

Woolly figures

An analysis of the Treasury's modelling of emissions from sheep and cattle

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Introduction

Agricultural emissions will be excluded from the initial stage of the Rudd Government's proposed CPRS, but the government proposes a review of this situation in 2013, and is disposed to include the agriculture sector in the scheme by 2015. The inclusion of agricultural emissions in the CPRS is likely to affect the sector significantly, requiring the modification of farm practices, management techniques and, in some cases, the cessation of operations. The purpose of this paper is to analyse Treasury's modelling of the likely impact of the CPRS on the agricultural sector to highlight a number of its more implausible assumptions and results. The paper relies on unpublished modelling details obtained from Treasury under the *Freedom of Information Act 1982* (FOI Act) to highlight the fact that the impacts of the CPRS on the agriculture sector are likely to be much greater than has previously been suggested.

Agriculture and the CPRS

The object of the CPRS is to ensure that Australia's international mitigation target is achieved at least cost. To do this, it will provide firms, including farms, with a price signal to encourage them to reduce their greenhouse gas emissions. The more firms can reduce their emissions, the fewer permits they will need to purchase and the lower the cost will be to their enterprises.

An understanding of how firms and consumers are likely to respond to the introduction of a carbon price is essential to forecasting the impacts of the CPRS. For certain sectors of the economy, the impacts will be small because firms will be able to pass costs on to consumers without significantly affecting demand. In other cases, the impacts could be significant. Undoubtedly, certain industries will suffer adverse effects and shrink as a result of the introduction of a carbon price but this is the intention of the scheme—production practices and demand should shift in order to lower the emissions from the economy as a whole.

The agriculture sector is a significant source of greenhouse gases in Australia, accounting for 15 per cent of total national emissions in 2007. One of the main reasons emissions are so high in the sector is that large amounts of methane, a particularly potent greenhouse gas, are produced as a result of the digestive processes of ruminants such as sheep and cows. In its current formulation, the CPRS proposes that greenhouse gas emissions from the agriculture industry will be covered from 2015.

If this occurs, the amount of greenhouse gas emissions from each farm will need to be measured and farmers will be required to purchase one emissions permit for each tonne of greenhouse gases (carbon dioxide equivalents) attributable to their farm. The price of these permits will be determined by the market, making it impossible to forecast accurately the exact cost of permits to individual farms, even if farmers knew what their current level of emissions were.

In 2008, Treasury undertook economic modelling to investigate how the CPRS would affect the economy. Part of this involved looking at the likely response of the agriculture sector.

Treasury modelling of the impact of the CPRS on agriculture

In order to assist the Rudd Government to select the appropriate emissions reduction targets on which to base the CPRS, the Australian Treasury was tasked with using macroeconomic modelling to estimate the likely effects. This modelling has been described by the government as follows:

The Treasury has conducted one of the largest and most complex economic modelling projects ever undertaken in Australia. This report investigates the potential economic impacts of reducing emissions over the medium and long term. It spans global, national and sectoral scales, and looks

at distributional impacts, such as the implications of emission pricing for the goods and services that households consume.¹

The inherent limitations of the modelling process are described by Treasury as follows:

No single model adequately captures all four dimensions. Previous Australian studies of climate change mitigation policy typically focused on one in isolation from the others. This report uses a suite of models that together span global, national, sectoral and household scales to provide an integrated set of projections across all four dimensions.²

Treasury relied on a number of Computable General Equilibrium (CGE) models for its modelling, stating:

The Treasury's climate change mitigation policy modelling is centred on three top-down, computable general equilibrium (CGE) models developed in Australia: Global Trade and Environment Model (GTEM); G-Cubed model; and the Monash Multi-Regional Forecasting (MMRF) model. These CGE models are whole-of-economy models that capture the interactions between different sectors of the economy. GTEM and G-Cubed are models of the global economy; whereas, MMRF is a model of the Australian economy with state and territory level detail.³

However, in relation to the impact of the CPRS on agriculture, it is important to note that Treasury goes on to say:

Sectors other than electricity, transport and land use change and forestry were modelled within the CGE models. Assumptions about mitigation options for these sectors were informed by historical data, stakeholder consultations and literature reviews.⁴

Put simply, the above quotation states that the Treasury did not conduct any detailed modelling for sectors other than electricity, transport, land-use change and forestry. Instead, it relied on 'historical data, stakeholder consultations and literature reviews' to estimate the likely impact of the CPRS on sectors such as agriculture. In the absence of any other information, such an approach might be justified, but it is important to highlight the circularity of the claims being made about the CPRS modelling. On the one hand it is claimed to be 'one of the largest and most complex economic modelling projects ever undertaken in Australia' yet, at the same time, its authors are admitting that they have relied on what patchy information already exists for most of the economy.

The question that must be asked, however, is exactly what information did Treasury rely on in its efforts to determine the likely impact of the CPRS on the agriculture sector, given that:

- there is no historical data on the impact of the CPRS on the Australian agriculture industry
- few, if any, stakeholders would have any idea how their farms would respond to an as yet nonexistent emissions trading scheme for agriculture

1 Australia. Treasury, *Australia's low pollution future—the economics of climate change mitigation: Summary*, Commonwealth of Australia, Canberra, 2008, p. iv. Available at: http://www.treasury.gov.au/lowpollutionfuture/summary/downloads/Australias_Low_Pollution_Future_Summary.pdf

2 Australia. Treasury, *Summary*, p. 12.

3 Australia. Treasury, *Summary*, p. 12.

4 Australia. Treasury, *Australia's low pollution future—the economics of climate change mitigation: Report*, Commonwealth of Australia, [Canberra] 2008. Available at: <http://www.treasury.gov.au/lowpollutionfuture/default.asp>

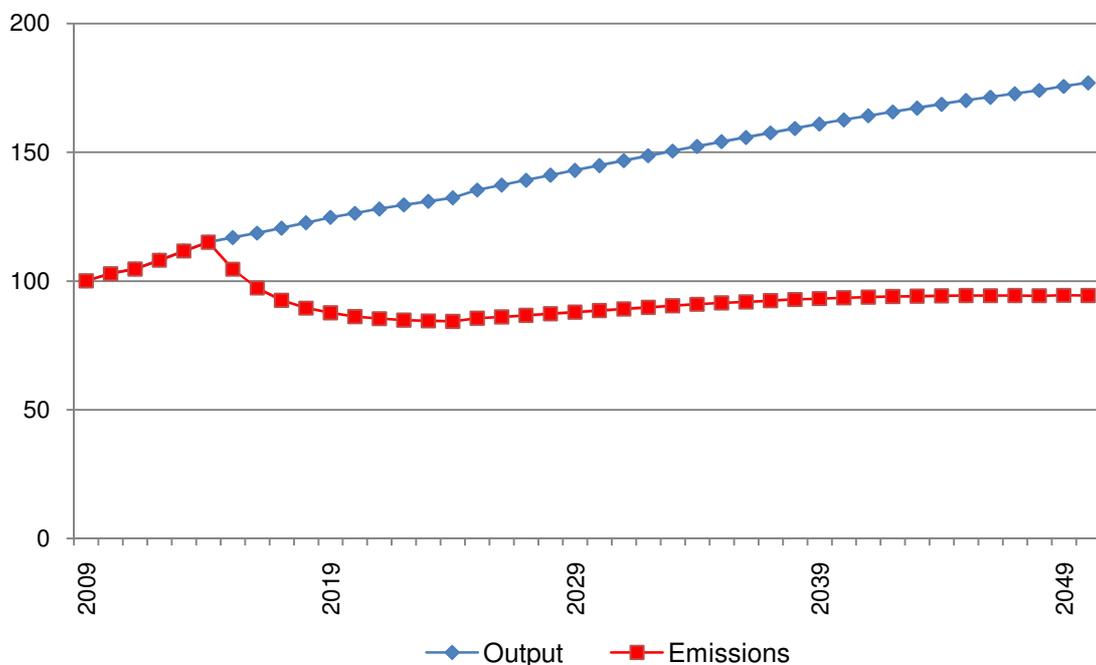
- there is virtually no academic literature on the impacts of this non-existent scheme.

Treasury's forecast of the impact of the CPRS on agriculture

While it is unclear exactly how it has done so, Treasury has produced detailed estimates of the likely impact of the CPRS on all Australian industries, which it has published selectively.⁵ However, The Australia Institute has obtained the detailed results for all industries under the FOI Act.

Figure 1 shows Treasury projections of the levels of output (production) and greenhouse gas emissions from Australia's sheep and cattle industry. The data are derived from the modelling results obtained from the Treasury and have been converted into index numbers to allow for easy comparison.

Figure 1: Sheep and cattle output compared with emissions, 2010–2050



Source: Treasury, Modelling of the CPRS—15 scenario obtained under FOI

As Figure 1 shows, according to Treasury estimates the level of output from sheep and cattle is expected to rise steadily between now and 2050; indeed, it is expected to rise by around 50 per cent by 2030. However, as Figure 1 also shows, over the same period the total level of greenhouse gas emissions from the sheep and cattle industry is expected to fall in absolute terms. As soon as the CPRS is introduced, the amount of methane per animal begins to fall sharply, with emissions declining by around 40 per cent between 2015 and 2020 and continuing to fall steadily but more slowly until 2050, by which time the introduction of a carbon price is assumed to have lowered the emissions per animal by around 50 per cent.

⁵ Australia. Treasury, *Report*.

Treasury is silent on the scientific or animal husbandry processes that may account for this feat but its significance should not be understated. Due to the assumed existence of 'low emission sheep and cattle', the Treasury modelling allows the size of the agriculture industry to continue to rise steadily while its emissions fall.

Although economists typically place great faith in the capacity of price signals to motivate behavioural change among human beings, it is unusual to do so where the adaptation capacity of animals is concerned. The most obvious way for farmers to respond to the price signals associated with the CPRS is to breed fewer animals but, as Figure 1 shows, the modelling assumes that farm output will rise steadily after the CPRS is introduced.

Conclusion

Agricultural emissions are a significant source of Australia's greenhouse gas emissions and well-designed policy instruments are required to reduce them over time efficiently and equitably. That said, the CPRS does not appear to be either equitable or efficient. Further, the Treasury modelling of the likely impact of the CPRS on sheep and cattle emissions is simply implausible.

In order to better inform the upcoming parliamentary debate on the CPRS, the government should answer the following questions:

- Does the government believe that the number of cattle and sheep in Australia can continue to rise while greenhouse gas emissions from those animals fall?
- What scientific or animal management practices are assumed to lead to a 40 per cent reduction in emissions per animal by 2020?
- If farmers cannot reduce the emissions per animal by the levels assumed by Treasury:
 - ❖ what will the impact of the CPRS be on the output and profitability of the agriculture industry?
 - ❖ will the government stand by the claim that the modelling is 'one of the largest and most complex economic modelling projects ever undertaken in Australia'?