AARES 2007 – Summary Conference Paper

Beyond the Double Dividend:

Modelling the impacts of achieving deep cuts in Australian greenhouse gas emissions

Steve Hatfield-Dodds (CSIRO) and Philip Adams (Monash University)

January 2007

Abstract

Australian economic modelling of policy options to reduce greenhouse gas emissions has to date given little attention to (i) crafting policy scenarios that use emissions revenues to target significant existing tax distortions, (ii) quantifying the effects of policy on the price and affordability of energy products, and (iii) communicating policy impacts on living standards relative to current levels, as well as relative to future levels in the reference case. Building on modelling undertaken for the Australian Business Roundtable on Climate Change – which found that real consumption and income continue to grow strongly with emission reductions – we find that smart tax reform could significantly reduce the economic impact of emissions reductions, particularly in the initial years; and that the affordability of energy products improves over time despite marked increases in prices.

Key words: greenhouse policy, double dividend, equity, adaptive governance

Presenter Contacts: steve.hatfielddodds@csiro.au
+61 2 6242 1510
www.csiro.au/integration

Please note: This summary reports work in progress. Please contact the authors for the latest version before citing.

Introduction

This summary paper reports on economic modelling of policies to achieve a 60% reduction in Australian greenhouse gas emissions by 2050, building on work undertaken for the Australian Business Roundtable for Climate Change (ABRCC 2006, ACG 2006). This paper extends the previous work in three ways. First, on the economic front, it explores the impact of a tax efficiency approach to the use of the carbon revenues generated from the auction of emissions permits. Second, it advances a new approach to assessing policy impacts on the affordability of energy products. Third, on the environmental front, it analyses changes in emissions and energy use in terms of national totals, intensity (total per dollar of GDP), and per capita.

We expect to submit a full version of this paper to an Australian journal by late February 2007.

Theoretical contributions

The forthcoming full paper makes two main theoretical contributions.

The first is to argue that funding targeted tax reductions through the sale of emissions permits will provide an unambiguous ‘double dividend’, or tax efficiency benefit. The logic of this conclusion is that auctioning tradable emissions permits provides a direct and proportional benefit, and so does not qualify as a tax from either an economic or legal perspective. This means that the tax reduction achieved through the use of permit auction revenues involves no offsetting distortionary tax effect.

The second is to develop and apply a simple approach to assessing the impact of emissions reductions on the affordability of energy products. This involves identifying an average household energy expenditure bundle for a recent base year (based on ABS 2006) and adjusting this for price and income changes to calculate the cost of this bundle as a share of household income over time. This provides a conservative measure, as it does not take account of expected improvements in energy efficiency or household responses to changes in relative prices.

Method

The modelling presented uses the MMRF multi-regional CGE model for Australia (ACG 2006). The two emissions reduction scenarios assume that a tradable emission permit system is introduced in 2013, with 50% of the permits grandfathered in the first year, transiting to a 100% auction over ten years. Revenues are used to reduce personal income and company tax. The tax efficiency scenario assumes the government introduces an earned income tax credit or similar measure around the same time, to reduce disincentive effects for second earners and those on income support. The representation of this policy in the model is based on Dixon and Rimmer (2001, 2003). This uses the bulk of the available permit revenues in the first three years, but accounts for less than a third of the income tax reduction from 2030 through to 2050, implying substantial tax reductions in addition to the EITC.

Results

Major modelling results include:

(i) Dramatic reductions in emissions are compatible with strong economic growth, which averages 2.2% per annum above inflation with policy action, rather than 2.3% per annum without emissions reductions over the period to 2050. As shown in Table 1, GDP grows by 169% over the 45 years to 2050 with policy action (in the tax efficiency scenario), rather than 184%, while private final consumption per person rises 80% rather than 91%.

(ii) The use of carbon revenues to replace existing taxes significantly reduces total tax as a share of GDP, with carbon revenues between 1.5% and 2.0% of GDPfor most of the period. This suggests that the use of carbon revenues to reduce taxes may have significant international competitiveness implications in its own right (in addition to competitiveness issues associated with the treatment of emissions intensive exports). It also implies that the efficiency and distributional impacts of policy are not entirely separable, and that excessive free allocation of permits (to compensate adversely effected parties) could result in higher than necessary economic impacts.

(iii) Targeted tax reductions have the potential to boost total employment slightly above the reference case in the early phase, and reduce the economic impact of emissions reductions throughout the period relative to policy action with untargeted tax reductions. As shown in Figure 1, the tax efficiency approach modelled reduces the adverse impact of emission reductions on GDP by around 50% relative to the untargeted policy scenario in the early part of the period, falling to a 15% advantage by 2050. GDP, PFC pc, employment, and real wages are all higher relative to the untargeted tax reduction scenario over the period. The underlying explanation for this result is that untargeted reductions in income tax have little impact on labour supply, reflecting the very low average elasticity of labour supply for most existing workers (Gruen 2006).

(iv) The affordability of energy products improves with policy action, with the cost of the average 2005 energy bundle falling from 7% of household income in 2005 to 6% by 2050 (see Figure 2). This suggests that the social impacts of emissions reductions are likely to be manageable. This improvement in affordability is despite increases in real energy prices of 73% by 2050 (including a increase in petrol prices of 19% by 2050). Energy prices only increase 17% without policy action, and so the cost of the average 2005 energy bundle falls to 4% of household income by 2050. Income tax could be 12% higher, however, reflecting the loss of around $1,200 in carbon revenues per person in 2050 (before taking account of the reduction in climate risks associated with emissions reductions).

(v) The policy options modelled effectively decouple emissions from energy use and economic growth. As shown in Figure 3, emissions fall 62% from 2005 levels while GDP grows 169% with policy action. Total energy use increases 55%, representing a minor increase in energy use per capita. This contrasts with increases of 80% in total greenhouse emissions and 119% in energy use without policy action.

(vi) The smaller impact of the tax efficiency approach on economic growth is associated with slightly higher energy use, emissions permit prices, and carbon revenues than in the untargeted tax reduction scenario, noting the scenario is constructed to achieve the same absolute emissions target in 2050.

Concluding comments

In interpreting these findings, it is important to note that these scenarios assume that (i) the total emissions reduction is achieved within Australia, without any buying in of reductions through international emissions trading, and (ii) emissions intensive exports receive no special treatment (such as the quarantining provisions outlined in the state discussion paper on a national emissions trading system). Altering the first assumptions to allow international emissions trading would be expected to reduce the economic impact of participating in global action to reduce emissions. In contrast to this, the sign and size of the impact of introducing special treatment of emissions intensive traded goods would depend on the detail of the policy, and any related changes to the definition of the national emissions target to be achieved.

References

ABS (Australian Bureau of Statistics), (2005). *Household Expenditure Survey, Australia: 2003-04.* ABS 6530.0 (Released 15 February 2006)

Allen Consulting Group (2006). *Deep cuts in greenhouse gas emissions. Report to the Business Roundtable on Climate Change.* ACG, Melbourne. <www.businessroundtable.com.au>

Australian Business Roundtable on Climate Change (2006). *The business care for early action*. ABRCC. <www.businessroundtable.com.au>

Dixon, P.B. and m.T. Rimmer (2001). A Wage-Tax Policy to increase employment, *Australian Economic Review* 34(1) pp.64-80

Dixon, P.B. and m.T. Rimmer (2003). A new specification of Labour Supply in the MONASH model with an illustrative application, *Australian Economic Review* 36(1) pp.22-40

Gruen, N. / Lateral Economics (2006). *Tax Cuts for Growth: The impact of marginal tax rates on Australia's labour supply*, CEDA Information Paper 84, Committee for Economic Development of Australia, Melbourne.

Table 1. Overview of economic impacts of deep cuts in greenhouse emissions, with and without targeted reduction in distortionary taxes

			Tax Efficiency			Untargeted Tax Reductions			Reference Case		
		2005	2020	2035	2050	2020	2035	2050	2020	2035	2050
Economic impacts											
GDP	2005A$ billion	816	1,208	1,649	2,200	1,201	1,633	2,179	1,217	1,687	2,318
PFC.pc	2005A$	21,172	26,568	32,277	38,192	26,592	32,200	38,077	26,515	32,786	40,419
Employment	'000 people	9,475	11,321	12,680	14,142	11,257	12,601	14,050	11,294	12,637	14,050
Real wages	index 2005=100	100	104	109	111	105	110	112	108	116	125
Economic performance relative to reference case											
GDP	% difference		-0.7%	-2.3%	-5.1%	-1.3%	-3.2%	-6.0%			
PFC.pc	% difference		0.2%	-1.6%	-5.5%	0.3%	-1.8%	-5.8%			
Employment	% difference		0.2%	0.3%	0.7%	-0.3%	-0.3%	0.0%			
Real wages	% difference		-3.8%	-6.5%	-11.7%	-2.3%	-5.4%	-10.7%			
Carbon price	2005A$ / tCO2e		38	81	228	36	77	223			
Carbon revenues / GDP			1.5%	1.6%	1.9%	1.4%	1.5%	1.9%			
Reduction in income taxes			8%	9%	12%	8%	9%	11%			
Economic performance relative to 2005											
GDP	% difference		48%	102%	169%	47%	100%	167%	49%	107%	184%
PFC.pc	% difference		25%	52%	80%	26%	52%	80%	25%	55%	91%
Employment	% difference		19%	34%	49%	19%	33%	48%	19%	33%	48%
Real wages	% difference		4%	9%	11%	5%	10%	12%	8%	16%	25%

Figure 1. Relative impact on GDP and PFC of targeted and untargeted tax reductions as part of greenhouse policy scenarios

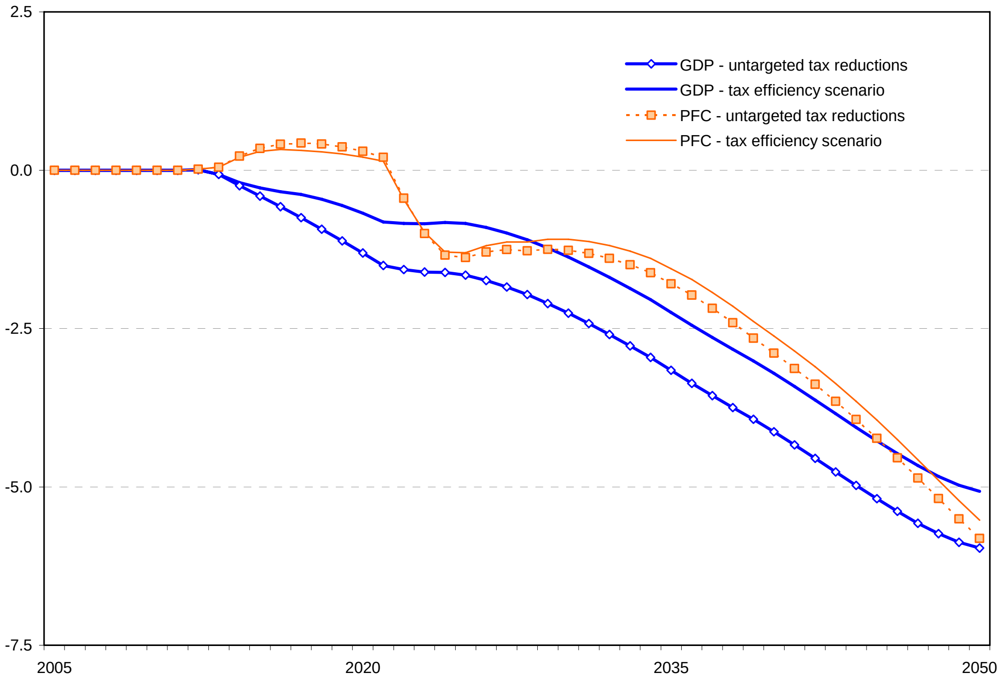

Figure 2. Affordability of energy products 2005-2050, tax efficiency scenario

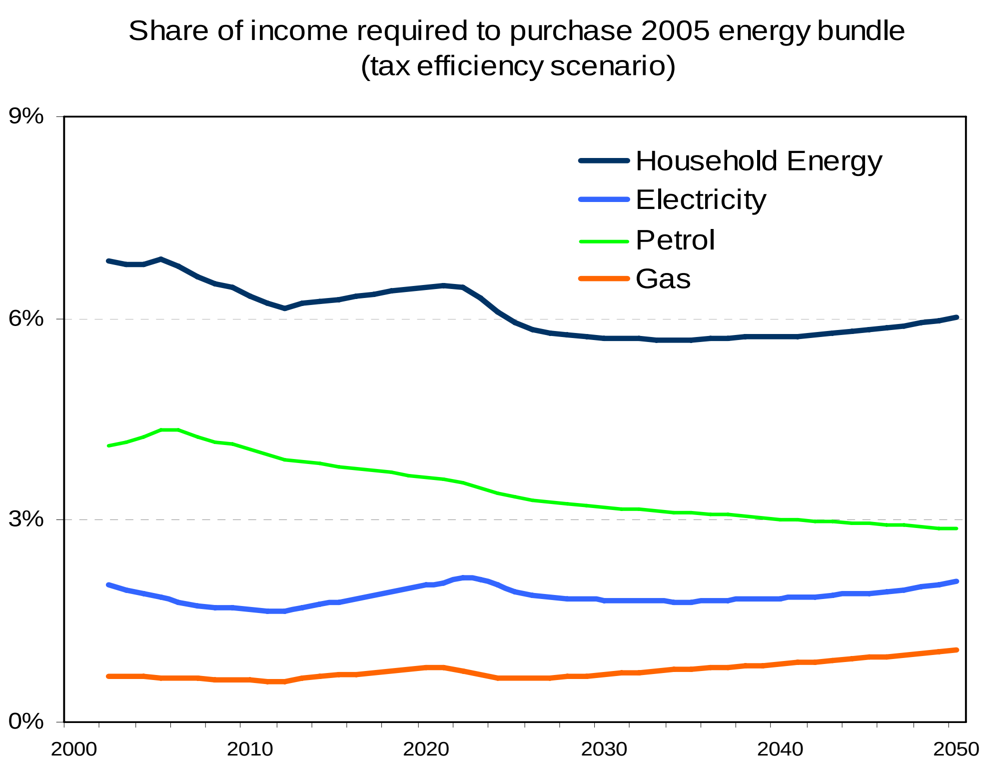

Figure 3. Economic growth, energy use and greenhouse emissions with and without policy action