

Evaluating Carbon Price Induced Inflation Using the National Accounts

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Overview

If a carbon price levied on fossil based energy is passed through the supply chain to final demand, one might expect the price of products that either directly or indirectly require fossil fuel inputs to also rise. The recent introduction of the *Clean Energy Act* in Australia provides a narrow window of opportunity to model such effects under *ex-ante* conditions. Taking a birthday cake as a representative example, this paper aims to reveal the supply chain contributions to the carbon price induced inflation on a product using real world policy settings. The method is based upon economic input-output analysis using make and use data from Australia's National Accounts as well as National Greenhouse Gas Inventory data, both of which are publicly available. The model is conservative in that it assumes full pass through of carbon costs to final demand, no greenhouse gas (GHG) abatement and no substitution towards untaxed imports in reaction to carbon pricing, all of which might tend to lower the rate of carbon price induced inflation. Results estimate the carbon price inflation on a birthday cake to be 0.38 per cent at \$23/tCO_{2e} in the first year of the scheme. This compares to a carbon price induced inflation rate of 0.67 per cent for the Gross Domestic Product (GDP) price deflator in the first year of the scheme. In the subsequent two years of the scheme the carbon price induced inflation on both products is estimated at near zero, this despite the carbon price rising at 2.5 per cent per annum in real terms.

Methods

The period of analysis is FY2011-12 to FY2013-14, which corresponds to the fixed price period of the *Clean Energy Act 2011*. The method uses economic input-output analysis with emissions factors based on historical data. This is conducted within a make and use framework under an industry-technology assumption. Economic activity data were sourced from the Australian Bureau of Statistics Input-Output tables 2005-06. Australian 2006 GHG emissions data by economic sector were sourced from the Australian Greenhouse Emissions Information System within the Department of Climate Change.

Emission factors were developed in terms of carbon dioxide equivalence (CO_{2e}) per dollar of economic activity. An assumption was made that emissions occurred 6 months after economic activity. Standard United Nations Framework Convention on Climate Change accounting rules were used for the Global Warming Potential conversion of greenhouse gasses to CO₂ equivalence. A policy coverage filter was applied so that uncovered sectors would not incur a carbon liability. Emissions from covered sectors were multiplied by a carbon price. To bring the analysis to 2005-06 prices, the carbon price was adjusted by a ratio of the 2005-06 GDP deflator with a simple time series forecast of future GDP deflator ratios.

A birthday cake was represented by modelling \$100 of final demand in the most relevant disaggregated commodity sector and \$0 of final demand in all other sectors. Unit GDP was represented by multiplying the 2005-06 final demand vector by the inverse of the sum of its elements. An assumption of stability in the direct requirements matrix was assumed between 2006 and 2012. It was also assumed that the CO_{2e} intensity of economic activity between 2006 and 2012 remained stable.

The algorithms were written using the 'R' software package and some results were plotted using excel.

Results

Results are discussed and presented in both graphical and tabular formats. Graphical formats provide the distribution of carbon price induced inflation through the supply chain in terms of either ANZSIC 93 sectors or ANZSCC 93 commodity sectors. Tables show the main results in terms of the carbon price induced inflation rate for a birthday cake and for the GDP price deflator.

Results on a birthday cake were 0.38 per cent at \$23/tCO_{2e} in the first year and near zero in the two subsequent years of the scheme with a carbon price rising at 2.5 per cent per annum in real terms. The Gross Domestic Product (GDP) price deflator was estimated to rise at 0.67 per cent because of carbon pricing in the first year of the scheme, and near zero in the subsequent two years of the scheme.

Conclusions

Under Australian policy settings the electricity sector dominates as the supply chain source of carbon price induced inflation, both for the birthday cake example and for the GDP price deflator. This applies to both direct purchases of electricity and to indirect passing on of electricity costs through the supply chain to final demand. However, while the distribution of supply chain contribution to carbon price induced inflation is heavily skewed towards this one sector, its overall magnitude for the representative products chosen appears rather modest. Given the conservative nature of this analysis, it may be concluded that consumers will be unlikely to feel the impact of carbon pricing on products other than direct purchases of electricity and possibly natural gas for domestic consumption. The price impact will be essentially a one-off phenomenon felt in the first year of the scheme, with minimal impact in subsequent years.

References

Below is a sample of the reference list:

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