

Modelling the Australian government's buyback scheme with a dynamic multi-regional CGE model

Peter Dixon, Maureen Rimmer and Glyn Wittwer

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Executive Summary

The ongoing crisis in the southern Murray-Darling basin due to recurring droughts over the past decade has provided many challenges for farmers and policy makers. COAG policies concerning the basin that have evolved since the mid-1990s have been harder to implement in the wake of drought.

The focus of this study is the Commonwealth's buyback scheme, commencing in 2009 and continuing over eight years until 1,500 gigalitres of entitlements have been taken out of irrigation. This study uses TERM-H2O, a multi-regional model of the Australian economy adapted to include regional water accounts. It has been developed specifically to deal with catchment regions in the southern Murray-Darling basin. The model is a successor of TERM, first used to depict the drought of 2002-03.

The application detailed here is to the Commonwealth government's water buyback scheme against a background of temporary drought. In the scenario, the buyback water volume accounts for around 33 percent of initial irrigation allocations in the southern Murray-Darling basin (based on ABS water accounts). The assumption in the scenario is that water is freely tradable between irrigators across the southern Murray-Darling basin. In TERM-H2O, irrigators use water from two sources, namely natural rainfall and irrigation supplies. Overall water availability in the basin falls by 25.8 percent due to buyback, which proceeds from 2009 to 2015. However, long-run irrigation output falls by only 7.2 percent while dryland farm output increases slightly relative to a baseline without buyback. The gap between water availability and output arises from two modelling features. First, there is weak substitutability between water and other factors of production in TERM-H2O: as the scarcity of water worsens, farmers reduce water requirements per unit of output. This relatively weak effect is most marked for irrigated cereals. Second, and more importantly, through a combination of water trading and farm resource movements, remaining water switches to higher value uses within irrigation.

In order to understand the impact on regional income in the southern Murray-Darling basin, we first note that irrigation accounts for only 4.0 percent of GDP across the region, and all farming only 11.2 percent of GDP. This reflects ongoing economic development: large towns within rural regions are dominated by services sectors. Our first task is to compare real GDP at an aggregate level for the SMDB with a back-of-the-envelope

(BOTE) calculation. The value of water used in SMDB irrigation in the initial TERM-H2O database is 0.58 percent of SMDB GDP. Therefore, a first guess is that buyback purchases will reduce SMDB's real GDP by 0.15 percent ($=25.8\% \times 0.58\%$). The modelled deviation relative to forecast in real GDP in the year 2017 is -0.058 percent. As explained above, the gap between the BOTE and modelled outcomes comes from a combination of weak substitution away from water, resource movements on farms away from water-intensive activities and water trading to facilitate such resource movements.

Next, we must explain what happens to aggregate consumption or household spending. The buyback scheme provides a windfall gain for holders of water rights by raising the price of irrigation water. Therefore, farmers who sell water to the Commonwealth do so at a higher price than if they were selling water to other irrigators in the absence of buyback. Based on the assumption that all buyback revenues are spent in the region of origin, buyback raises rather than lowers aggregate consumption in each region relative to forecast. This assumption is not critical to the outcome, as buyback revenues are a small proportion of regional spending. Were we to assume (perhaps quite unreasonably) that all buyback revenues were spent outside the region of origin, regional aggregate consumption would track regional GDP, implying small losses relative to forecast at worst.

During drought, the buyback scheme may be potentially beneficial to regional communities by enlarging the market for water during a period of drought-induced rural depression. The main cost of buyback in the context of drought will be to the Commonwealth, to the extent that drought raises the asset value of water rights. Moreover, the Commonwealth would be subject to the same fractional allocations as other water users during drought. This implies that during drought, the Commonwealth potentially would be spending more while having less water for environmental flows. From the perspective of both the environment and irrigators, with the benefit of hindsight, it would have been preferable to introduce environmental flows before the past decade of intermittent or continual droughts. This proved not to be possible under the slow and difficult process of policy evolution. Had there been a lower volume of highly secure irrigation allocations leading into the past decade, there would have been fewer farmers caught with insufficient water particularly for perennials, as investments in the latter would have decreased. Moreover, the Commonwealth could have sold temporary water back to irrigators during drought while allowing environmental flows during years of relatively cheap water. The current dire circumstances still warrant Commonwealth purchases, to the extent that environmental flows now are able to mitigate irreversible ecological damage in the SMDB.

Perhaps the most important result from our modelling is that the impact of the buyback on regional economies is quite small and most likely beneficial. Moderate droughts and cuts in water allocations arising from drought have much greater impacts on regional economies in the SMDB than a buyback scheme conducted over a number of years. Droughts have had a negative effect on regional economies since the turn of the millennium, but even that has been far more pronounced in small towns than in larger regional centres. This is because rural regions too have followed a global trend that agriculture's share of an economy decreases with economic growth. To put this shrinkage

into context, Australia at a national level was more agriculture intensive 60 years ago than the southern Murray-Darling basin is now. The vitality of regional economies in the future will depend much less on preserving existing water rights assigned to irrigation and more on regional provision of services, particularly in education, health and aged care, which already account for substantial shares of economic activity at a regional level. Any policy measures that seek to hinder water trading or the buyback process are more likely to harm than protect regional communities.

References

Horridge, M., Madden, J. and Wittwer, G. (2005) "Using a highly disaggregated multi-regional single-country model to analyse the impacts of the 2002-03 drought on Australia", *Journal of Policy Modelling* 27(3):285-308, May.