Carbon Pricing

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Summary

Placing a price on carbon, either as a tax or via a tradable permit scheme, is the most cost effective way to reduce greenhouse gas pollution. A tax mix change package in which the government revenue windfall gain is returned to households as increases in social security payments and a reduction in income taxation would be even better.

While the carbon price initially will be paid by about 1000 businesses producing petroleum products, electricity and some other manufactures, the higher production costs are passed on to other businesses and ultimately to households. By increasing the relative prices of carbon intensive products and production processes the carbon price provides the incentives and the rewards for all businesses and households to find the least cost ways of reducing pollution. As a result, the structure of the economy will change to less carbon intensive ways and pollution. But, the aggregate level of employment and investment will be little changed. Government needs to explicitly and fully explain how the carbon price scheme would operate.

In choosing between a tax or a tradable permit scheme, the tax option is argued to have advantages. But, these advantages are of second order importance when compared with the relative inefficiency of regulations and subsidises for selected pollution reduction activites promoted by all sides of parliament.

Introduction and Context

This submission assumes that government aims to reduce greenhouse gas emissions in the most cost effective way. The arguments and debates for and against reducing Australian greenhouse gases pollution are not considered. The submission describes how a price on carbon would work to achieve this objective and some of its likely effects on the economy.

A carbon tax or a tradable permit scheme provide a mechanism to place a price on carbon to increase relative prices of the vast majority of carbon intensive products and production processes, and to provide incentives and rewards for R&D to reduce the carbon footprint. In turn, the changes in relative prices induce decision changes by businesses and households to reduce Australian carbon pollution. The relative price changes provide incentives and rewards for all businesses and households to search for the lowest cost ways of reducing pollution. Many of the low cost options are not known to governments and often will be discovered over time by the private sector.

A carbon tax or the auction of tradable permits in effect is an increase in indirect taxation and a revenue windfall to government. This effect can support the slogan "a great big tax on everything." I go on to argue that there are good reasons for a tax mix change package to return the revenue windfall as compensating payments to all households in the form of lower income taxes and higher social security payments, in what might be called "a big tax mix change." Such a revenue neutral package has similarities with the ANTS reform of 2000 where a new tax, the 10% GST, was used to replace the WST and some state indirect taxes, and to fund higher social security payments and across the board reductions in income tax rates.

The submission draws some comparisons of different policy options that have been considered to reduce greenhouse gas emissions. These include a carbon tax, a tradable permit scheme, some of the targeted regulations such as the renewable energy target scheme and cash for clunkers, and subsidies for selected activities such as solar energy and business energy saving measures.

Placing a Price on Carbon

In 2006, Australia's greenhouse gas emissions using the Kyoto Protocol accounting provisions were 576 million tonnes of CO2-equivalent. The main sources were

- Stationary energy, mostly electricity (of which 84% is coal, 9% gas and 7% hydro) of 270 Mt CO2-e
- Transport, mostly petroleum products, 75 Mt CO2-e
- Agriculture, 80 Mt CO2-e
- Fugitive emissions (waste dumps and mines), 40 Mt CO2-e

- Industrial processes (mostly steel and iron and cement), 30 Mt CO2-e

The combustion of fossil fuels to produce energy for electricity, manufacturing processes, transport and temperature control represents the dominant source, and about 70%, of Australian greenhouse gas pollution. If these polluter sources are to be taxed or to require pollution permits in a tradable permit scheme, the government White Paper (Department of Climate Change, 2008) estimates that it would directly affect about 1000 large businesses. Such a system would minimise costs of both government administration and taxpayer compliance costs.

The main source of greenhouse gas pollution omitted from the above proposal is agriculture. With current technology there are serious and costly issues of measurement. Even proxy measures such as the number of animals or animal product production would not provide incentives for changes in management and genetics to reduce pollution per animal. Also, the large number of small producers would require high administration and compliance costs.

A carbon or emissions tax directly places a cost on pollution produced. Because under a tradable permit scheme, such as the Carbon Pollution Reduction Scheme (CPRS), the aggregate number of permits will be less than current pollution, the permits have an opportunity or scarcity value which works much the same way as a tax. Then, both options place a new cost on the combustion of fossil fuels that generate pollution. The greater the pollution per unit output, the greater the additional cost and effective increase in indirect taxation per unit of output.

While only about 1000 businesses initially would be directly affected by the new charge for greenhouse gas pollution, all other businesses use electricity and petroleum products as business inputs. Then, as shown in Figure 1, the charge for pollution on the 1000 businesses flows through to all products and to the rest of the economy. Figure 1 also highlights the key decision points to reduce GHG pollution. Energy can come from the combustion of fossil fuels, including brown and black coal and gas, from renewables such as wind and geothermal, and from nuclear. Some of the energy is directly consumed by households, but most is used as a business or intermediate input and combined with labour, capital and natural resources for the production of

other goods and services consumed by households. For example, food purchased by you and I at the supermarket has embedded in it energy to produce fertilisers and to run machines by the farmer, energy to process the farm product and to transport it from farm to factory to supermarket, and energy used by the supermarket for refrigeration, air conditioning, lights and running computers. In 2006-07, 30 per cent of refined petroleum products consumed domestically went direct to households and the rest as intermediate inputs, and only 23 per cent of electricity was consumed directly by households (ABS catalogue 4604.0, 2009). As a result, even though the production of greenhouse gas emissions as a by-product of the combustion of fossil fuels to produce energy is concentrated in a relatively small part of the economy, most businesses and all goods and services consumed by households indirectly involve along their production chain energy and the production of greenhouse gas emissions pollution.

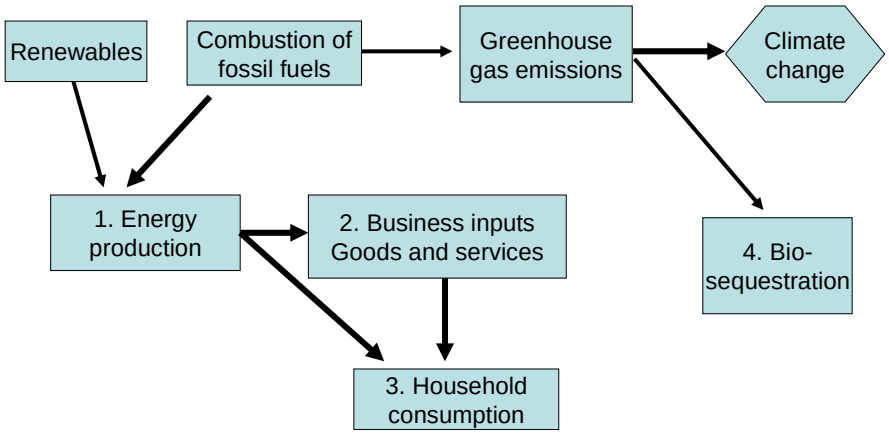

Figure 1: Energy in the Economy

Figure 1 highlights four sets of decision points for directly and indirectly reducing greenhouse gas emissions:

1. The choice of input and production method to produce energy demanded by households and businesses, e.g. brown coal, and then with or without carbon capture and sequestration, gas, solar, wind
2. The choice by businesses of input mix and production method affecting the energy component of goods and services produced, e.g. required transport, building insulation, machinery energy efficiency
3. The choice by households of the mix of goods and services consumed in terms of their relative energy intensity and source of energy, e.g. air conditioning levels, building insulation, solar versus grid hot water, electricity and heating/cooling, type of motor vehicle and distances travelled, building design
4. Decisions to sequest carbon, e.g. planting more forests, soil carbon bio-sequestration, algal farms.

Decisions also can be made to invest in R&D to find new and better products and production processes to reduce greenhouse gas emissions and climate change.

Incidence of Carbon Tax and Relative Price Changes

Although the statutory or initial incidence of a higher price on carbon, either a tax or the market price of tradable permits, falls on the about 1000 firms producing petroleum products and electricity, once the economy adjusts most of the new indirect taxes and explicit charges for pollution are passed on to households as higher prices. In particular, products which are carbon intensive and use carbon intensive production methods rise relatively more than products and production processes which are carbon extensive. To illustrate, the White Paper (Department of Climate Change, 2008), estimates for a permit price or tax of $25 per tonne of CO2-e in terms of choice options for household warming are price increases of

- Electricity of 18%
- Gas of 12%
- Clothing of < 1%
- An average basket of goods and services represented by the CPI of 1.1%.

This section explores the reasoning that households end up paying most of a tax or tradable permit scheme to place a price on carbon.

A carbon price increase on petroleum products would have a consumption or destination base. It would operate along the line of a comprehensive excise tax. Domestic production and imports would pay the charge, and exports would be refunded. Given that Australia is a price taker in a large global market for petroleum products, an Australian carbon price on domestic consumption of petroleum products would be fully passed forward to domestic household and business buyers. The conjecture that the petroleum products industry will pass forward 100% of a carbon tax or extra costs of purchasing tradable permits is supported by ABS and academic studies of incidence of the petroleum products excise (ABS, catalogue 6537.0 and Warren, et al., 2005), and would be consistent with ACCC inquiries into the pricing of petroleum products.

The Australian electricity generation industry is a non-traded industry with no exports or imports. Because electricity generation involves a non-storable product, and so time of day pricing varies with shifts in demand, and because it uses different technologies in terms of carbon intensity, ease of varying output over a day and different costs, the extent to which higher production costs associated with a carbon tax are passed forward to consumers is uncertain. If coal was always the marginal producer, then under current pricing arrangements 100% of extra costs of coal-fired electricity would be passed forward to consumers for all electricity. If gas is the marginal producer and coal is an inframarginal producer, as occurs with some peak pricing, the extra cost for gas-fired electricity would be passed on to buyers; and here the price increase would not compensate the extra costs of the coal-fired electricity, but they would still produce as the price covers variable production costs. At the other extreme, if renewable energy is the marginal producer, with coal and gas as inframarginal producers, the market price for electricity would not rise. At present coal represents 84% of electricity production and gas another 9%. This suggests that for moderate carbon prices, say up to $40/tonne CO2-e, coal will be the marginal supplier for the vast majority of electricity production. That is, electricity prices will rise by between 80 and 100% of the extra carbon tax cost for coal-fired electricity.

The foregoing argument on expected increases in electricity prices has support from the experience of the European emission trading scheme. Even though Europe is far less dependent on fossil fuels for its electricity generation, Sijm et al., (2006) estimate

that between 60 and 100% of the market price of tradable permits was passed forward to consumers as higher prices.

Consider next the rest of the business sector who use electricity and petroleum products as one of their business inputs, along with labour, capital, other materials. The higher prices for these business inputs can be considered as a new or additional indirect tax. The new impost has a production or destination base in the sense that competing imports would not have the tax and there would be no rebate or offset for exports. If other countries with whom we trade impose a carbon tax, there would not be an issue as import suppliers and export competitors would face similar production cost increases. If Australia proceeds before most other countries, and that is only in part reality, there is a prima facie case to consider either (i) adopting a consumption base by taxing the carbon content of imports and exempting the tax on exports, or (ii) developing a system of compensation for the so called trade exposed energy intensive industries.

For the non-traded industries using petroleum products and electricity as business inputs, or more generally if a consumption tax base is implemented for all of the economy, experience is that close to 100% of extra production costs, and in this context a carbon price, is passed forward to households as higher prices. The underlying theoretical model is that for most of the manufacturing and services industries their product supply curves are highly elastic. In turn the high supply elasticity arises because of constant returns to scale production technology and each industry is a price taker in the hiring of labour, purchasing of capital and materials, and borrowing funds. Models with this framework to estimate price changes with the ANTS tax changes of 2000 were very close to the actual outcome (see, for example, The Treasury, 2003, and Valadkani, 2005).

It is important that the price signals are passed from the electricity generation and petroleum products industries to producers of other products and ultimately to households. Changes in relative prices, and in particular the relatively large increases in prices of carbon intensive products, provide the incentives and rewards to businesses and households to change purchases and production methods which will reduce the aggregate level of greenhouse gas pollution.

Honesty in the political debate requires that the economic or final incidence effects of a carbon price be fully explained.

A Tax Mix Change Policy Package

The carbon tax or the opportunity price of tradable permits effectively operates as a new set of indirect taxes. With no other tax changes, there is a revenue windfall for government. As part of an approximately aggregate revenue neutral tax reform package, there are at least three related sets of arguments to use the revenue windfall to compensate households for the higher cost of living. These arguments are an equity argument, to avoid further taxation distortions to decisions to work and save, and to ensure macroeconomic stability.

Consider first the equity argument. Introducing a price on carbon not only raises the relative prices of carbon intensive products and processes to reduce pollution, it also raises the average cost of living. It seems likely that the indirect tax increase will have a regressive incidence. Returning most of the revenue windfall to households as an increase in social security payments and as income tax cuts will go close to restoring overall household purchasing power, but at the same time changing relative prices which provide the incentives and rewards to reduce aggregate greenhouse gas emissions. In the case of social security payments indexed to the CPI this compensation occurs automatically, although with a six month lag. In the case of social security payments indexed to a measure of wages, an explicit additional payment increase would be required.

A second set of arguments to use the government revenue windfall to compensate households is to negate aggravating existing tax distortions and their efficiency costs. A combination of existing income tax and existing indirect taxes, such as the GST, place a wedge between labour costs to the employer and the effective purchasing power to the employee of income from work. The Henry Review (Henry, et al., 2009) estimate the efficiency costs of distortions to labour market decisions at around 25 cents per dollar tax revenue. With no changes in the income tax and other indirect taxes, the new effective indirect tax on carbon increases the aggregate tax wedge. The higher tax wedge in turn reduces the reward from and incentive to work. Use of the

government revenue windfall from the carbon tax or sale of tradable permits to fund an offsetting reduction in income tax can reverse or offset the tax wedge increase.

The third and related set of arguments for compensating households for an increase in the cost of living caused by a price on carbon is to avoid the increase in the CPI flowing on as compensating increases in wages, interest rates, further rounds of price and cost increases, and ultimately a new round of inflation. Rather, the income tax reductions funded from the indirect tax revenue windfall provides adequate compensation. This line of argument is the same as that made successfully with the 2000 ANTS reforms in which the potential inflationary effects of an increase in indirect taxation (with the 10% GST collecting more than the replaced WST and state indirect taxes) balanced with lower income taxation resulting in a one-off blip in inflation and no significant changes in the paths of wages and nominal interest rates.

There is however an important difference between the ANTS reforms and the idea of placing a price on carbon. The ANTS reform was a one-off change in the mix of indirect and income taxation. Likely proposals to place a price on carbon involve either a carbon tax with a rate that increases over time or a tradable permit scheme with smaller aggregate pollution quotas over time, and hence a rising price per pollution permit. The scenario of a rising trend in the price of carbon therefore calls for a rolling sequence of tax mix change packages every few years.

Some Effects on the Economy

The principle intention and effect of a carbon tax or a tradable permit scheme is to internalise the external costs in the form of adapting to climate change in the future. The policy intervention aims to raise the relative prices of carbon intensive products and processes across the economy and to change the decisions by households and businesses in a cost effective way. If effective, the structure of the economy will change, and this means changes in the composition of products produced and consumed, production methods, employment, investment, and in the choice of R&D projects. A changed economy composition is one that involves less greenhouse gas pollution.

From the perspective of aggregate or economy wide production, employment and investment, the effects are likely to be very small. The change to a less carbon intensive economy brings new opportunities as well as challenges. An unfortunate fact of modern economies is that we mostly hear from those industries and employees who perceive or attribute blame to the tax changes for falling opportunities. But, at the same time, the relative price changes create opportunities for new investment and employment in low carbon products and production processes. Overall, job creation is expected to roughly match job destruction so that aggregate employment and unemployment remains about the same. Adams (2007) provides an illustrative simulation using a computable general equilibrium model. The experience of microeconomic reform in the 1980s and 1990s in which the reduction of tariffs and associated relative price changes, allowing financial markets to set prices for different saving and investment options, and so forth, created more jobs and investment than they destroyed provides a comparable historical example of empirical support for the argument that aggregate economic activity will be little affected.

Choice of Policy Instrument

So far this submission has proceeded on the simplification that a carbon or emissions tax is roughly the same as an emissions trading scheme such as the CPRS. On the big issue of placing an explicit price on carbon, and then cost effectively reducing Australian greenhouse gas emissions by changing relative prices facing most businesses and households, the two options are very similar. There are different views among economists on the different options, with, for example, Nordhaus (2008) in favour of a tax and Stern (2006) and Garnaut (2008) proponents of a tradable permit scheme.

There are three sets of second in importance arguments why I favour the tax option. A tradable permit scheme provides certainty about the reduction in pollution and the market sets the permit or carbon price. Because of imperfect and changing information about levels of aggregate economic activity, technology, commodity markets, tastes and so forth, the permit price is highly variable (as illustrated by the permit price in Europe). By contrast, a tax provides certainty on the carbon price and leaves the market to determine the quantity. Again, because of changing conditions and imperfect knowledge, the market determined quantity will be both uncertain and

variable over time. Price stability has important benefits for business and household decision making, and price stability also makes it easier to set fiscal and monetary policies. Since climate change is driven by the global stock of greenhouse gases, and not the Australian annual flow of emissions, I would argue that getting an average quantity reduction over an extended period, such as a decade, is OK; but clearly there are different points of view. The arguments for a tax mix package of the previous section are easier to sustain with a tax and price certainty than with a quota scheme with varying prices.

The argument that policy to date, both in Australia and internationally, has concentrated on the tradable permit option rather than a tax has been advanced as a reason to build on the existing institutions rather than to start from scratch with a tax, and then a harmonised global tax. Given the serious flaws in the CPRS, and in particular the excessive compensation promised to businesses, when in fact households are likely to bear most of the additional costs, to me means starting from scratch is more an advantage than a disadvantage. Internationally, a tax system recycles revenue to each country for its own emissions, and this effect is robust over time across countries with different rates of economic growth. Also, the tax option dispenses with finding a starting base to allocate a global quota across different countries. For these reasons, there seem to be advantages of a harmonised global tax for reaching an international agreement which so far has proved illusive with a tradable permit scheme.

On the Australian political front, I contend that a fully explained carbon tax as part of a tax mix change package has advantages of transparency with limited redistributional effects when compared with the poorly explained and politically damaged CPRS.

A mixture of a tradable permit scheme with price ceilings and floors as proposed by Warwick McKibbin is another credible option. For reasons of simplicity and greater ease of explanation to the electorate I prefer the tax option.

For good analytical and empirical reasons economists favour an explicit carbon price intervention, either a tax or a tradable permit scheme, to regulations and specific subsidy options (see almost any Environmental Economics textbook, and for example

Kolstad, 2009). As argued above, an explicit carbon price taps all the options across most businesses and households noted in boxes 1 through 4 in Figure 1 to reduce greenhouse gas pollution. Further, as businesses and households reduce pollution to the point where the last unit of pollution reduction just equals the market price of carbon, the least cost package of pollution reductions is achieved.

By contrast, regulations and subsidies for selected forms of pollution reduction are far more expensive ways to achieve a given pollution reduction. Only a subset of the wide set of potential ways of reducing pollution are tapped, e.g. insulating homes is only one of many ways households can reduce energy consumption (others include choice of air conditioner and temperature, clothes, heating device, white appliances); subsidies for carbon capture and storage or for solar panels may not be effective as price signals to encourage greater efficiency by existing power stations or geothermal, and they do not pass on higher price signals to other businesses and households. More importantly, regulations result in different costs per marginal unit reduction in pollution, and so do not cost effectively achieve an aggregate pollution reduction quantity. Recent examples of the very high costs of pollution reductions (relative to Treasury estimates of a carbon tax of $20-40 per tonne of CO2-e) with solar panels on homes and the cash for clunkers scheme illustrate the perils of governments trying to pick winners.

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