

11 May 2020

Nigel Taptiklis
Senior Analyst
Ministry for the Environment

Email: Nigel.Taptiklis@mfe.govt.nz

High-level Review of Essential Freshwater Economic Impact Reports: NZIER Modelling

Dear Nigel

This note relates to the general equilibrium (GE) modelling undertaken by NZIER in *The economic effects of water quality proposals: Modelling scenarios*, May 2020. The modelling addresses the economy-wide effects of the EFW package, incorporating as inputs various outputs from the partial equilibrium (PE) Cost Model developed by Resource Economics. That was reviewed in my letter of 22 April.

As with that review, I understand that the scope of my review should address the following questions:

- Is there a clear and logical approach to the modelling?
- Are the approaches credible and reasonable given the available information and timeframe constraints?
- Are the conclusions reasonable and consistent with the analysis undertaken?

Out of scope are:

- Modelling inputs such as the modelled load assumptions, or cost and effectiveness of mitigations.
- The assumptions made by consultants or MfE such as discounts rates, multifactor productivity etc.

General Equilibrium models are generally not strong in simulating land use change as most do not directly incorporate factors such as land quality (rainfall, slope, soil type etc) and non-economic factors that affect land use decisions such as lifestyle choices, resistance to change and so on. Given that the objective was to assess the economy-wide effects of what the PE analysis produces, it makes sense to over-ride the GE model's usual structure and set land use exogenously. This has been done in a sensible manner, with exogenous shocks to pastoral agriculture by way of increases in costs and changes in land use – less land for pastoral farming and more available for arable farming and forestry.

In addition, the macroeconomic closure assumptions are appropriate to the issue with regard to both content and timing.

Just as the PE modelling did not consider other events and policy changes that could impact farming over the next few decades, apart from the NPS(2017), neither did the GE analysis. Naturally one has to place an envelope around the scope of any investigation, especially with PE analysis. With GE analysis, however, although one still cannot model everything, ignoring something that is deeply intertwined with the central issue could distort the results.

In this instance such a confounding influence is the government's policy on agricultural emissions; entry into the ETS or targeted methane reductions by 2030 and 2050. The report is quite clear that the modelling excludes the effects of climate change, which also excludes climate change mitigation policy.

However, GHG mitigation policy has a nonlinear interaction with water quality policies. This means that the incremental effect of each depends upon the order in which they are introduced. The estimated effects of an EFW package are probably more negative if mitigation policy is ignored, that is when GHG mitigation policy is implicitly assumed to be introduced after an EFW package. There is both an industry level effect with regard to the incremental cost of abatement action and an economy-wide effect with regard to the carbon price and/or purchase of international emission units needed to meet any given national emissions pledge.

This omission is not a criticism of the work as allowing for the effect of GHG mitigation policy would enlarge the scope of the analysis which would not have been possible within the time and budget, but it may be worth pursuing as a separate piece of research.

The results are entirely commensurate with the assumed input shocks and closure rules. I agree with footnote 4 that other GE modelling by Ballingall and Stroombergen produces similar, but slightly worse results for similar input shocks. The difference is largely attributable to the NZIER taking the land use changes from the PE modelling as exogenous inputs.

The PE analysis estimates the annual cost of the EFW package in 2050 of \$294m – over and above the cost of NPS(2017). The cost of stock exclusion adds another \$61m.

The GE modelling shows a cost of \$450m in terms of GDP (for EFW-I relative to NPS). The cost in the PE model is not a loss in GDP, which would typically be about half of the cost. Hence the GE effect carries an implicit multiplier of about 2.5, which is very plausible.

At the regional level, in the PE model Canterbury, Southland and Waikato incur the largest financial cost as well as the largest changes in land use. The GE model could theoretically produce a quite different spatial pattern of effects if second round impacts are large enough. As it happens the GE model shows the largest proportionate negative GDP effects in Canterbury, Southland and Taranaki, so first round effects generally dominate the wider economic response.



Summary

With regard to the stated scope of this review I conclude that:

- The approach is clearly described and accords with best practice GE modelling. The methodology is appropriate for addressing the issue.
- The scope of the analysis covers the brief, although if the opportunity arises it would be worthwhile examining the interaction between the EFW packages and GHG mitigation policies.
- The results flow logically from the modelling and are credible. Appropriate caveats are noted.

I am happy to discuss any aspect of the above especially if I have misunderstood something.

Yours faithfully

Adolf

Dr Adolf Stroombergen

Chief Economist

Infometrics

Email: adolfs@infometrics.co.nz

DDI: 64 4 474 2141

