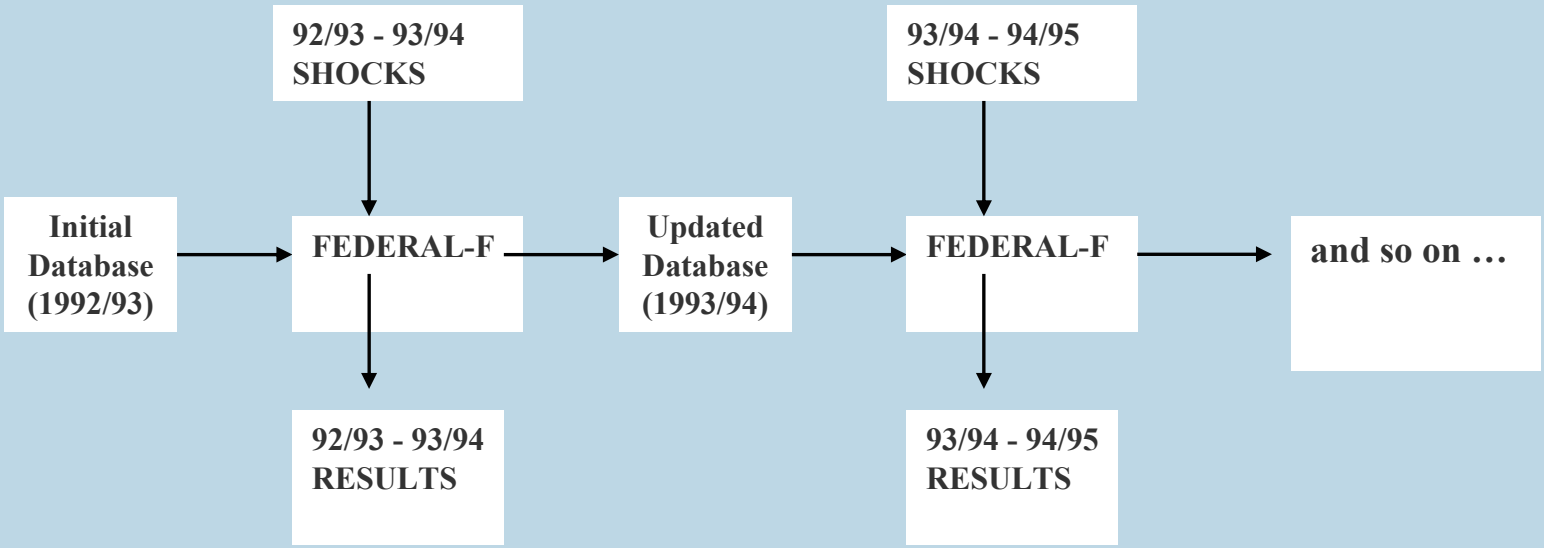
Jobs available in the new category are dependent on total (t+1) jobs in that category less retirements and voluntary departures from that category.

Moves to an occupation in a particular regional industry are also assumed to be affected by the size of the destination category.

There is also a parameter which keeps the overall level of voluntary movements to about 5 per cent of the employed workforce.

FEDERAL-F Simulations

- Simulations are conducted using a two-region version of FEDERAL-F incorporating Tasmania and the rest of Australia.
- Model simulated through time.



The Simulations

- Three sets of simulations used to model impact of NCP.
- Historical and forecast simulations used to form the base case.
- Historical simulations used to uncover the values of model's structural variables (such as technical and taste changes) and certain other variables
- To uncover these values the model was shocked with the (ABS) observed values for certain macroeconomic, commodity, industry, and government variables relating to both the national and regional economies over the period 1992/93 to 1998/99.
- A second set of simulations generated baseline forecasts for the Tasmanian and Australian Mainland economies for the period 1999/00 to 2000/03.

NCP Simulations

- Third set of simulations involved modelling a hypothetical case in which NCP is assumed not to have occurred
- The historical and forecast simulations were redone but for a lower growth in productivity than actually occurred
- Past studies of NCP effects were generally not dynamic and invariably assumed that, for industries undergoing NCP reform, competition policy would completely close the gap between productivity in each of the Australian states and world's best practice.
- This study makes use of results from the historical simulations to obtain an alternative estimate of NCP-induced productivity change.
- The results for primary-factor-saving technical changes in the Utilities sector computed in the historical simulations are shown in Figures 1 (Tasmania) and 2 (Mainland).
- To form the shock it is necessary to estimate how much of the change in these variables was due to NCP.

Figure 1: Tasmanian Utilities: primary factor saving technical change

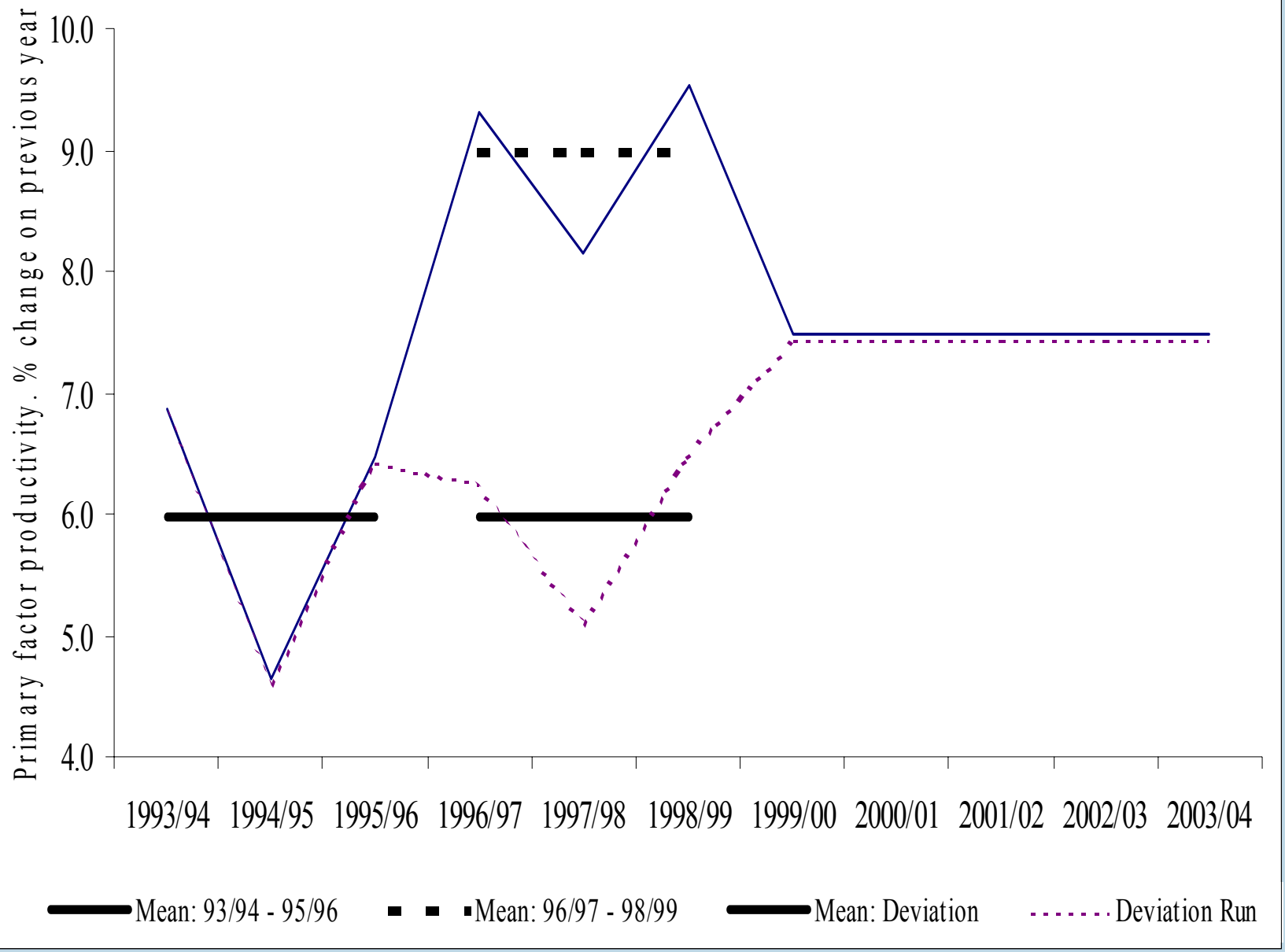
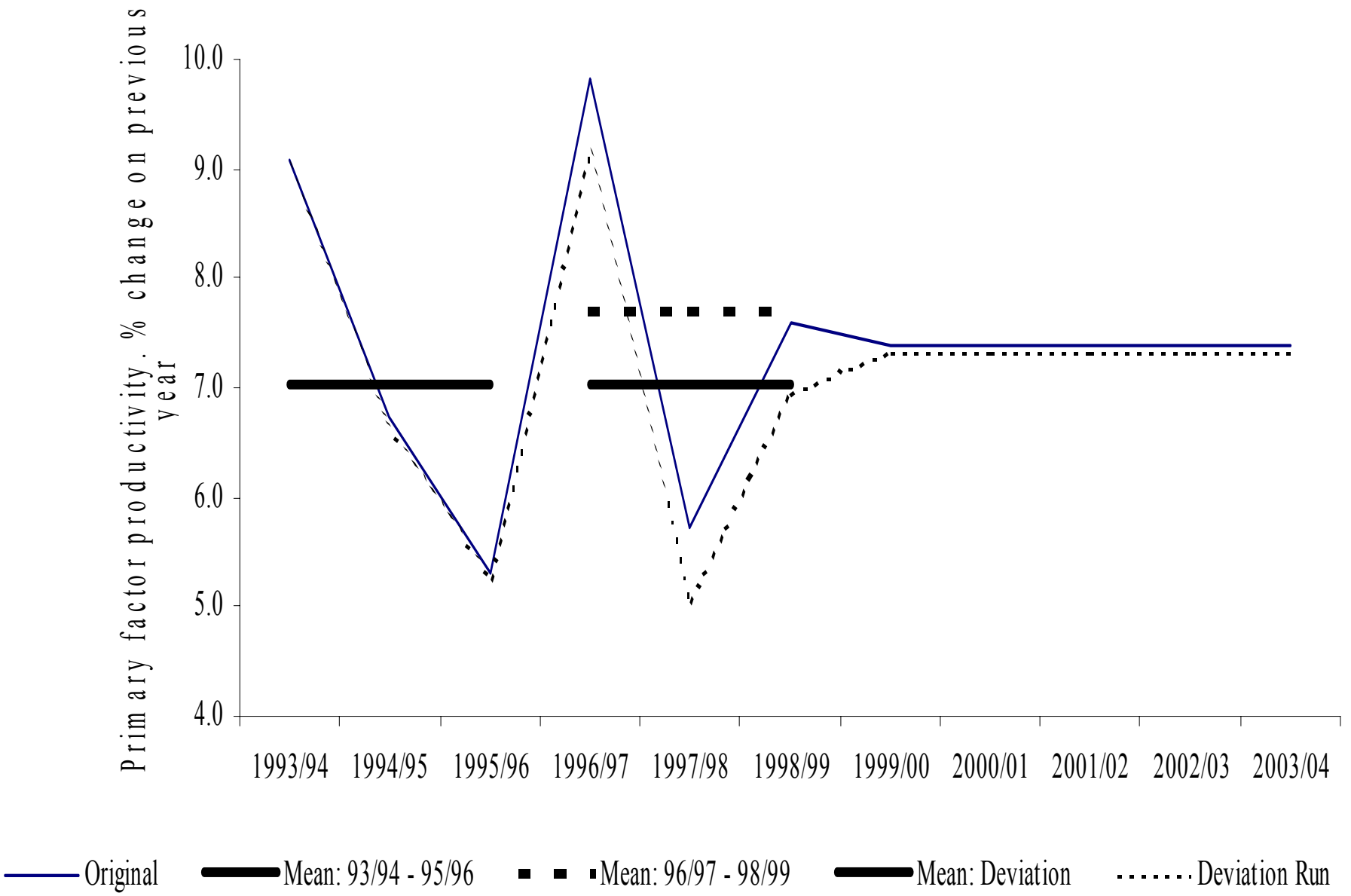


Figure 2: Mainland Utilities: primary factor saving technical change



NCP Productivity changes

- The six years of the historical simulation period divided into two
- First three years considered to approximate the pre-NCP period
- The second three years assumed to be post-NCP period
- Average productivity improvements for the two phases compared
- Differences assumed to be impact of NCP as agreed by COAG April 1995.
- Pluses and minuses of this approach
  - Direct estimate of degree and speed of NCP removal of productivity gap
  - Allows for on-going productivity improvement in the counterfactual (hypothetical case)
  - Observed inter-period difference in average productivities attributed to only one explanatory variable (NCP).
- From Figure 1 average additional productivity improvement from NCP for 3 years post-NCP is 3.0 percentage points (=9.0% - 6.0%).
- From Figure 2 corresponding mainland figure 0.7 percentage points (=7.7% - 7.0%)
  - Consistent with substantial microeconomic reform in Mainland Utilities prior to NCP.

Utilities productivity in the no-NCP hypothetical case

- Rate of change in pre-NCP period unaffected
- In second half of historical period (post-NCP) primary factor growth in Utilities sector assumed to be 3.0 and 0.7 percentage points per annum lower in Tasmania and the Australian Mainland respectively.
- For forecast period, 1999/00 - 2003/04, total factor productivity growth assumed to return to its assumed growth rate under the forecast simulations.

Key Assumptions

- The simulations were run under a standard set of assumptions (see Section 4.5 of Giesecke, 2000).
- Only exceptions were the use of a labour market adjustment mechanism and a CPI-X pricing rule for industries in the Utilities sector.
- The former allows for a gradual return to the forecast value of regional unemployment following some shock to the model.
- The latter, the CPI-X pricing rule, assumes that state governments determine the price of Utilities industries output so that price changes are always in line with changes to the state's CPI (less some fixed amount) with deviations in productivity affecting the amount of profits flowing to the assumed government owners.
- This is the exact situation in Tasmania where electricity and water utilities are government owned.
- It is only approximately the case for Mainland Utilities industries, where there is substantial private ownership; although around two thirds of the Mainland utilities sector is still state-owned.

The Deviation Simulations

- The deviation simulations compute the difference between the time path of the economy with NCP and the time path of the economy without NCP (at least not for Utilities).

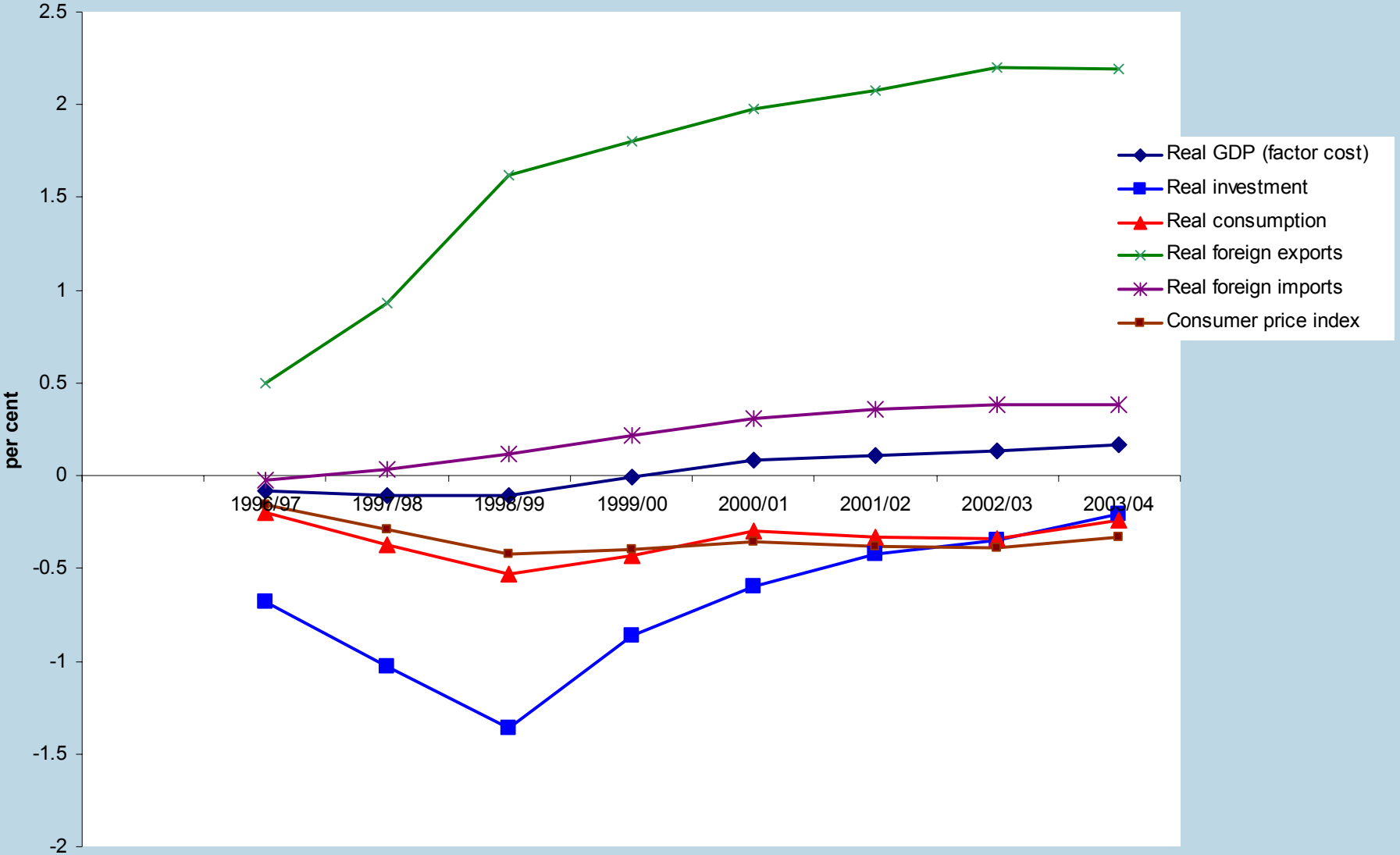
- The paths diverge from 1996/97, the first year that NCP is assumed to significantly affect Utilities productivity.

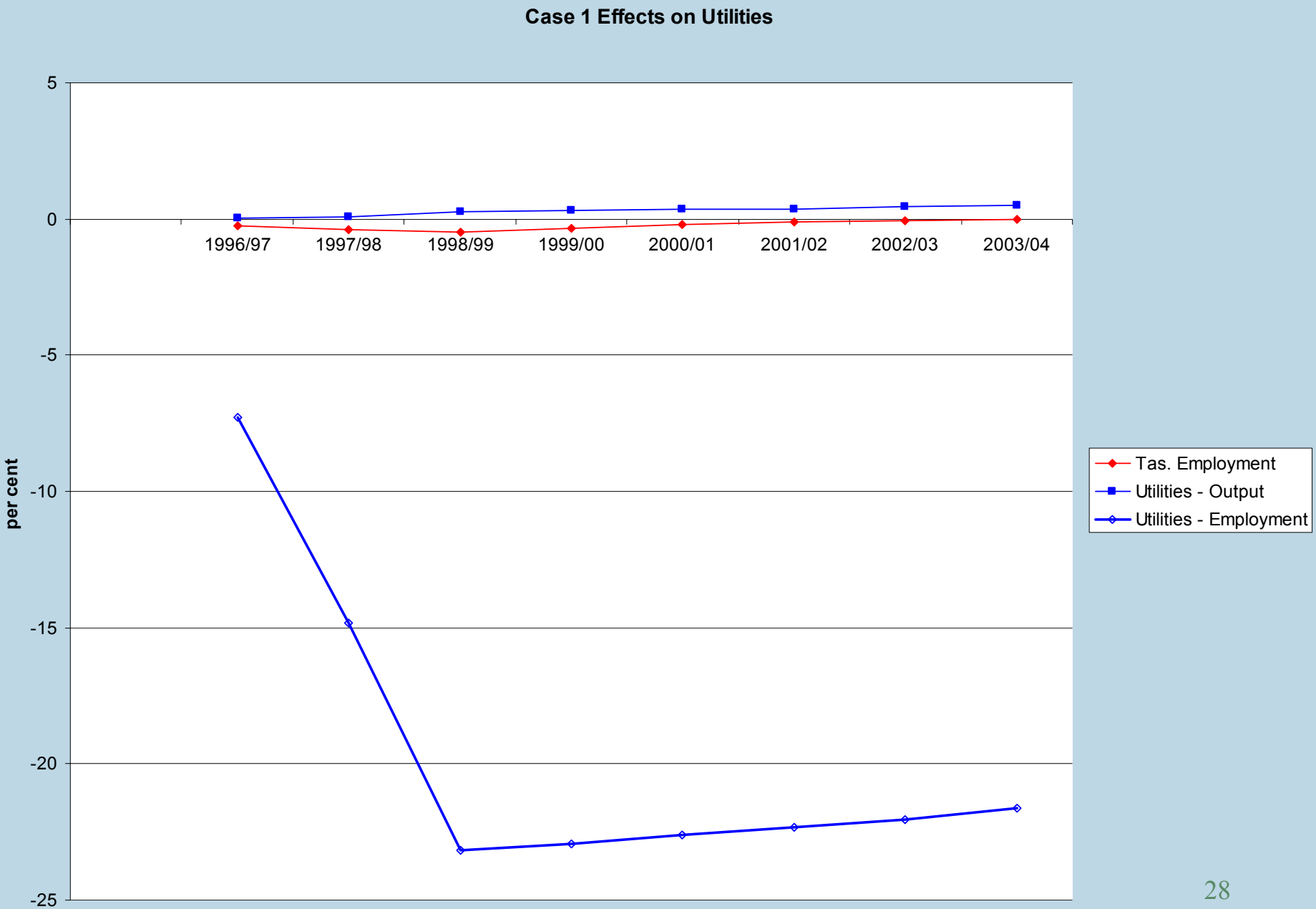
- For ease of explanation we report the deviations as the time path with NCP (the actual case) compared to the hypothetical no-NCP (for Utilities) case. That is we treat the base case as one that excludes the component attributable to NCP in so far as it affects Utilities. Thus the results of the deviation simulations that we report here represent the change against this adjusted (no NCP) base case of the introduction of those productivity gains in Utilities which we have attributed to NCP.

Results

- Two alternative policy simulations were undertaken
- Case 1: Governments allow their budget bottom line (borrowing requirement) to vary. Shows direct effects of NCP.
- Case 2: Commonwealth and state governments are assumed to take action to ensure that the Utilities NCP reforms do not change their borrowing requirements away from the base case.
  - State governments do this by varying their average payroll tax rates
  - Commonwealth government varies its average PAYE income tax rate.
- The full paper gives detailed results along with an extensive explanation of the major model mechanisms that determined the results.
- Will only show the main Tasmanian results today.

Effects of Utilities Productivity improvement on Tasmanian Economy
(when Tas Govt. keeps the Utilities surplus)

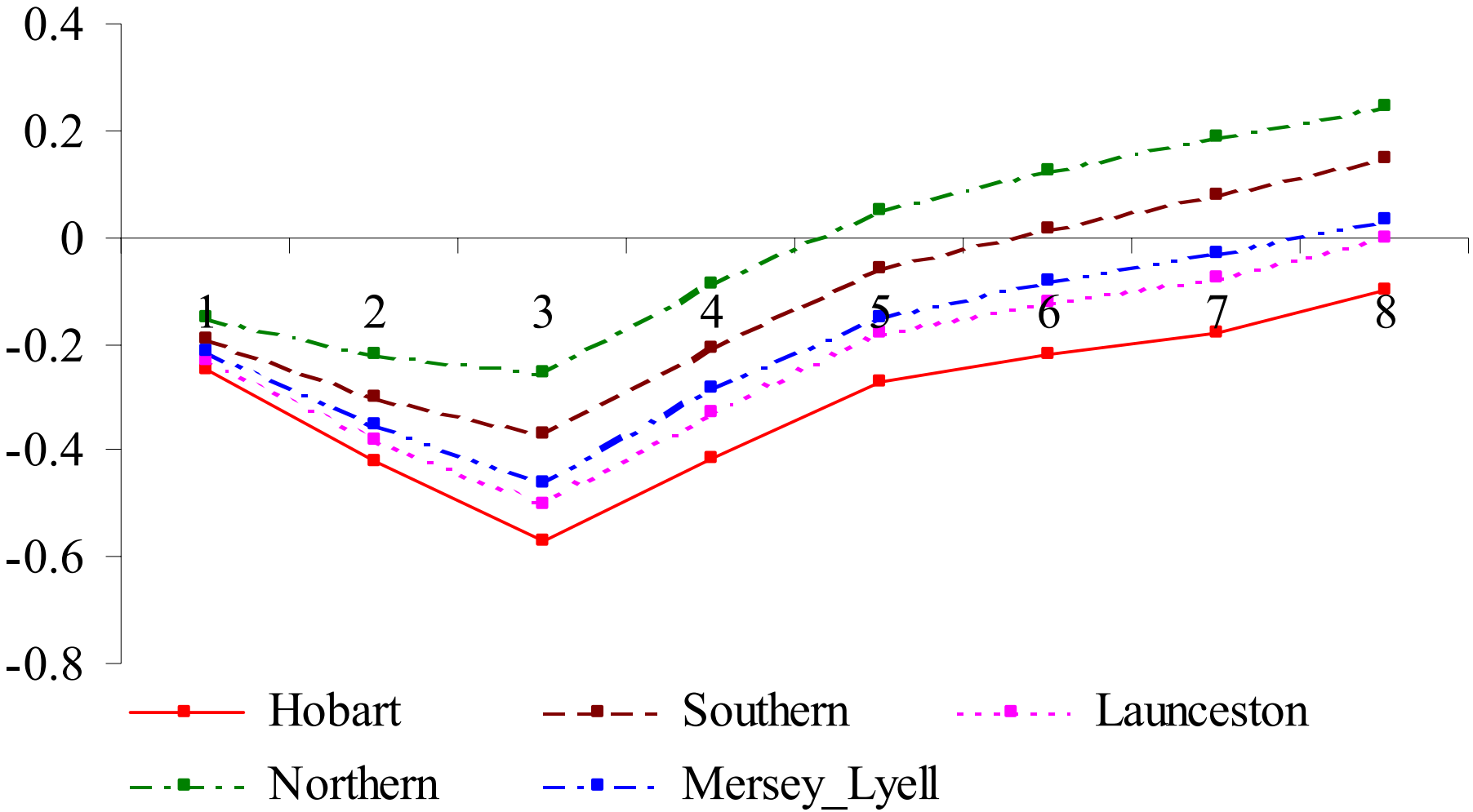



Case 1 Effects on Utilities
5
0
-5
-10
-15
-20
-25
per cent
1996/97
1997/98
1998/99
1999/00
2000/01
2001/02
2002/03
2003/04
Tas. Employment
Utilities - Output
Utilities - Employment

Case 1: Tasmanian Government keeps the cost-savings to improve its budget bottom-line.

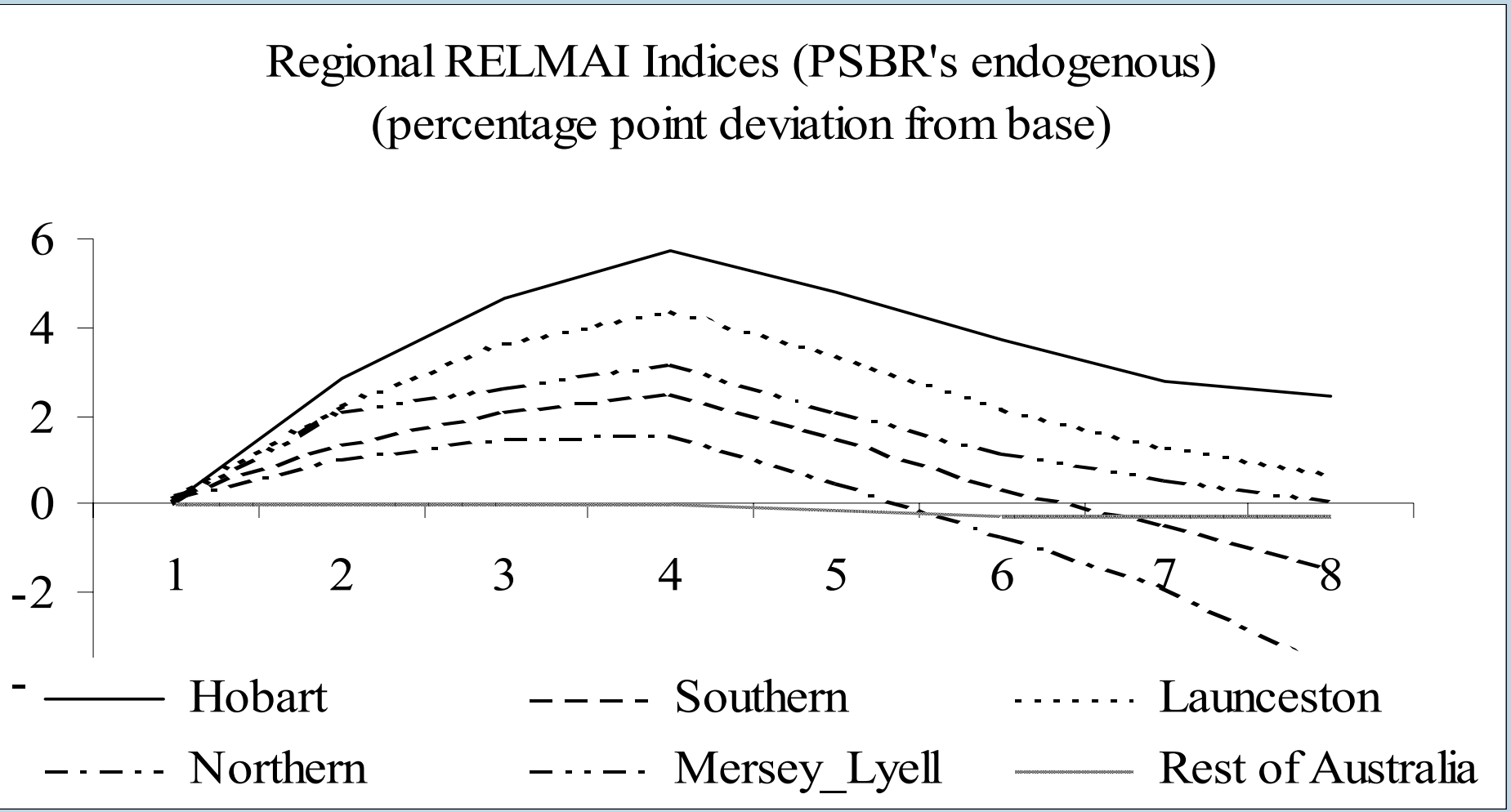
- CPI-X pricing by Utilities means that Utilities price and output changes little.
- An increase in Utilities primary factor productivity of 3 per cent, with capital stock fixed, implies a 7.5 per cent decrease in Tasmanian Utilities employment in each year of the productivity increase.
- By 1998/99 employment in Tasmanian Utilities is approximately 23 per cent lower than would otherwise have been the case.
- In initial year Tasmanian employment is 0.23 per cent lower - 0.13 per cent from fall in Utilities employment; the rest through multiplier effects.
- Deviation in Tasmanian employment reaches its lowest point in the final year of the NCP shocks.
- A fall in the regional real wage allows Tasmanian unemployment to gradually return to its base case level.

Tasmanian Sub-regional Employment (Case 1)
(percentage point deviation from basecase)



Tasmanian sub-regions (Case 1)

- Movements in employment in sub-regions tend to follow those of state as a whole
- But some differences between the sub-regions due to differences in industrial structure.
- Northern region does best as it has a high proportion of its total activity in Agriculture, which gains from decline in general costs that arise from lower CPI (in wake of lower real household consumption as Tasmanian wage bill falls). Also a slightly lower than average proportion of activity in Utilities.


Regional RELMAI Indices (PSBR's endogenous)
(percentage point deviation from base)
6
4
2
0
-2
1
2
3
4
5
6
7
8
Hobart
Southern
Launceston
Northern
Mersey_Lyell
Rest of Australia

RELMAI (Case 1)

- Effects on RELMAI largely mirror the movements in employment in each sub-region.

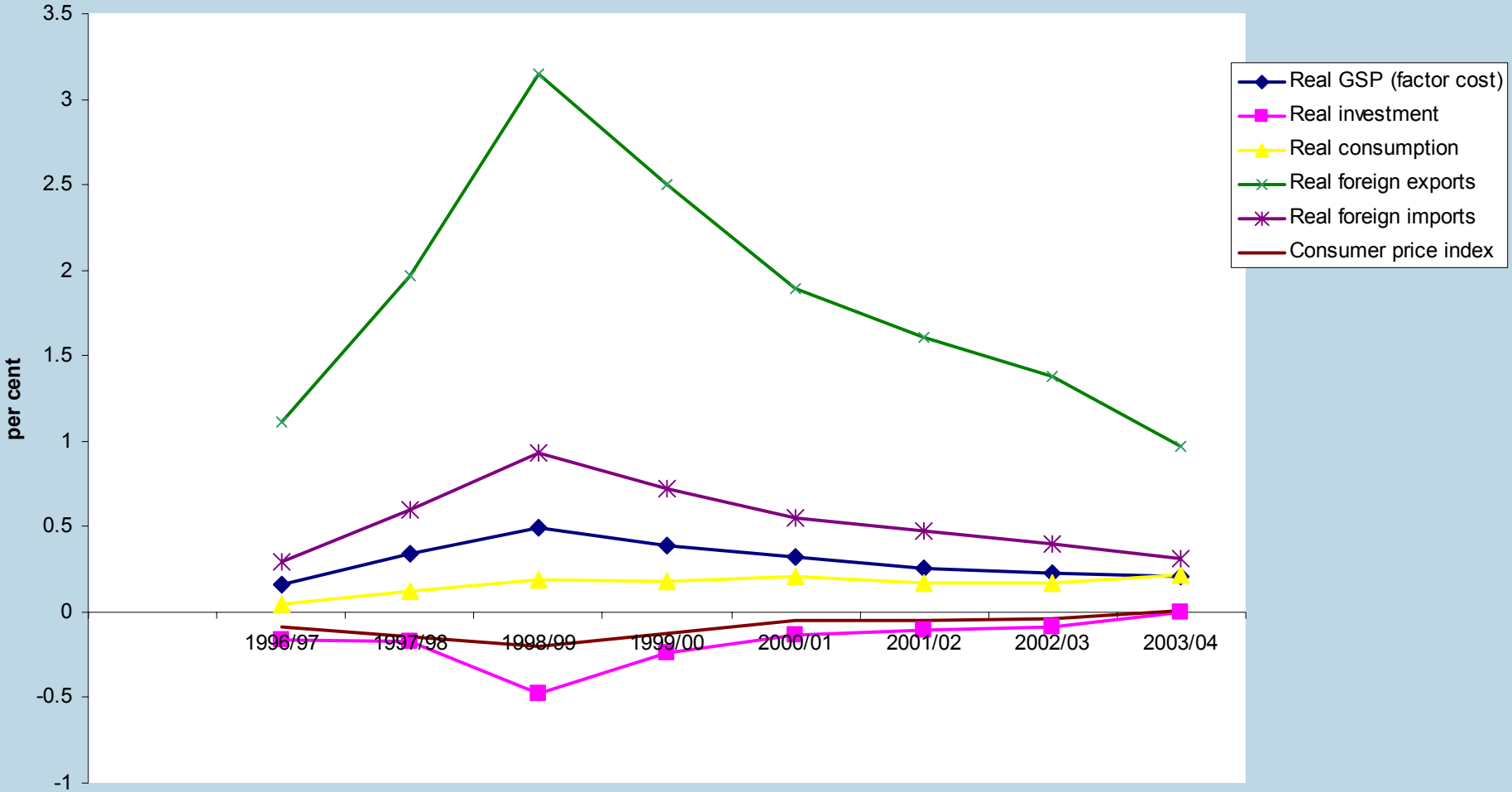
- Loss of jobs in Utilities drives RELMAI up.

- As real wage starts to fall, employment position improves and RELMAI starts to decline.

- While retrenchments increase adjustment costs, a more subdued number of voluntary movements (in the face of slower employment growth along the case 1 NCP time path) acts to reduce adjustment costs (in terms of retraining costs).

Case 2: Cost-savings in Utilities distributed as tax cuts

- Previous case provided an incomplete picture of consequences of faster growth in productivity in the Utilities sector.
- In the Case 1 simulation the Tasmanian government has accumulated surpluses of$57 million by the end of 1998/99.
- While state governments originally saw microeconomic reform as a way of simply improving their bottom line, it is reasonable to assume now that governments pass on cost savings from reforms of government business enterprise.


Effects of Utilities Productivity improvement on Tasmanian Economy
(when Tas Govt. cuts payroll tax rate)
per cent
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
1996/97
1997/98
1998/99
1999/00
2000/01
2001/02
2002/03
2003/04
Real GSP (factor cost)
Real investment
Real consumption
Real foreign exports
Real foreign imports
Consumer price index

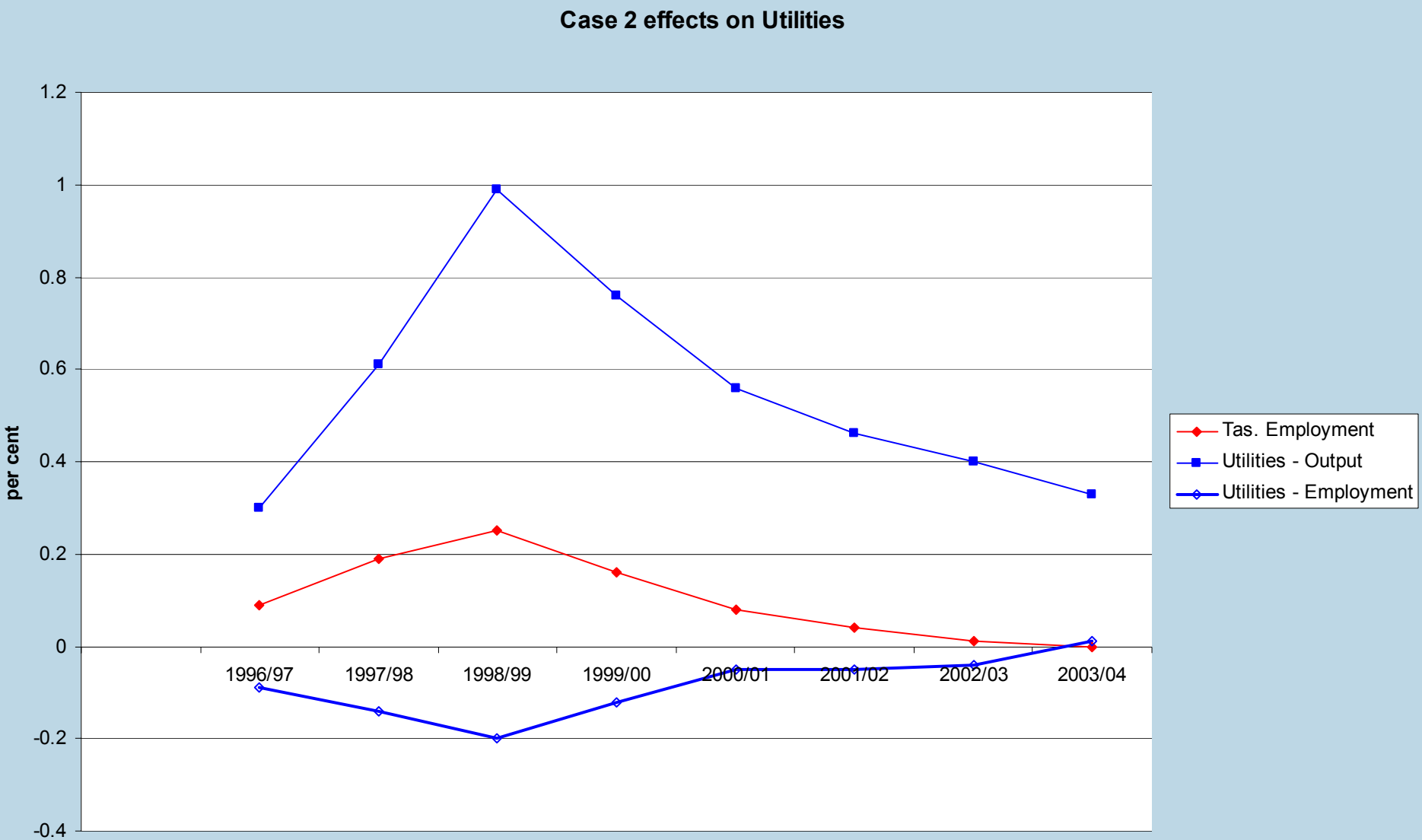

Case 2 effects on Utilities
per cent
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
1996/97
1997/98
1998/99
1999/00
2000/01
2001/02
2002/03
2003/04
Tas. Employment
Utilities - Output
Utilities - Employment

Figure 5
Tasmanian Sub-regional Employment (PSBR's exogenous)
(percentage point deviation from base)

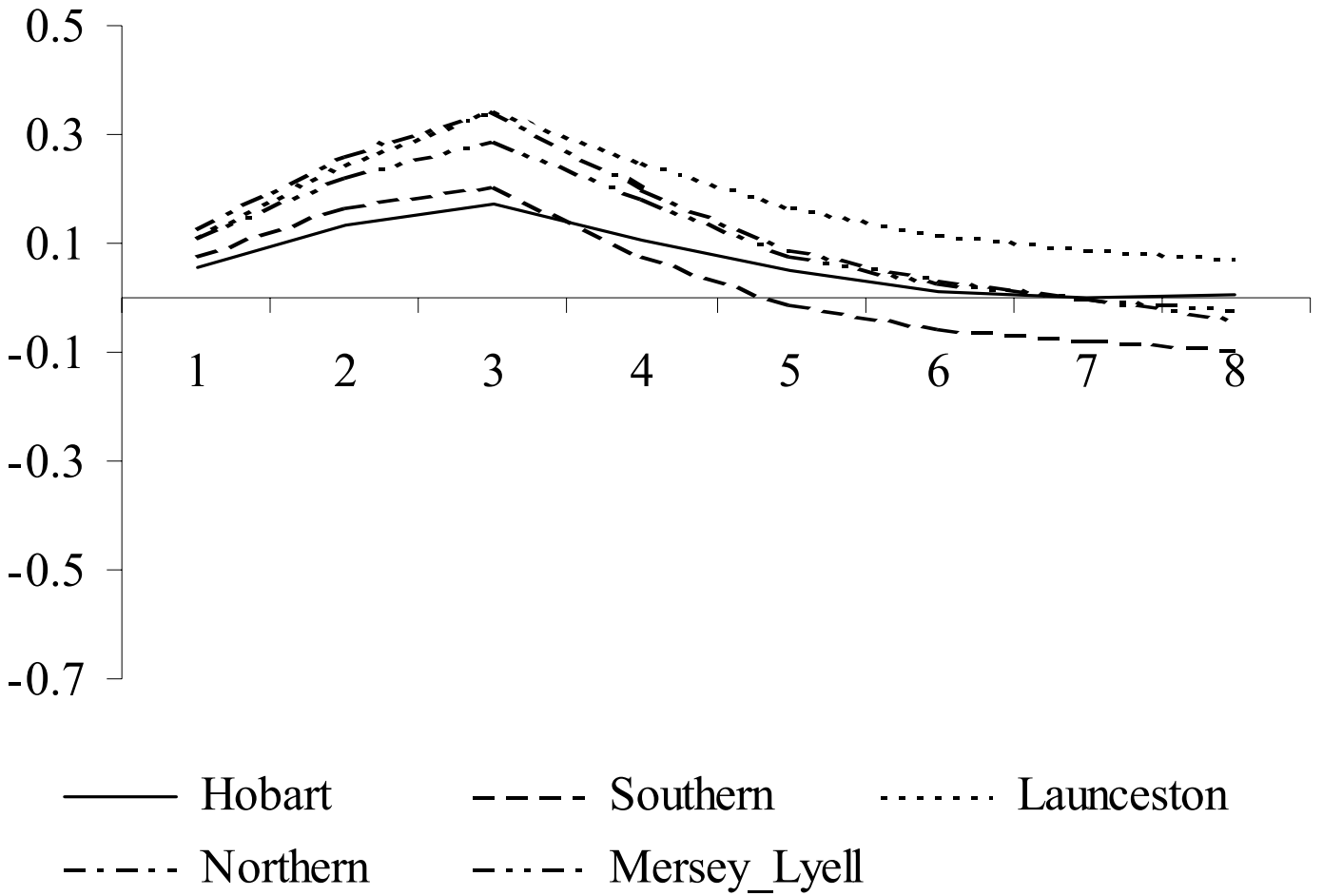
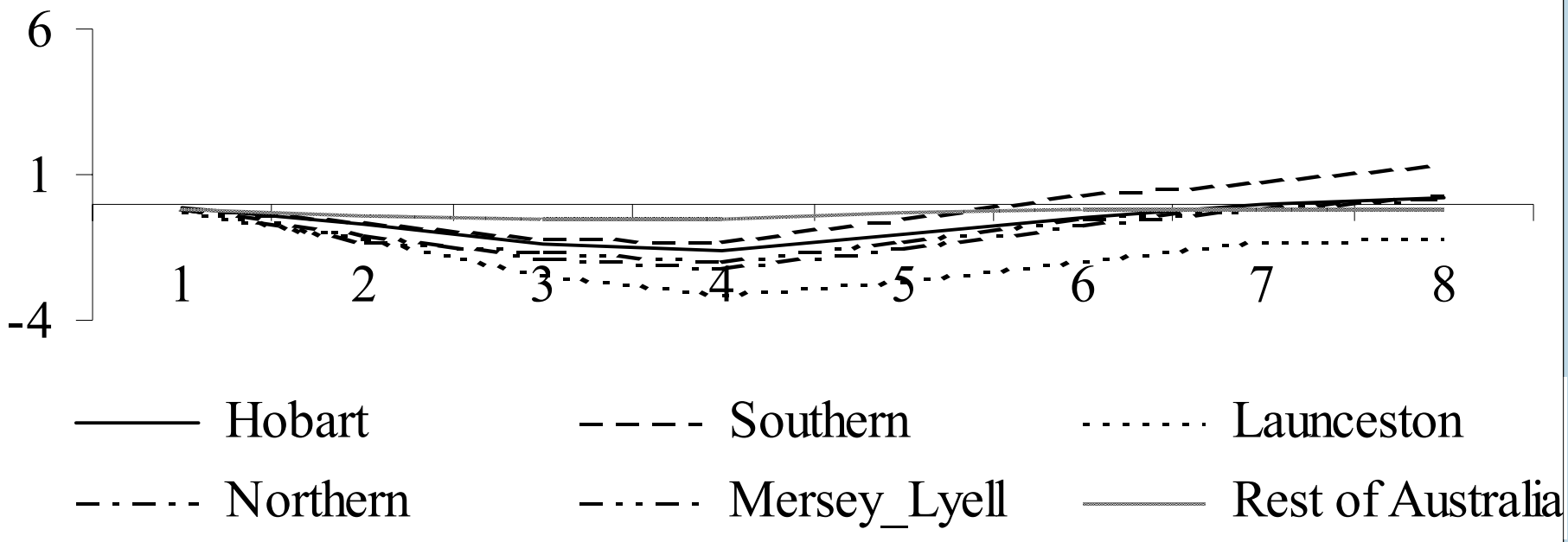


Figure 6
Regional RELMAI Indices (PSBR's exogenous)
(percentage point deviation from base)



- Case 2 simulations assume that each regional government and the Commonwealth Government maintain the same borrowing requirements in the deviation simulation as in the base case simulation.
- Regional governments do this by adjusting their average payroll tax rate.
- After 3 years the Tasmanian Government's payroll tax rate is projected to be 39 per cent lower than the base case.
- This causes the economy to expand.
- Real wage therefore must rise over time to eventually return unemployment to its base case level.
- Launceston most favourably affected
  - high shares of activity in expanding industries such as Manufacturing and Margins
  - relatively low share in Utilities sector.
- Southern (which along with Hobart in the first three years) experiences the worst employment and RELMAI outcomes, reflecting its large employment share in Utilities and its relatively low share of activity in Manufacturing.

Conclusions

- The development of the RELMAI represents a valuable step in enhancing the methodology for estimating regional labour market adjustment costs of policy changes.
- The bulk of the changes in the RELMAI were accounted for by regional employment effects.
- Further work could improve the index by incorporating the costs of migration and social disruption.
- However regional employment outcomes may well remain the key determinant of adjustment costs.
- In the case of national competition policy, governments' fiscal policy reaction is crucial in determining whether the policy adds to or ameliorates adjustment costs.