

# ***MEASURING PASS-THROUGH RATES OF CARBON COSTS ON AUSTRALIAN ELECTRICITY PRICES***

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## **Overview**

The previous Australian government aimed to strengthen its position as an international leader in the development of environmental markets by introducing the Carbon Pricing Mechanism (CPM) in July 2012. Stationary energy in Australia is the largest source of CO<sub>2</sub> at around half of total emissions, of which more than two-thirds come from electricity generation (i.e. electricity generation accounts for 35% of all CO<sub>2</sub> emissions in Australia). In the confines of the Australian wholesale electricity market, the intention behind imposing a price on carbon was to encourage producers to switch away from coal-fired generation and move to gas and renewable sources of energy. However, the coincidence of increases in power prices with the implementation of the CPM in Australia has raised concerns about the effectiveness of the CPM policy in encouraging the substitution of current methods of power generation with low-carbon-intensive technologies. Therefore, the new government (Liberal-National coalition) plans to repeal the CPM after 30 June 2014 (Clean Energy Regulator, 2013). This paper assesses the CPM's performance and its impact on wholesale electricity prices. More specifically, it evaluates the extent to which the increase in electricity prices can be attributed to the pass-through of the costs of carbon to consumers; the so-called "carbon costs pass-through rate" (CPTR). The contribution of this paper is to statistically estimate the CPTRs by employing an empirical analysis using econometric evidence from the National Electricity Market (NEM) during the period July 2010 to December 2013. Hence the paper undertakes one of the first evaluations of the CPM and fills a vital research gap around design issues in environmental markets in Australia.

## **Methods**

The degree of the carbon pass-through rates are influenced by a range of factors, such as electricity supply and demand elasticities, the market structure, emissions intensity of the existing capital stocks, the availability of low carbon emissions substitutes and technologies, changes in the merit order, the availability of international credits, and the extent of government assistance. The hypothesis of this paper is that carbon costs are passed on fully to electricity prices within the NEM. In contrast to the very few existing studies in Australia that address a similar issue by using simulation analysis (Wild et al., 2012; Simshauser and Doan, 2009; ROAM Consulting, 2008; McLennan Magasanik Associate, 2008), in order to statistically test this hypothesis the paper adopts an empirical approach and a "let the data speak for itself" modelling philosophy. The empirical investigation employs a sequence of econometric tests and a time-varying parameter model to estimate the carbon pass-through rates. The study uses volume-weighted hourly data for the electricity spot market (calculated based on real-time trading data) for each regional market across the NEM individually from July 2010 to December 2013. In order to examine the dynamic interaction among electricity, fossil fuel and carbon markets, all prices are transformed and expressed in A\$/MWh by using the daily observations for volume-weighted emission intensities, the standard energy conversion, energy densities and thermodynamic efficiency rates.

## **Expected Results**

The findings reveal that not only are carbon costs fully passed on to wholesale electricity prices but also in some Australian states the degree of the pass-through is greater than unity, resulting in higher electricity prices for consumers. Therefore, the results are consistent with the hypothesis of the paper that in the short-run consumers rather than generators are bearing the incidence of the carbon costs. These findings corroborate those of Wild et al. (2012), who use simulation analysis to investigate the impact of carbon prices on electricity prices. Their results show that there is a strong relationship between electricity and carbon prices. However, these findings can be contrasted to the results produced in Nelson et al. (2010) who find that the rate of pass-through is likely to have an immaterial impact on electricity prices relative to other electricity price drivers.

## Conclusions

The extent of the estimated CPTRs for all states considered in this study reveal that the implementation of the CPM could lead to windfall profits for carbon-intensive generators and thus, it would be unlikely to result in displacement of coal by existing renewable or gas generators. Therefore, this analysis undermines the government financial assistance (introduced by the previous government) to power generators as compensation for the introduction of a carbon price in Australia. Furthermore, the evidence on the degree of the pass-through indicates that if there is a transition to an emission trading scheme (under the new government) applying the grandfathering method (free allocation of allowances), it could increase the potential for windfall profits. In this regard, the full auctioning of permits would be a better policy option.

## References

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