THE EFFECTS OF THE CARBON PASS-THROUGH COST ON ELECTRICITY PPRICES IN AUSTRALIA

Overview

The purpose of this study is to assess the impacts of the newly introduced Carbon Pricing Mechanism (CPM) in Australia on electricity prices. This paper aims to undertake a first evaluation of the CPM and fill a vital research gap on market design issues of environmental markets. It will answer this question: what are the pass-through costs of carbon in electricity markets? Using econometric techniques, it evaluates these costs.

Australia has the highest polluting electricity sector of all OECD countries, because of the availability of low-cost coal. Currently only around 15 per cent of Australia's electricity is produced by gas-fired generation and renewable resources account for around 8 per cent of Australia's power supplies (Productivity Commission Submission, 2011). In order to improve price competitiveness of the presently expensive low carbon technologies, and thus slow the pace of climate change, Australia has introduced the Carbon Pricing Mechanism (CPM) in July 2012. From theoretical point of view, in a competitive market, imposing a price on carbon emissions will lead to an increase in the cost of fossil fuel combustions. In turn, the higher prices should diffuse throughout the economy resulting in a wide range of adjustments towards low carbon technologies.

Although there is consensus that carbon pricing is required to support lower carbon emissions technologies in electricity sector a debate remains on the degree of carbon pass-through (the extent to which the proportion of carbon prices can be passed through into electricity prices). The degree of carbon pass-through is influenced by a number of factors such as: supply and demand elacticities, emissions intensity of the existing capital stocks, the availability of low carbon emissions technologies, the availability of international credits, and market structure (Reinaud, 2007; Chen et al., 2008; Chernyavs' ka and Gulli, 2008; Freebairn, 2008; Sijm et al., 2008; Menezes et al. 2009; Kim et al., 2010; Nelson et al., 2010; Sijm et al., 2010). According to the 2011 Treasury Report, each dollar of the carbon price can add around 85 Cents to wholesale electricity prices. Moreover, the 2011 Australia's Climate Change Plan report indicates that a $23 carbon price is expected to increase electricity prices by 10 per cent over the first five years of the scheme or $3.30 per week on average across households. However, there are some concerns that electricity generators could "double dip" on carbon prices and charge consumer excessively for the carbon price. This paper investigates the issue.

The findings will significantly support policymakers to make better regulatory decisions when designing an environmental market to deliver emissions reductions in the most cost-effective way. More specifically, based on the observed pass-through costs, the paper will develop recommendations for policy and government stakeholders with respect to regulations on carbon-pass through costs and the performance and efficiency of the CPM.

Methods

This paper provides a pioneering study on the performance of the CPM in Australia based on empirical data. So far mainly simulation studies have been undertaken to estimate ex-ante the impact of the Australian CPM on electricity prices (e.g. Treasury) while empirical work on market performance and pass-through costs is restricted to the EU ETS (e.g. Benz and Trueck, 2009; Fezzi and Bunn, 2009; Nazifi and Milunovich, 2010). This study will be **the first ex-post study using available data** after the introduction of the CPM.

To assess the performance of the Australian CPM, data from regional Australian electricity spot and futures markets will be analysed in order to derive estimates for the cost pass-through. This involves the development of appropriate models for electricity spot prices and futures risk premiums in Australian electricity markets as a first step. Based on these models, in a second step the 'carbon premium' i.e. the increase of electricity prices as a result of the new CPM will be calculated. The resulting increase based on observed spot and futures prices will be compared to the theoretical increase in costs for producers based on emission intensities for electricity production in the considered regional markets. The obtained results for wholesale markets will also be compared to the actual increase in electricity prices that retailers pass on to households and industries.

Expected Results

The primary result shows that after controlling for risk premiums in electricity futures markets, there is still a significant anticipated increase in prices, indicating that market participants have already included the additional costs of the carbon price in their pricing mechanism. However, estimated pass-through costs of carbon are generally lower than what could be expected based on emission intensities for the considered regional electricity markets.

References

Australia's Climate Change Plan (2011) "The implications for Business", Available at: http://www.kpmg.com.au.

Benz, E.; Trück, S. (2009) "Modelling the price dynamic of CO2 emission allowances", Energy Economics 31(1): 4-15.

Chen, Y., Sijm, J., Hobbs, B., and Lise, W. (2008) "Implications of CO2 emissions for short-run electricity market outcomes in northwest Europe", *Journal of Regulatory Economics*, 34: 251-281.

Chernyavs' ka, L., and Gulli, F. (2008), "Marginal CO2 cost pass-through under imperfect competition in power markets", *Ecological Economics*, 68: 408-421.

Fezzi, C. and Bunn, D. (2009) "Structural interactions of European carbon trading and energy prices", *The Journal of Energy Markets*, 2(4): 53-69.

Freebarin, J. (2008) "The carbon pollution scheme and electricity: generator claims for compensation", Monash Symposium 2008, available at: http://energy.unimelb.edu.au/uploads/publications/John%2Freebairn.pdf

Kim, W., Chattopadhyay, D., and Park, J. (2010) "Impact of carbon cost on wholesale electricity price: A note on price pass-through issue", *Energy*, 35: 3341-3448.

Menezes, F., Quiggin, J., and Wagner, L. (2009) "Grandfathering and greenhouse: the role of compensation and adjustment assistance in the introduction of a carbon emissions trading scheme for Australia", *Economic Paper*, 28(2): 82-89.

Nazifi, F., and Milunovich, G. (2010) "Measuring the impact of carbon allowance trading on energy prices", *Energy & Environment*, 21(5): 367-383.

Nelson, T., Orton, F., and Kelley, S. (2010) "The impact of carbon pricing on Australian deregulated wholesale electricity and gas markets". Working Paper No. 23, *AGL Applied Economic & Policy Research*, March 2010.

Reinaud, J. (2007) "CO2 allowance & electricity price interaction. Impact on industry's electricity purchasing strategies in Europe", *IAE Information Paper, International Energy Agency*.

Sijm, J., Hers, I., Lise, W. and Wetzelaer, W. (2008) " The impact of the EU ETS on electricity prices. Final report to DG Environment of the European Commission", *Energy Research Centre of the Netherlands*.

Sijm, J., Chen, Y. and Hobbs, F. (2010) "The impact of power market structure on CO2 cost pass through to electricity prices under quantity competition: a theoretical approach", *Energy Economics*.

Garnaut, R. (2008) "Garnaut climate change review report", Available at: http://www.garnautreview.org.au.

Productivity Commission Submission (2007), Productivity commission submission to the Prime Ministerial Task Group on Emissions Trading, Commonwealth of Australia 2007

Treasury Report (2011) "Strong growth, low pollution, modelling a carbon price". Commonwealth of Australia 2012.