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Delayed Carbon Policy Certainty and Electricity Prices in Australia: A Concise Summary of Subsequent Research*

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In this brief update on analysing the economic costs associated with carbon policy uncertainty, we outline the public policy processes commenced by the Commonwealth Government following the publication of Nelson *et al.* (2010). We also summarise the research completed by other economists testing the hypothesis that there are material economic costs associated with ongoing carbon policy uncertainty. Independent studies by Frontier Economics (2010), Deloitte (2011) and Sinclair Knight Merz (2011) all conclude that climate change policy uncertainty will result in sub-optimal capital investment within the electricity sector. In turn, this sub-optimal investment will manifest itself in unnecessary increases in electricity prices.

Keywords: carbon tax, policy uncertainty, decision making, electricity prices.

1. Introduction

In 2010, the Australian Commonwealth Government was not able to implement a key 2007 election commitment relating to the introduction of a greenhouse gas emissions trading scheme. The legislation underpinning the scheme was passed by the House of Representatives but rejected by the Senate. The bi-partisan support that existed in relation to introducing an emissions trading scheme during the 2007 Commonwealth election had evaporated. Furthermore, the 2010 Commonwealth election was characterised by bi-partisan support for a broad public policy objective (reducing Australian greenhouse gas emissions by 5 per cent by 2020) but very different views emerged on the policy levers needed to achieve such an objective.

In Nelson *et al.* (2010), the authors argued that carbon policy uncertainty imposes material economic costs on society as a result of sub-optimal investments in new electricity-generation capacity. Modelling of electricity markets concluded that a three-year delay in the provision of carbon policy certainty would result in higher electricity costs of AUD 2.1 billion per annum or AUD 8.60 per megawatt hour in 2020. In this short note, we outline the industry and policy-maker reactions to this paper during the 2010 Commonwealth election, and the broader public policy

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response. We also summarise the research completed by other economists testing the hypothesis outlined in Nelson *et al.* (2010). This short note is structured as follows: Section 2 summarises the original research of Nelson *et al.* (2010); Section 3 outlines the public policy response during and after the 2010 Commonwealth election; Section 4 provides a summary of economic research completed since the publication of Nelson *et al.* (2010) in *Economic Papers*; and Section 5 provides concluding remarks.

2. Summary of Nelson *et al.* (2010)

In Nelson *et al.* (2010), it was argued that there is effectively a binary decision facing investors in new baseload and intermediate power-generation capacity: combined cycle gas turbines (CCGT) or conventional coal-fired generators. The lack of policy certainty in relation to climate change policy effectively prevents firms from investing in either of these options. However, to ensure the security of supply, firms are likely to minimise capital at risk and invest in plant with the lowest capital cost: open-cycle gas turbines (OCGT). This is despite OCGT plant having a materially higher long-run marginal cost than either CCGT or conventional coal plant.

Utilising a National Electricity Market (NEM) simulation model, the study established that delaying the provision of policy certainty by three years would result in firms investing too heavily in OCGT plant. The manifestation of this sub-optimal capital investment is a significant increase in wholesale electricity prices – up to AUD 8.60 per megawatt hour. The study established that the introduction of Renewable Energy Targets and energy efficiency measures could significantly reduce this largely deadweight loss cost to society.

3. Public policy response to Nelson *et al.* (2010)

Since its publication, this research into the costs of policy uncertainty had a surprisingly large influence over the development of climate change policy, being regularly referenced by Australia's key policy-makers. The Prime Minister of Australia, Julia Gillard, has made reference to the key findings of the research (the ''investment paralysis'' in the generation sector, and the AUD 2 billion per annum that ongoing regulatory uncertainty will cost the economy by 2020) in a number of speeches and policy launches, including the introduction of new emissions standards for coal-fired power stations (Gillard, 2010). The Minister for Climate Change and Energy Efficiency, Greg Combet, referenced the research in his keynote address at the 2010 Carbon Expo (Combet, 2010), as did Australia's Treasurer Wayne Swan in an editorial published in *The Age* newspaper in November 2010 (Swan, 2010). A leading regulatory economist published an editorial supporting the thesis of the research (Keating, 2010) and it was a key thematic of the Australian Industry Group's report *Energy Shock: Confronting Higher Prices* demonstrating the wider relevance of the research to the Australian economy (Australian Industry Group, 2011).

Furthermore, the publication of the research (and the associated media coverage) prompted an independent review of investment activity in the Australian electricity-generation sector. In February 2011, the Minister for Resources, Energy and Tourism established an Investment Reference Group (IRG) comprised of government and private-sector representatives to investigate the key issue explored in the research, namely that investment in the sector is being adversely affected by ongoing policy uncertainty. The Terms of Reference required the Group to ''examine whether an ongoing delay or uncertainty around the introduction of a carbon price is causing delay or economically sub-optimal outcomes in investment in electricity generation plant needed to meet anticipated demand'' (Investment Reference Group, 2011a). Importantly, the Group found that policy uncertainty is indeed contributing to sub-optimal outcomes (Investment Reference Group, 2011b).

4. Summary of Subsequent Research

Since the publication of Nelson *et al.* (2010) in *Economic Papers*, three quantitative studies have been published which seek to test the hypothesis that carbon policy uncertainty will lead to higher costs associated with sub-optimal electricity-generation investment:

Table 1. *Summary of Carbon Policy Uncertainty Research*

Study	Core scenario additional costs in 2020	Core scenario higher wholesale electricity prices
Frontier Economics	N/A	AUD 3.40/MWh
Deloitte	AUD 2 billion	AUD 5/MWh
Sinclair Knight Merz	AUD 1 billion	AUD 6/MWh

- Frontier Economics (2010) utilised a linear programming economic model of the NEM known as WHIRLYGIG to estimate the costs associated with carbon policy uncertainty, but expanded the analysis to include sunk investments
- Deloitte (2011) utilised a proprietary economic model of the Australian electricity industry known as Long Term Model to estimate the costs of carbon policy uncertainty. This modelling was commissioned as part of the IRG process outlined in Section 2
- Sinclair Knight Merz (2011) utilised a sophisticated economic model of Australian electricity grids known as Strategist to provide estimates of the costs of policy uncertainty for the Investor Group on Climate Change.

Table 1 outlines the most basic findings of the studies completed by Frontier Economics, Deloitte and Sinclair Knight Merz.[4] Importantly, all of the studies demonstrated that there are non-trivial economic costs associated with sub-optimal investment in electricity generation as a result of carbon policy uncertainty. This is likely to manifest itself through higher electricity prices with estimates of between AUD 3.40 and AUD 6 per megawatt hour produced by these studies. In an extension of the carbon uncertainty concept, Sinclair Knight Merz (2011) also estimated that, in addition to the AUD 1 billion in costs associated with suboptimal capital investment, around AUD 3 billion in higher costs would be incurred due to the costs associated with higher emissions.[5]

5. Conclusion

This paper has outlined the public policy response to the arguments and quantitative evidence presented in Nelson *et al.* (2010). Importantly, the three quantitative studies completed by leading economic modelling firms, testing the hypothesis that there are significant economic costs associated with sub-optimal investment in electricity generation as a result of carbon policy uncertainty, all found that the costs of policy uncertainty are significant.

The studies summarised in this paper have added to the literature in relation to how economists can measure the costs of uncertainty in electricity markets. There are two areas that the authors believe further research is warranted: examining whether other capital intensive industries are similarly making sub-optimal investment decisions as a result of carbon policy uncertainty; and analysis on whether the various types of uncertainty costs (such as sub-optimal capital investment, higher emissions and financing spreads) estimated by researchers are cumulative or overlapping.

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[4]The results presented in this paper are a very basic summary of complicated economic modelling. The results summarised provide a representative view on the overarching findings of the studies.

[5]Sinclair Knight Merz noted that Simshauser and Nelson (2011) have presented additional costs associated with carbon policy uncertainty in relation to capital market efficiency losses but did not include these in the modelling completed.

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