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Global Trade Analysis Project

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Changing Fuel and Carbon Costs: Implications for New Zealand Agriculture

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Considerable uncertainty exists about future fuel prices and carbon costs, with different trajectories for these variables having significant potential impacts on New Zealand agriculture. This paper explores the impacts of a range of possible changes in fuel and carbon prices on New Zealand's key agro-food sectors, particularly dairy, beef and sheep.

We use the latest version of the GTAP-E model (Corong et al., 2019), based on the well-known Global Trade Analysis Project model (GTAP) (Hertel, 1997; Corong et al., 2017). This model enables us to capture inter-sectoral linkages within New Zealand as well as internationally, along with a relatively detailed specification of energy inputs and associated carbon emissions. To enable detailed analysis of key livestock sectors, we split the GTAP beef and sheep (i.e., "ctl") sector, using data from the Food and Agricultural Organisation, supplemented with New Zealand input-output and other country-specific data. To capture energy use and emission data, we use the latest GTAP version 10 Data Base, including carbon dioxide emission data distinguished by fuel type and user. We supplement this with the GTAP non-carbon dioxide emissions data on other greenhouse gas emissions (including methane), which are tied to household and intermediate consumption, endowment use and activity output. This research is part of a larger study that explores the energy and carbon costs of New Zealand livestock agro-food products through their life cycle to overseas markets; we draw on data on energy use and emissions from this wider study to augment the New Zealand data available in the GTAP-E and non-carbon dioxide databases.

We model a range of scenarios, making different assumptions on future fuel prices and carbon costs. In particular, we consider low, moderate and high increases in these prices to explore different impacts on both global and New Zealand economies. We also explore potential trade diversion and carbon leakage effects if New Zealand were to impose carbon taxes unilaterally, as opposed to a global carbon tax policy. As well as overview results for the New Zealand economy, our analysis includes detailed assessment of changes in bilateral trade flows - both commodity and embedded carbon emissions vis a vis New Zealand's important trading partners - and activity output, along with implications for energy use and GHG emissions, with a particular focus on key agro-food sectors in New Zealand.

References

- Corong, E. L., Hertel, T. W., McDougall, R., Tsigas, M. E., & van der Mensbrugghe, D. (2017). The standard GTAP model, version 7. *Journal of Global Economic Analysis*, 2(1), 1-119.
- Corong, E. L., Golub, A., McDougall, & van der Mensbrugghe, D. (2019). GTAP-E model, version 7: an energy-environmental version of GTAP (manuscript). Center for Global Trade Analysis, Purdue University.
- Hertel, T. W. (Ed.). (1997). *Global Trade Analysis: Modeling and Applications*. Cambridge and New York: Cambridge University Press