NZ Climate Change Commission Model Review, Part 2

Dr. King

Thank you again for the opportunity to provide comments on the modeling analysis undertaken by the New Zealand Climate Change Commission.

This is the second part of my review, with a focus on the C-PLAN and DIM modeling.

C-PLAN is a best-in-class recursive-dynamic general equilibrium model of New Zealand and the rest of the world based on economic microfoundations: households who maximize utility, firms who maximize profits, and prices that balance supply and demand throughout the economy. It estimates the overall economic impacts (GDP) of a transition policy path as well as impacts across firms and a representative household. The DIM model is a "microsimulation" model that combines C-PLAN output and detailed data on job characteristics by sector and demographic data by workers to project what type of workers are likely to be most affected by the policy transition path.

I have not seen details on functional form and elasticity of substitution assumptions within C-PLAN but I have no reason to believe the model should not be used by the Commission. Likewise, while I feel that there are significant improvements that should be made to the DIM analysis (more on this below), I have no reason to believe model results cannot be used by the commission.

My following comments are organized around the Commission use of the C-PLAN and DIM models going forward, and then specific comments on C-PLAN and DIM separately.

Commission Use of C-PLAN and DIM

C-PLAN and DIM satisfy the Commission's requirements to identify economic impacts, distributional impacts, and international competitiveness impacts of emissions reduction pathways. My primary question is whether the Commission plans to leverage these models to show *how* economic/distributional/international competitiveness impacts *depend* on policy design. Models like C-PLAN are useful laboratories for qualitatively and quantitatively evaluating how changes in policy design or technology assumptions impact firm and household behavior, holding fixed other assumptions such as substitution elasticities. (The half-price scenario comparison was useful for precisely this reason). The analysis in both slides and Chapter 12 seem to focus on impacts of a particular policy design and not on how impacts could change under different policy assumptions. C-PLAN, however, could show how economic impacts, distributional impacts, and international competitiveness impacts of emissions reduction pathways vary with allocation assumptions.

C-PLAN Comments

I don't quite understand why much of the discussion in Chapter 12 is qualitative and doesn't present more C-PLAN results. What is the reasoning for this?

I'll also not that it is generally hard to make sense of very high carbon price scenarios; this usually just means the model has squeezed out all substitution possibilities and relies on income effect to reduce emissions at high cost. I'm not sure what we learn from scenarios with $800 carbon prices.

On GDP impacts

- Report average GDP growth rate 2017-2050 in each scenario
- GDP impacts of additional policy may be limited because quite a bit of reduction is already baked into CPR
    - Comparing target aligned scenarios to CPR won't show impacts of things already included in CPR (existing ETS, plant closures, etc)
- It is hard to evaluate statements such as "C-PLAN models emissions reducing in response to climate policy with little or no reduction in output, and so shows a smaller impact on gross domestic product (GDP) and abatement costs than other CGE models"
    - Is there a way to estimate what GDP impacts would be in absence of "key emissions-reducing technologies"?
- Economists all know GDP is a flawed measure of economic costs. What is the utility-consistent welfare impact of the target scenarios? Can welfare costs be reported as welfare costs per ton reduced or welfare costs as a fraction of total consumption (expenditures plus value of leisure)?

NDC

- What is the current NDC and why would international offsets likely need to be purchased to meet it?

Energy Production

- Where does coal demand in target scenarios come from?
- PJ stands for Petrojoules?

Emissions leakage and competitiveness

- Are there modeling results that can be provided here to demonstrate some of the points made in this section? Show output in EITE industries in scenarios with and without the output-based free allocation?

DIM Comments

DIM seems fine and but it could use improvement and it is not totally clear how results are really going to be used by the Commission. A narrative to explain the results seems to be lacking. What is the key takeaway? In future, DIM must account for policy-induced price change impacts on overall expenditures/income by different household groups to more substantially evaluate policy impacts across households

- DIM modeling results in Chapter 12 hard to evaluate/interpret, since StatsNZ has not allowed them to be released yet.
- As discussed above in the context of C-PLAN, DIM is probably most useful in analyzing how employment impacts change across various policy designs such as free/auctioned allowances and revenue use but the current analysis seems to focus on impacts of a single scenario.
- Can DIM measure gross reallocation (sum of job loss and job gains divided by BAU jobs) for NZ as a whole, regions, tenure, qualification, industry, etc). Since net job gains are VERY small, measuring reallocation might tell a better story of the disruption of climate policy. (Will also be important to show how this measure changes *across* policy designs).

As was the case with part one of my review, I'm happy to discuss my comments, particularly those that revealed a misunderstanding.

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