Modelling the impact of environmental policy reforms on water markets and irrigation use in Australia

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Pressures for water policy reforms in Australia include

• Soldier settlement schemes: production far removed from price signals

• Importance of irrigated agriculture: competition for resources

• Blue-green algae outbreak

• International treaties

• Marketing attributes: clean and green
Irrigation in Australia

- Accounts for more than 70% of water use
- Is used on less than 0.5% of agricultural land (12% of crop land)
- Accounts for 35% of value of agricultural production
- Murray Darling Basin is the bread basket
THE MURRAY-DARLING BASIN

Sustainable Development and the General Equilibrium Approach
June 5-7, 2002 - Taipei, Taiwan
Agriculture as a proportion of total water usage

Europe
North America
Australia
South Australia
Asia

38%
49%
70%
80%
86%
Per capita water availability: Australia and elsewhere


Sustainable Development and the General Equilibrium Approach
June 5-7, 2002 - Taipei, Taiwan
Growth in Irrigated Area: Grapes, Cotton and Rice

- Cotton
- Rice
- Grapes

Sustainable Development and the General Equilibrium Approach
June 5-7, 2002 - Taipei, Taiwan
Average water costs as per cent of production costs

<table>
<thead>
<tr>
<th>Crop</th>
<th>Water costs as % of total costs</th>
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<tbody>
<tr>
<td>Grapes</td>
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<td>Citrus</td>
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<td>Rice</td>
<td>22</td>
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<tr>
<td>Pasture</td>
<td>23</td>
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The Salt Issue

- Salinity is a growing problem in Australian agriculture
- By 2020 water supplied to Adelaide will exceed the WHO threshold for drinking water by 20%
- More than half the increase in salinity arising from MDB irrigation is from salt intrusions within South Australia
Recent Water Policy Reforms

- A cap on water taken from the Murray
- Environmental flows
- Water markets
- Interstate trade pilot project
Interstate Trade Outcomes

- More than $10 million water traded
- Trade represents less than 1 percent of water use
- Virtually all (99%) of the water sold was not being used by sellers
  - going to high value uses --more than two thirds to vines
  - reforms induce state-of-art technology
Modelling water distribution across boundaries

- We are only dealing with interstate, not international boundaries
- Notions of freehold water resource ownership have prevailed until the past decade
- Interstate cap on water usage: a rule still made to be broken
Issues raised by interstate trade

• High transactions costs
• Long processing delays
• Cheaper to pay the fine for exceeding one’s allocation than to buy water on the temporary market
Quantitative approach

• What are the implications for regional industries of water pricing and allocation reforms?
• Who are the winners and losers in agriculture?
General equilibrium approach

- There are water users other than commercial irrigators
- Households included in CGE framework
- Global demand swings will also influence allocation
- We attempt to account for the environmental costs of irrigation
Version of FEDSA

• 24 sectors including six irrigation industries
• South Australia and ROA, but the latter has specific regional sectors (Grape NSW)
• Based on a 1999-00 database projected from the published 1996-97 ABS table
Early inferences

- Pricing reform that alters relative prices to irrigators helps SA more than NSW or VIC
- Raising prices to users to account for externalities + water-saving technologies: moves irrigators away from relatively water-intensive activities
Extending the database/model

- At Centre of Policy Studies, we are developing a 144 sector database for 8 regions (& 57 statistical divisions with meaningful agricultural data)
- Scope for closer analysis: e.g. Rice in MrmbidgeeNSW
- Scope exists for a more detailed environmental module in MMRF
Possible outcomes

• If water prices between irrigators in different regions merge, there could be transfers of irrigation activity

• But all users may pay more if water is diverted to the environment

• If the rate of uptake of water-saving technologies exceeds rate of diversion to environment, output can still grow