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# Output-based allocations and revenue recycling: Implications for the New Zealand Emissions Trading Scheme

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ABSTRACT

The New Zealand Emissions Trading Scheme (NZ ETS) is more comprehensive in its coverage of emissions than schemes introduced or proposed to date in any other country in that it includes agricultural greenhouse gases, which account for half of New Zealand's total emissions. But, motivated by concerns for the international competitiveness of emissions-intensive, trade-exposed industrial and agricultural activities, current legislation provides for substantial ongoing free allocations to such activities, linked to their output. Here we use a computable general equilibrium model to analyse the impacts of output-based allocation, given the possibility of recycling net revenues to reduce prior distorting taxes. Unlike previous modelling studies of alternative NZ ETS designs, we allow for a more realistic modelling both of capital and labour supply. We find that, as suggested by theoretical results, interactions between the ETS and existing taxes are important. Given any level of output-based allocation, the negative macroeconomic impacts can be reduced by recycling net revenues as efficiently as possible. Less obviously, we find that there may be an optimal non-zero level of output-based allocation. This optimal level increases as the carbon price and/or factor supply elasticities increase, but decreases if revenues are recycled with greater efficiency.

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## 1. Introduction

Market-based instruments such as taxes or cap-and-trade schemes are widely seen as an efficient means of reducing global greenhouse gas (GHG) emissions. International emissions trading under the flexibility mechanisms of the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) allows less costly emissions reductions than if each Annex I party met its obligations through domestic actions alone. Firm-level emissions trading schemes (ETS) and/or emissions taxes have been or are likely soon to be implemented in many developed countries. An issue of major political and economic significance is how permits are allocated in a domestic ETS. There are important trade-offs between objectives of global environmental effectiveness, promoting static and dynamic economic efficiency and equity.

In September 2008, the New Zealand Parliament passed the Climate Change Response (Emissions Trading) Amendment Act (henceforth, 2008 Act).[1] The 2008 Act provided for a comprehensive ETS, ultimately to cover all sectors (including agriculture and forestry) and all those GHGs covered under the Kyoto Protocol. Coverage of both agricultural emissions and emissions and removals from the forest sector was motivated by their large contributions (positive and negative respectively) to New Zealand's emissions inventory.[2]

In November 2008, a new government instigated a review of the 2008 Act, citing "the weak state of the economy, the need to safeguard New Zealand's international competitiveness, the position of trade-exposed industries and the actions of competing countries" (New Zealand Parliament, 2008). The legislation was subsequently amended in June 2009 (henceforth, 2009 Act[3]). The amendments included changes to short-term transitional measures, such as delaying the entry of agriculture into the NZ ETS from 2013 until 2015. More importantly, though they provided substantially greater protection to emissions-intensive, trade-exposed activities over a much longer period, it was also announced that the amended NZ ETS would be 'fiscally neutral',

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[1] The Climate Change Response (Emissions Trading) Amendment Act 2008. Public Act 2008 No. 85.

[2] In 2007, GHG emissions ($CO_2$ equivalent) from agriculture accounted for 48.3% of gross emissions, while net removals in land use change and forestry offset 31.6% of gross emissions (New Zealand Ministry for the Environment (2009b), New Zealand's Greenhouse Gas Inventory 1997–2007, Table 1.2.)

[3] The Climate Change Response (Moderated Emissions Trading) Amendment Act 2009. Public Act 2009 No. 57.

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whereas the previous scheme was expected to raise significant revenue in the medium term (Smith, 2009).

Under the 2008 Act, total free allocations to eligible agricultural and industrial firms would begin at 90% of 2005 emissions and be phased out linearly by 2029. Allocations to firms were not related directly to their output, although some provisions of the Act would have incentivised increased output (e.g. s81a made allocations conditional on continued operation while s81b provided for free allocations to new entrants). The 2009 Act increased the phase-out period for free allocations to 75 years. It also switched to an 'intensity-based scheme' for 'emissions-intensive, trade-exposed activities'. Permits are allocated to firms carrying out individual activities in proportion to their output and to a benchmark emissions-intensity defined for each type of activity.

That the NZ ETS might disadvantage New Zealand producers relative to their international competitors is a legitimate concern. Shifting of the existing or (more likely) new production to other countries with less stringent policies might have both economic and social costs for New Zealand, while reducing environmental effectiveness through emissions leakage.[4] However, many modelling studies (e.g. Graichen et al., 2009) and recent empirical evidence from the EU ETS suggest that such concerns are often exaggerated. The levels and forms of free allocation in the first phases of the EU ETS have been widely criticised as excessive, leading to billions of euros of windfall profits for electricity generators (Point Carbon, 2008) and *increase* of emissions-intensive EU exports. In the context of the NZ ETS, Kerr and Zhang (2009) find that large changes in land use or intensity are unlikely to result at a price of NZ\$25/t$CO_2$e. They argue that international emissions leakage from New Zealand agriculture may be relatively limited, and that preventing loss of output through free allocations may be excessively costly, especially if other negative environmental impacts of agriculture in New Zealand (e.g. on water quality) are accounted for.

In theory, the best way to address these concerns would be to impose comprehensive border adjustments, imposing an emissions cost on imports and removing the emissions cost from exports. However, calculating the required adjustment rates for specific goods (especially imports) would be difficult and costly, and their design would be severely constrained by the international trade law (e.g. van Asselt and Biermann, 2007). In this context, output-based allocations may be a more effective means of reducing competitive disadvantage and associated emissions leakage (Fischer and Fox, 2007, 2009). Greenhalgh et al. (2007) consider these two options in the specific context of the NZ ETS.

Granting free allocations means forgoing revenue from selling permits, by auction or other means. If net revenues were generated by the scheme, these could be 'recycled' to reduce distorting taxes, leading to a 'double dividend'. However, interaction of the ETS with pre-existing distortionary taxes will increase its economic costs (Bovenberg and de Mooij, 1994). The double dividend is qualified as 'strong' if the former effect outweighs the latter, or 'weak' if it does not. Bovenberg (1999) provides a review of the relevant theoretical literature. Both theoretical results and empirical studies of emissions taxes or trading schemes suggest that weak rather than strong double dividends should be expected. Strong double dividends may nevertheless be obtained if particularly distorting taxes are reduced. For example, in a study of carbon pricing in Switzerland, Felder and Van Nieuwkoop (1996) find strong double dividends when high marginal tax rates are reduced.

We assume that 'fiscal neutrality' of the NZ ETS means that there will be no revenues to recycle. However, it is unclear from official documents (e.g. Emissions Trading Scheme Review Committee, 2009) if or how the government has determined that this will actually be the case. Moreover, forgoing potentially significant revenues from the NZ ETS potentially conflicts with the government's stated interest in pursuing substantial tax reforms to increase economic productivity and growth (Dunne, 2009).

While there have been four general equilibrium modelling studies published since 2007, only NZIER (2008) considers the current situation in which substantial free allocations will be maintained in the long term (2025). In studies conducted for the government's Emissions Trading Group, Infometrics (2007, 2008) models output-based allocation only in the shorter term (2011/12) while most recently, NZIER and Infometrics (2009) assess the impacts of different levels of obligation and international emissions trading under full auctioning.

These previous studies of the NZ ETS give little consideration either to the scheme's interaction with pre-existing distortionary taxes or to the gains or losses associated with more or less efficient use of net auction revenues. The scope of gains from revenue recycling is in fact very limited in the Infometrics model, because it assumes fixed long-run supply of both capital and labour. In the NZIER model, long-run labour supply is fixed, but long-run capital supply adjusts to meet an exogenously fixed rate of return. However, the NZIER studies do not consider preferential lowering of taxes on capital income.

In this paper, we examine the effects on the New Zealand economy of different rates of output-based allocation to emissions-intensive trade-exposed industries within a comprehensive ETS open to international emissions trading. We account for the fact that net revenue from auctioning permits may be recycled more or less efficiently or, if free allocation is excessive, existing distorting taxes will have to be increased. These policies reflect the broad emissions coverage (ca. 2020) of the NZ ETS and (somewhat more loosely[5]) its provision for free allocations linked to output. Our aim is not to provide a specific assessment of the NZ ETS or specific design changes, but to highlight in more general terms important trade-offs that merit more extensive analysis and policy consideration.

We assess the macroeconomic impacts of the modelled policies using a large-scale CGE model: the New Zealand Climate Economics Model (NZCEM). NZCEM is comparable in many respects to the aforementioned CGE models, but includes a labour–leisure choice of households, unemployment and a long-run elastic supply of capital (via changes in the level of foreign investment). It also includes a more detailed treatment of land-based production. We focus on effects of the policies in 2020. This has become a milestone year in the context of international climate negotiations and, in that context, represents the 'mid-term': substantial international progress may be made, but a high degree of international harmonisation of mitigation policies is unlikely. In the context of domestic adjustment to the introduction of the NZ ETS, we may generally consider it the 'long term'.

[4] International emissions leakage is defined by the UNFCCC as "That portion of cuts in greenhouse-gas emissions by developed countries – countries trying to meet mandatory limits under the Kyoto Protocol – that may reappear in other countries not bound by such limits. For example, multinational corporations may shift factories from developed countries to developing countries to escape restrictions on emissions." (http://unfccc.int/essential_background/glossary/items/3666.php)

[5] At the time of writing (February 2010), eligibility for intensity-based allocations and emissions intensity benchmarks for different activities in the NZ ETS had not been defined.

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