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Assessing the effects of using a share of carbon price revenues for targeted tax reform:

A report to the Garnaut Review 2011 Update

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Assessing the effects of using a share of carbon price revenues for targeted tax reform

A report to the Garnaut Review 2011 Update

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Executive Summary and Introduction

The Australian Government has announced its intention to introduce some form of carbon price, to take effect from 1 July 2012. It proposes to establish this as an administratively determined carbon price that transitions to a market determined price after some years, subject to securing parliamentary agreement (Gillard 2010, MPCCC 2011).

This paper was commissioned by the Garnaut Review Update 2011 to analyse the extent to which using some portion of the carbon revenues raised could boost employment and economic activity (relative to other options for the use of carbon price revenues) through addressing existing high effective marginal tax rates and related disincentives. The paper draws on analysis undertaken in 2007, before the development of the Carbon Pollution Reduction Scheme, and applies these insights to key results from the Australian Government modelling (2008) undertaken by Treasury.

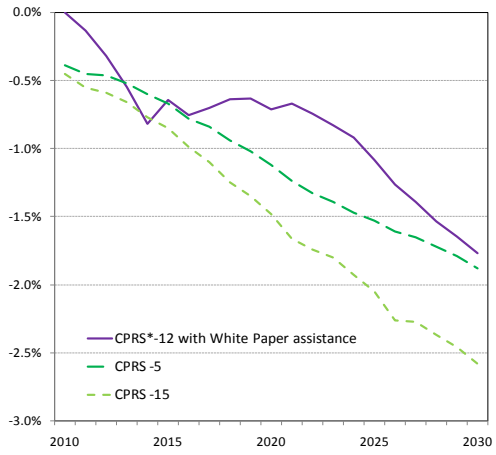
Major policy findings

The analysis suggests that using carbon price revenues to fund targeted tax reform could halve the GDP impact of achieving the CPRS-5 and -15 emissions reductions in the period to 2020, reducing the projected GDP impact from 1.1-1.5% down to 0.5-0.8% in 2020 (as shown in Figure ES-1).

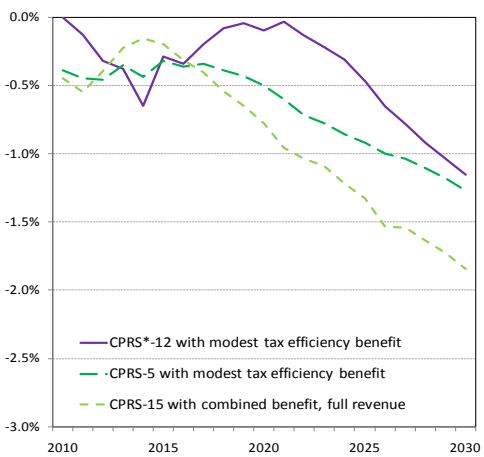
While the precise benefits would depend on the scale, timing and detail of the tax reductions implemented, this implies that there is potential to achieve a significant 'period of grace' where the benefits of tax reductions can substantially reduce the growth inhibiting effect of introducing a carbon price. Another perspective on the results is that targeted income tax reductions would allow Australia to achieve a 15 percent national emissions target in 2020 with around the same projected economic impact as achieving a 5 percent national emissions target without tax reductions.

Figure ES-1. GDP impacts of emission reductions with and without tax reductions

(a) GDP impacts without tax reductions before 2020 (relative to reference case)



(b) GDP impacts with tax reductions (relative to the reference case)



Notes: see Figure 7. Source: data from Australian Government 2008, TCI 2009 as described in the text.

The second major policy finding is that using carbon price revenues for targeted tax reductions has the potential to further decouple economic growth from carbon pollution over the longer term. With targeted tax reductions, GDP per person is projected to increase by more than $10,000 over the period to 2020, and by $20,000 per person by 2030 (as shown in Table ES-1). Tax reform is projected to increase GDP by more than $10 billion by 2020, relative to policy options without tax reform – equivalent to an increase in GDP of around $500 per person, and an estimated cumulative GDP 'tax reform benefit' of more than $150 billion by 2030. This economic growth is achieved while national greenhouse gas emissions fall by up to 39% from 2000 levels by 2030, representing a 50-60% reduction from the reference case.

Table ES-1. Headline results for policy action with and without targeted tax reform, CPRS-5 and CPRS-15 scenarios

	lump sum transfers and no tax reductions (a)		targeted tax reductions (b)	
	CPRS-5	CPRS-15	CPRS-5	CPRS-15
Historical levels – at 2008				
Domestic emissions	583	583	583	583
GDP $b ($2010)	1,303	1,303	1,303	1,303
GDP per capita, $000 (c)	60.3	60.3	60.3	60.3
Medium term – at 2020				
Emissions allocation, change from 2000 level	-5%	-5%	-15%	-15%
Emissions allocation, deviation from reference	-32%	-32%	-39%	-39%
GDP, $b ($2010)	1,802	1,795	1,813	1,808
GDP, deviation from reference	-1.1%	-1.5%	-0.5%	-0.8%
GDP per capita, change from 2008 level, $'000 (c)	+11.2	+10.9	+11.6	+11.4
Longer term – at 2030				
Emissions allocation, change from 2000 level	-28%	-28%	-39%	-39%
Emissions allocation, deviation from reference	-53%	-53%	-60%	-60%
GDP $b ($2010)	2,255	2,239	2,269	2,256
GDP, deviation from reference	-1.9%	-2.6%	-1.3%	-1.8%
GDP per capita, change from 2008 level, $'000 (c)	+19.9	+19.4	+20.4	+20.0

Notes and Source: (a) Australian Government 2008; (b) estimates calculated as described in the text, drawing on data from Australian Government 2008, TCI 2007, TCI 2009. See Table 4 for more details.

Limitations in interpreting these results

It is important to note that this analysis focuses on the GDP effects and efficiency benefits of using a portion of carbon price revenues to reduce income taxes (rather than fund direct assistance outlays), and to fund targeted tax reductions rather than across-the-board or untargeted reductions in personal tax. As such, the paper does not provide a comprehensive assessment of the relative merits of different uses of potential carbon price revenues, such as the equity and distributional goals that may be achieved through direct household and industry assistance. These other goals and considerations are legitimate and important, and must be weighed carefully in decisions on policy priorities and the use of potential carbon revenues.

Technical findings

The policy findings above are supported by four more technical findings from the analysis:

(1) The similar assumptions and results of the different modelling imply that it is reasonable and useful to apply the insights of the tax efficiency analysis undertaken in 2007 to key results from the 2008 Australian Government modelling undertaken by Treasury, in the absence of economic modelling that incorporates both targeted tax reforms and emission reductions policies consistent with Australia's 2020 target range and other policy settings.

(2) Reform of existing personal income tax arrangements has the potential to increase employment and address the significant economic, social, and personal costs of unemployment and underemployment. In broad terms, these reforms could achieve a sustained increase in GDP of around 1%. Implementing these reforms would require significant revenues, however, estimated to be in the order of $4 billion per year or more, depending on the details of the proposed reform. The scale of these benefits and the revenue required to achieve them are primarily determined by existing tax policy arrangements.

(3) Linking the introduction of carbon pricing with targeted reductions in personal income tax would provide a stable source of public revenues to fund efficiency enhancing tax reforms.

(4) Achieving the benefits of targeted tax reductions would be likely to require at least one quarter of projected carbon revenues over the first four years, equivalent to around half the value of household assistance outlined in the CPRS (Carbon Pollution Reduction Scheme) 2008 White Paper. Full implementation may require this share to rise to around a third of total revenues over the years to 2020, depending on the carbon price. This implies that there would be more flexibility to implement these tax reductions with lower levels of industry assistance, or a more rapid decline in industry assistance over time. Decisions on this issue would need to consider the economic and social consequences of different levels and approaches to direct assistance, which have not been analysed in this paper.

Outline of the paper This paper is structured in three main sections. Section One provides an overview of the key assumptions and results of The Climate Institute (TCI) and Treasury modelling drawn on in this paper, finding that they are similar enough to legitimately apply insights and quantitative results from the TCI modelling to the headline impacts from the Treasury modelling. Section Two assesses the magnitude of the potential benefits of dedicating some of the carbon price revenues to targeted tax reforms to improve labour market participation, in the context of the introduction of carbon price from 2012. Section Three offers some concluding comments. The Terms of Reference for the paper are provided in Appendix A.

Section One: Overview of TCI and Treasury modelling assumptions and results

This section provides an overview of the key assumptions and results of the economic modelling drawn on in this paper. The Climate Institute (TCI) 2007 modelling was undertaken for The Climate Institute, and explored the economic impacts of different potential national emissions targets and trajectories for 2020 and 2050, before the development of the Carbon Pollution Reduction Scheme (DCC 2008). This analysis also included an assessment of the impact of using some carbon price revenues to fund targeted tax reform (see Hatfield-Dodds and Adams 2007, Hatfield-Dodds et al 2007). The Australian Government (2008) modelling was undertaken by Treasury following the publication of the CPRS Green Paper but before emissions trading policies were finalised and published in the White Paper. The Treasury modelling focused on two CPRS scenarios (for the -5 and -15 2020 targets), along with two scenarios modelled for the Garnaut Review (the Garnaut-10 and Garnaut-25 scenarios). The analysis in this paper also draws on unpublished modelling undertaken for The Climate Institute in 2009 (referred to as the assistance analysis or TCI 2009) to help calibrate the pace and extent of increases in GDP and employment associated with targeted tax reform, to inform the application of the earlier modelling results to the CPRS-5 and CPRS-15 scenarios from the Treasury modelling. All the modelling drawn on for this paper used the Monash MMRF macro-economic model, as described in Australian Government (2008) and Hatfield-Dodds et al (2007).

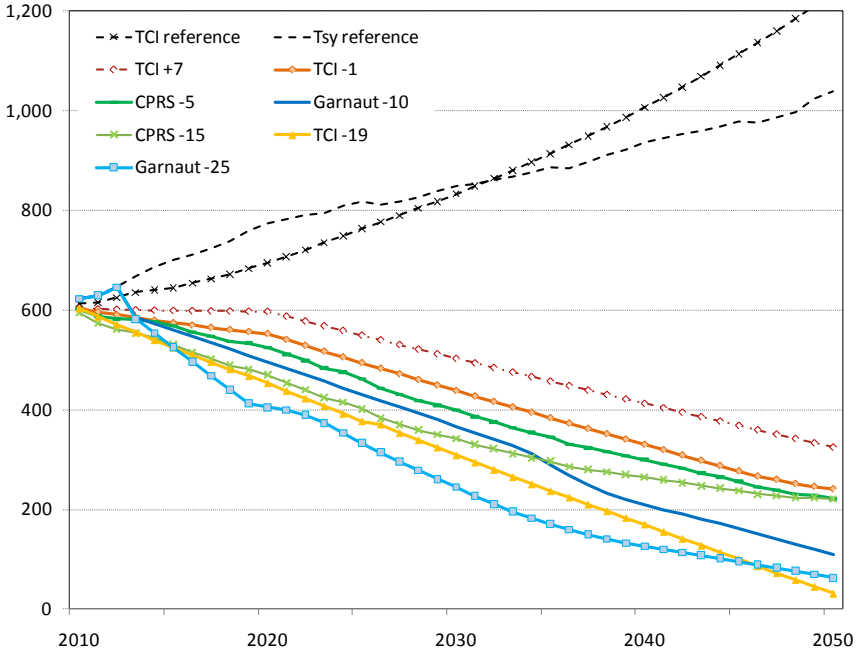
Emissions targets and outcomes

The TCI and Treasury modelling undertaken in 2007 and 2008 each examined several policy scenarios with different national emissions targets for 2020 and 2050. As shown in Figure 1 and Table 1, the set of TCI scenarios involved smaller reductions in emissions by 2020 than the CPRS and Garnaut scenarios modelled by Treasury, including a 'free rider' scenario where emissions were assumed to stabilise around current levels until 2020. The 2009 assistance analysis explored the use of carbon price revenues for emissions trajectories between -5% and -15% below 2000 levels in 2020.[1] The analysis in this paper uses the assistance modelling to assess the amount of revenue that might be available for implementing targeted income tax reductions under different approaches to assistance.

Emissions allowances may differ from domestic emissions due to banking (where the use of a permit is held over to a later year) and international trade in emissions permits. Figure 2 shows that projected domestic emissions are broadly comparable across the scenarios in the TCI and Treasury modelling, with abatement goals being met through proportionally higher levels of international trade in scenarios with more stringent 2020 or 2050 emissions targets.

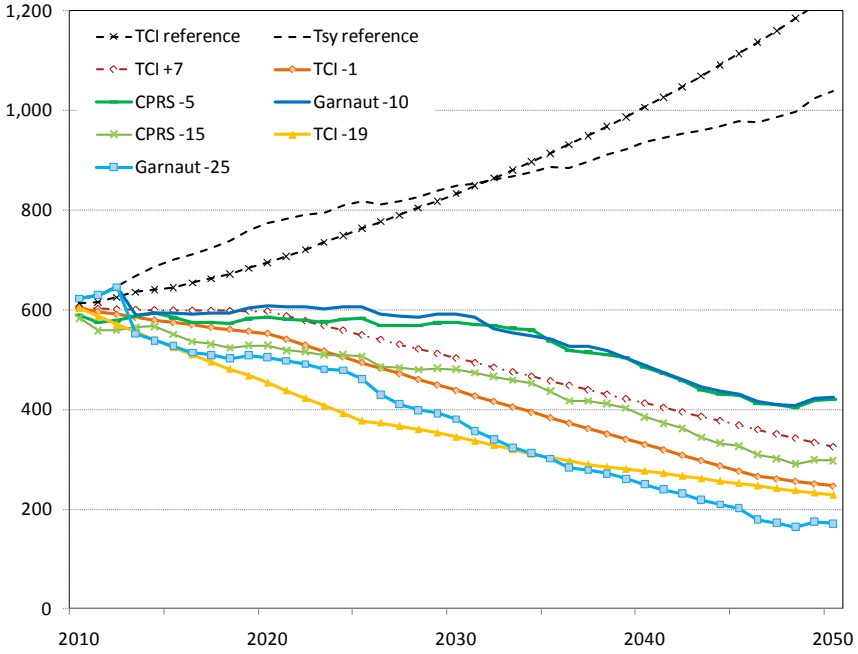
[1] The 2009 modelling explored 'white paper' and 'tax reduction' scenarios with similar national emissions allocations, and an 'industry assistance' scenario with smaller reductions in national emission and higher levels of industry assistance funded through increases in GST revenues. The tax reduction scenario assumed across the board reductions in personal tax, and did not include targeted tax reform.

Figure 1 Emissions allowances, 2010-2050 (MtCO2e)



Source: TCI 2007, Australian Government 2008

Figure 2 Domestic Emissions (after trade in permits), 2010-2050 (MtCO2e)



Source: TCI 2007, Australian Government 2008

Table 1. Overview of scenarios analysed in TCI and Treasury modelling

Scenario	Source and Date	Emissions allocations relative to 2000 levels		Average carbon price
		2020	2050	2015-2025 ($2010)
TCI +7 ('free rider')	A 2007	+7%	-43%	19
TCI -1 ('follower')	A 2007	-1%	-57%	19
CPRS-5	B 2008	-5%	-60%	41
CPRS*-5 Industry Assistance	C 2009	-5%	na	53
Garnaut-10	B 2008	-10%	-80%	40
CPRS*-12 White Paper	C 2009	-12%	na	53
CPRS*-13 Tax Reduction	C 2009	-13%	na	53
CPRS-15	B 2008	-15%	-60%	58
TCI-19 ('leader')	A 2007	-19%	-94%	55
Garnaut-25	B 2008	-25%	-90%	70
Reference case projections				
TCI 2007 (A)		+25%	+86%	na
Australia's Low Pollution Future 2008 (B)		+39%	+122%	na
TCI 2009 (C)		+14%	na	na

Source: TCI 2007, Australian Government 2008, TCI 2009 (unpublished)

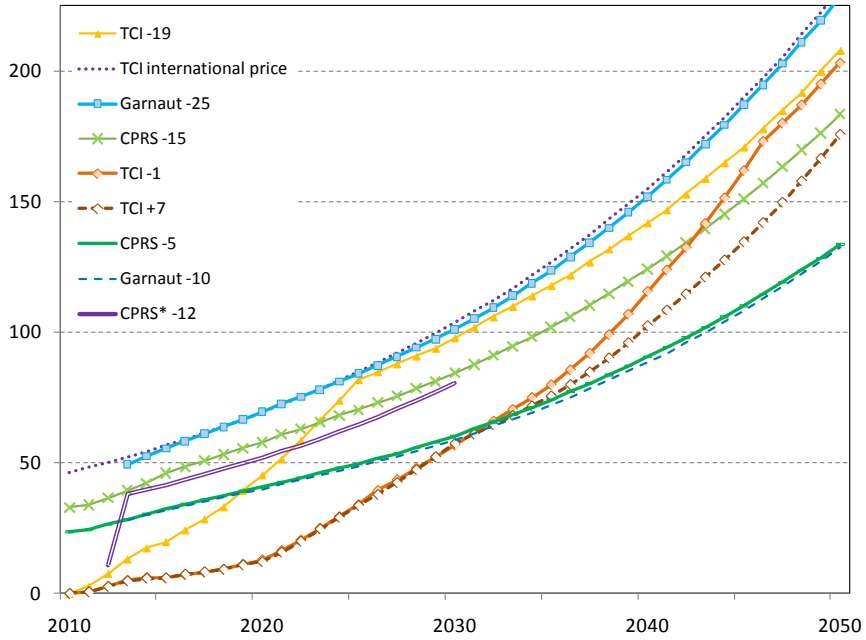
Carbon prices

The TCI and Treasury modelling allowed the use of international emissions permits to meet domestic emissions liabilities, capping the domestic carbon price at the international price. Other studies have demonstrated that allowing the use of international permits results in substantially lower economic impacts and domestic carbon prices in Australia (Australian Government 2008, see Ahamaad et al 2006, Fisher et al 2007). Other than allowing the use of international permits, the TCI-1 scenario is substantially the same as the 'early action' scenario modelled by the Allen Consulting Group (2006). Comparison of the results from these studies suggests that the use of international permits results in GDP impacts in 2050 being around half the level they would be otherwise (3.5% versus 5.8% deviation from the reference case in the scenarios with 'untargeted tax reductions'), and that the benefit of international trade in permits will be larger for more ambitious emissions reduction targets (see Hatfield-Dodds 2007).

The major differences in carbon prices across the modelling arise because the TCI 2007 modelling did not provide for banking of permits for use in later years. This results in carbon prices in the TCI scenarios that are below those from the Treasury modelling for the first 10-15 years (as shown in Figure 3), and more rapid percentage increases in carbon prices over time. This contrasts with the Treasury modelling, where the ability to bank current year permits for use in future years results in carbon prices starting somewhat higher and following a hotelling trend price path (increasing at 4% per annum above inflation). In the Treasury modelling, domestic targets are linked to the ambition of global action and associated global emissions trajectories, so that the international carbon price varies systematically across scenarios. This contrasts with the TCI modelling, which explores the impacts of different national emissions targets in the context of a single international emissions trajectory, involving a global reduction in emission of 50% on 1990 levels by 2050, and thus has one international carbon price (which is similar to the international carbon price in the Garnaut-25

scenario). The assistance modelling scenarios (CPRS*-12, CPRS*-13 and CPRS*-5) assumed a carbon price slightly lower than the CPRS-15 price, with a starting price of $11 in the first year stepping up to over $35 in the second year (in $2010 real prices).

Figure 3 Carbon prices, 2010-2050 (A$2010)



Notes and Source: TCI 2007, Australian Government 2008, unpublished 2009 data, all adjusted for inflation to 2010 price levels (ABS 6401.0 December 2010)

Assumed use of carbon revenues

The modelling drawn on for this paper makes four different assumptions about the use of carbon revenues.

The TCI scenarios assume free permits are provided to insulate trade-exposed emissions-intensive industries until 2030. All remaining permits are auctioned and all revenue is returned to the Government to reduce personal and corporate income tax, with a share of revenues used to remove work disincentives in the existing tax system (discussed further in Section Three). This reduces the impact macroeconomic impacts of reducing emissions because it improves the efficiency of the economy by reducing distortionary taxes at the same time as reducing emissions.

A sensitivity analysis of the TCI scenarios (referred to as 'untargeted tax reductions') reports macroeconomic impacts in the absence of targeted tax reform, where revenue from remaining permits is returned to the Government to reduce personal and corporate income tax in proportion to existing revenue shares. This finds that GDP in from 2025 through to 2050 is around 0.7% higher with targeted tax reductions than with untargeted 'across-the-board' reductions in personal tax (Hatfield-Dodds et al 2007:39). The 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).

The 2009 assistance modelling explored two main approaches to the use of carbon price revenues, contrasting a scenario where more than 95% of revenues are used for direct assistance over the

period to 2020 (based on CPRS White Paper settings) with a scenario where more than 70% of revenues are used for untargeted reductions in personal income tax (as illustrated in Figure 5 below).

The Treasury modelling noted that the use of carbon price revenue was not settled when the modelling was undertaken, but that some potential revenue "will be returned to business through shielding emissions-intensive trade-exposed industries" (Australian Government 2008:156). The modelling assumed that the remaining revenue is returned to households through lump sum transfers. The report notes (p.156):

> "This is a conservative assumption that assumes no productivity or labour supply benefit from the revenue recycling. Final decisions on how revenue is returned could change the GDP and GNP impacts reported."

The Treasury modelling results would thus be expected to overstate the economic impacts of achieving emissions reductions where some portion of carbon tax revenues are used to fund general tax reductions or targeted tax reform.

Headline findings on macro-economic impacts

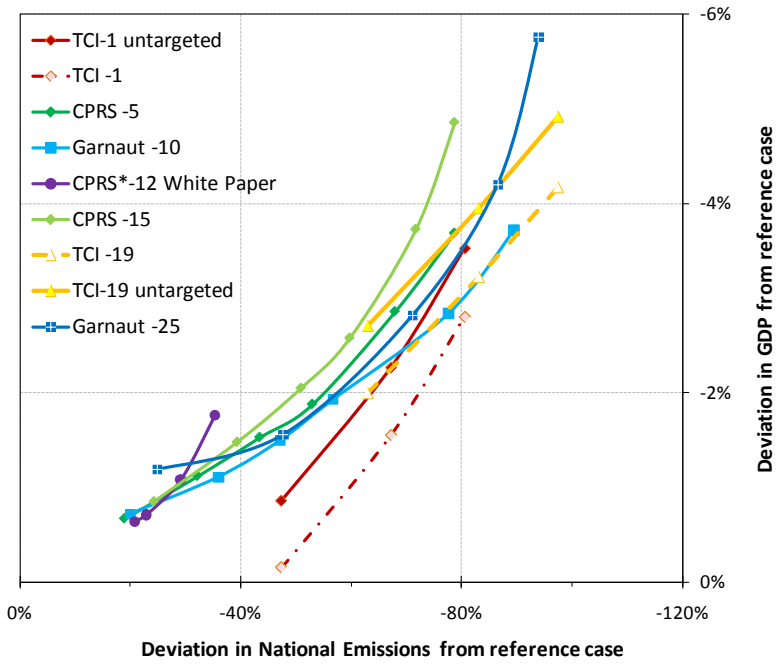
Consistent with economic theory, all the modelling drawn on for this paper finds that achieving larger reductions in emissions relative to the reference case will involve larger economic impacts in the next few decades. Over the long term, economic modelling and other analysis that accounts for the benefits of avoided climate impacts find that ambitious global emissions reductions result in substantial net global economic benefits (Stern 2008, Nordhaus 2010) and that supporting and participating in global action to reduce emissions is in Australia's national interest (Garnaut 2008, DCC 2008). Some economic modelling also suggests that ambitious mitigation efforts could also result net GDP gains relative to the reference case – before accounting for the benefits of reduced climate impacts – by catalysing net increases in innovation and global investment in research and development, which has very high economy-wide rates of return (Edenhofer et al 2006).

Figure 4 presents the impacts on GDP relative to the corresponding reductions in national emissions relative to the reference case for all the major scenarios, using TCI data for 2030 to 5050 and Treasury data for 2015 to 2050. These calculations do not include the value of avoided climate impacts, and so can be thought of as cost effectiveness analysis rather than more comprehensive or integrated cost-benefit analysis.

The data presented indicates that the TCI scenarios with 'untargeted tax reductions' and the CPRS*-12 scenario involve similar GDP impacts to the Treasury scenarios to achieve comparable reductions in emissions, with TCI scenarios generally falling between the CPRS-5 and Garnaut-10 scenarios. The relatively low economic impact of the smaller emissions reductions in the TCI-1 scenarios (47% below the reference case) is consistent with the lower carbon price in that scenario relative to the CPRS and Garnaut scenarios, and also with the positive terms of trade effect in the TCI analysis, where global action on climate change is found to boost Australian GDP relative to the reference case until the mid to late 2020s.

A second implication of the data presented in Figure 4 is that the additional economic impact of achieving greater emissions reductions over time is also similar across the TCI and Treasury analysis, as shown by the slope of the lines in Figure 4, although the Treasury analysis suggests GDP impacts increase more steeply as emissions reductions approach – or exceed – an 80% deviation from the reference case.

Figure 4. Emissions reductions and economic impacts relative to the reference case



Notes: Impacts from 2015 to 2050 for CPRS and Garnaut scenarios, 2030 to 2050 for TCI scenarios, and 2015 to 2030 for CPRS*-12 scenario.
Source: TCI 2007 and Australian Government 2008 (as summarised in Table 2), TCI 2009.

A third implication of the data is that the targeted tax reduction scenarios (TC-1, TCI-19) involve impacts on the lower bound or the Treasury range, or slightly below, consistent with the discussion above.

These findings are consistent with expectations, particularly given the Treasury modelling assumption that carbon revenues are returned as lump sum payments to households. Other factors that contribute to the differences in projected economic impacts include the higher reference case emissions in the Treasury modelling, the inclusion of the expanded Renewable Energy Target (RET) in the Treasury analysis (accounting for around a -0.1% impact on GDP relative to the reference case), the positive terms of trade impact in the TCI modelling, and different assumptions about trend improvements in autonomous energy efficiency.

Validity of cross-modelling comparisons

This overview of the TCI and Treasury modelling suggests that it is reasonable to apply the TCI findings on the benefits of targeted tax reform to Treasury projections of the macroeconomic impacts of emissions reductions (which assume available carbon revenues are returned as lump sum payments to households).

Key Finding 1:

The similar assumptions and results of the different modelling imply that it is reasonable and useful to apply the insights of the tax efficiency analysis undertaken in 2007 to key results from the 2008 Australian Government modelling undertaken by Treasury, in the absence of economic modelling that incorporates both targeted tax reforms and emission reductions policies consistent with Australia's 2020 target range and other policy settings.

Table 2. Summary of TCI, and the Treasury CPRS and Garnaut scenarios – Key assumptions and results for emissions and economic activity

	TCI +7	TCI -1		TCI -19		CPRS-5	CPRS-15	Garnaut-10	Garnaut-25
	tax reform	tax reform	untargeted	tax reform	untargeted				
2020									
Emissions allowance (MtCO2e)	597	553		454		530	474	502	418
relative to 2000 levels	+7%	-1%		-19%		-5%	-15%	-10%	-25%
deviation from reference case	-14%	-20%		-35%		-32%	-39%	-35%	-46%
Domestic emissions (MtCO2e)	597	553		454		585	529	608	505
relative to 2000 levels	7%	-1%		-19%		5%	-5%	9%	-9%
deviation from reference case	-14%	-20%		-35%		-24%	-32%	-21%	-35%
Carbon price ($2005)	12	13		45		35	50	35	60
GDP ($billion) ($2005)						1.55	1.55	1.55	1.55
deviation from reference						-1.12%	-1.48%	-1.11%	-1.56%
2030									
Emissions allowance (MtCO2e)	503	438		309					
relative to 2000 levels	-10%	-21%		-45%					
deviation from reference case	-40%	-47%		-63%					
Domestic emissions (MtCO2e)	503	438	438	345	344				
relative to 2000 levels	-10%	-21%	-21%	-38%	-38%				
deviation from reference case	-40%	-47%	-47%	-59%	-59%				
Carbon price ($2005)	52	52	55	94	96				
GDP ($billion) ($2005)	1.84	1.84	1.83	1.80	1.79				
deviation from reference	-0.03%	-0.15%	-0.86%	-2.00%	-2.71%				
2050									
Emissions allowance (MtCO2e)	325	241		31		223	223	112	56
relative to 2000 levels	-42%	-57%		-94%		-60%	-60%	-80%	-90%
deviation from reference case	-74%	-81%		-97%		-79%	-79%	-89%	-95%
Domestic emissions (MtCO2e)	325	246	246	228	227	420	297	425	171
relative to 2000 levels	-42%	-56%	-56%	-59%	-59%	-25%	-47%	-24%	-69%
deviation from reference case	-74%	-80%	-80%	-82%	-82%	-60%	-71%	-59%	-84%
Carbon price ($2005)	176	203	200	208	206	52	73	51	87
GDP ($billion) ($2005)	3.07	3.05	3.03	3.01	2.99	2.93	2.90	2.93	2.87
deviation from reference	-2.27%	-2.80%	-3.53%	-4.17%	-4.92%	-3.93%	-4.92%	-3.93%	-5.90%

Source: MMRF results from TCI 2007 and ALPF 2008

Section Two: Assessing the benefits of using carbon price revenues for tax reform

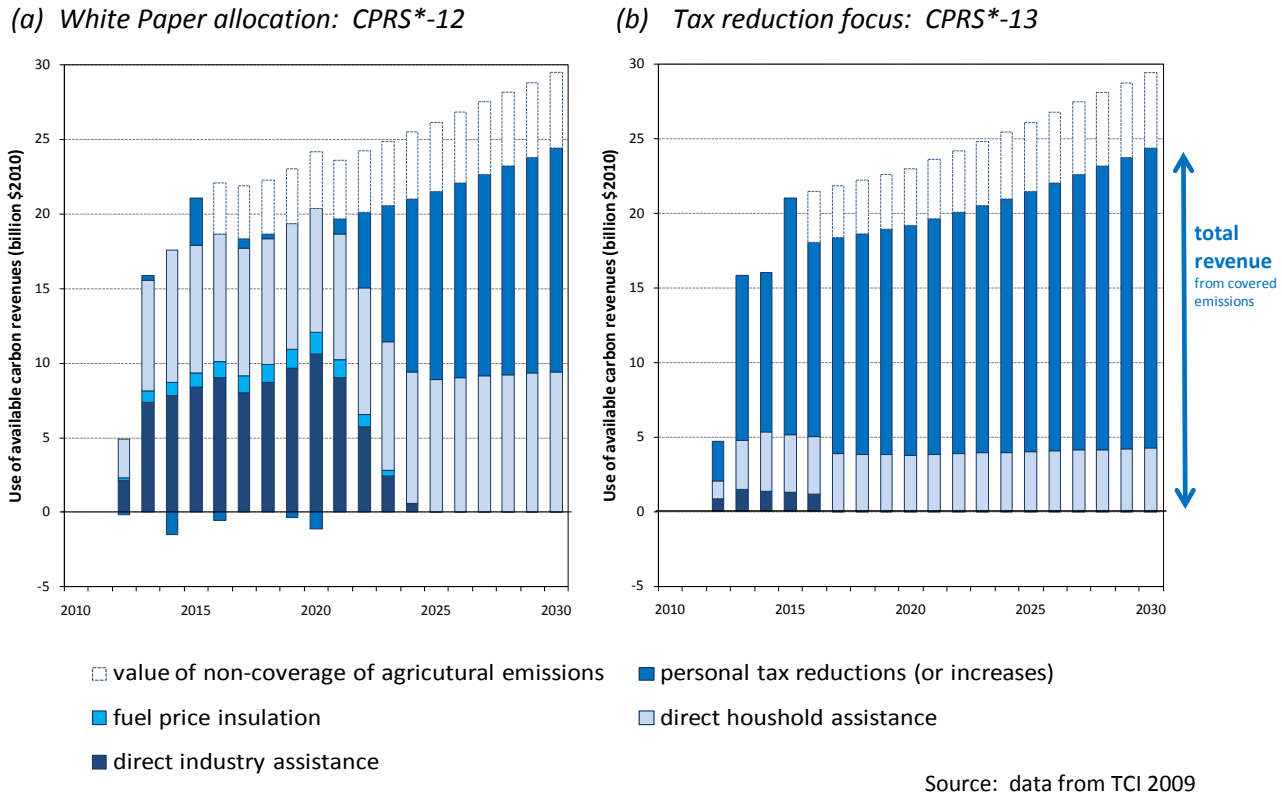
Quantifying the economic impacts of targeted tax reductions rather than direct assistance

Assumptions around the use of revenue raised through carbon pricing can have a noticeable effect on the projected macro economic impacts of reducing emissions through a carbon tax or emissions trading. This paper explores two separate but related effects, drawing on existing modelling results.

The first issue is that using carbon price revenues to provide direct assistance is likely to be less economically efficient than providing across the board reductions in personal or corporate taxation.

This proposition can be explored to some extent through the results of the 2009 assistance modelling, which provides several scenarios with different degrees of income tax reductions. The CPRS*-12 White Paper scenario replicated the assistance arrangements in the CPRS White Paper, with little or no reductions in personal tax before 2020, while the CPRS*-13 Tax Reduction scenario assumed significantly lower direct assistance and large across the board reductions in personal income tax. A third scenario, CPRS*-5 Industry Assistance, maintained similar levels of household assistance as the White Paper scenario, but provided more than twice as much direct industry assistance, funded through increases in the GST rate and tax revenues. [2]

Figure 5. Stylised approaches to allocation of available carbon revenues, CPRS* scenarios



Source: data from TCI 2009

[2] None of the assistance modelling scenarios included targeted tax reductions addressing existing work disincentives. The scenarios also assumed that agricultural emission would be subject to a carbon price from 2020, but would be shielded throughout the period of the modelling (from 2010 to 2030) through free permits.

The allocation of revenues is shown in Figure 5, above, which nets out potential revenue from agricultural emissions on that basis that these emissions are not currently expected to be subject to a carbon price.

Comparing scenarios and periods with reductions in personal tax reductions with scenarios without tax reductions indicates GDP is modestly higher in the early years of scenarios with tax cuts of more $5 billion (funded through carbon price revenues).[3] The peak GDP gain is 0.5%, with an average gain of around 0.1% across the available data. This relationship appears weak, however, with significant variation in GDP effects over time.

These results are consistent with the expectation that across the board reductions in personal tax are likely to have only modest incentive effects. This is because many personal tax payers, particularly full time adult workers without young dependent children, are not high responsive to changes in their marginal effective tax rate. Some specific groups of potential workforce participants are very responsive to the incentives effects of the tax and transfer system, particularly single parents, 'second earners' in households with small children, and individuals receiving various forms of government income support payments (AFTS 2010, Gruen 2006).

Existing tax and transfer arrangements results in high effective marginal tax rates on low income individuals and couples due to the combination of income tax and the progressive withdrawal of benefit payments. This can result in effective marginal tax rates (EMTRs) of over 80 cents from every additional dollar of labour income, discouraging labour market participation and creating the risk of poverty traps. Australia's Future Tax System (2010, also referred to as the Henry Tax Review) reported that around 10% of workers face effective marginal tax rates of over 50%, including 3% of workers who face rates of over 80%, before taking account of the incentive effects of child care costs, transport costs, and other work related expenses. This group also faces 'participation tax rates' of 60% or more – referring to the share of the increase in income that is paid in tax (or lost through the withdrawal of income support payments) as a person moves into full time work from little or no regular work (AFTS 2010 pp.13-15, 19-21).

Dixon and Rimmer (2003) explored this issue in the Monash CGE model and estimated that targeted tax reform to address these issues would require a reduction in tax revenue of around $3.0 billion (equivalent to around 4.5% of labour income), and would increase labour supply by around 1% and employment by around 2%. They find this boosts economic output and real GDP by a little over 1% on average over the first decade, with an initial GDP gain of 1.5% (see also Dixon and Rimmer 2001).

This finding was replicated in a conservative way as part of the TCI 2007 modelling of emissions reduction policies, which assumed that a portion of carbon revenues would be targeted to boost workforce participation, and that this increases labour supply by 0.5-1.0% in a phased way as total permit revenues increase from $4 billion to $6 billion (in 2005 dollars).[4] Comparing this to otherwise identical scenarios that do not include targeted tax reform – but instead return revenues as untargeted proportional reductions in personal and corporate tax rates – indicates this approach results in a sustained increase in employment of 0.8% relative to scenarios without targeted tax

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[3] This involved comparisons of the Tax Reduction versus White Paper scenarios for the period 2010-2020, White Paper versus Industry Assistance for 2020-2030, and Tax Reduction versus Industry Assistance for 2010-2030. The analysis adjusted GDP impacts for differences in the abatement task across scenarios.

[4] This analysis built on the analysis undertaken for the Australian Business Roundtable on Climate Change (AGC 2006), and reported in Hatfield Dodds and Adams (2007). The analysis was refined and incorporated into modelling undertaken for The Climate Institute in 2007 (Hatfield-Dodds et al 2007).

reductions, permanently boosting GDP by a little over 0.7% once fully phased in. The magnitude of this effect is consistent with previous studies (see Gruen 2006, Freebairn and Dawkins 2003). It is important to note that the magnitude of these benefits are largely a function of existing tax inefficiencies, and are thus largely independent of decisions about carbon pricing and greenhouse emissions reductions policies.

Key Finding 2

Reform of existing personal income tax arrangements has the potential to increase employment and address the significant economic, social, and personal costs of unemployment and underemployment. In broad terms, these reforms could achieve a sustained increase in GDP of around 1%. Implementing these reforms would require significant revenues, however, estimated to be in the order of $4 billion per year, or more, depending on the details of the proposed reform. The scale of these benefits and the revenue required to achieve them are primarily determined by existing tax policy arrangements.

The illustrative policy option modelled above is consistent with, but more focused, than the proposals in the Henry Review, which recommended a more 'root and branch' approach to reforming personal tax arrangements, avoiding tax-transfer interactions and associated high marginal effective tax rates by lifting the tax free threshold to $25,000 (AFTS 2010). Importantly, the approach modelled does not assume that all or even most of the revenues used to reduce income taxes would need to be dedicated to addressing these high effective marginal tax rates. While the specific proportion of revenues required will depend on the quantum and allocation of carbon revenues, in the TCI modelling the targeted tax reductions accounted for the bulk of available revenues in the first three years, declining to around one quarter of the available revenue in the TCI-19 scenario in 2020,and around one half of the available revenue in the TCI-1 scenario.

Assessing potential carbon revenues available for targeted tax reform

In the absence of new modelling, it is appropriate to apply the estimated benefits of more efficient use of carbon revenues, as a share of GDP, to the 2008 Treasury modelling results. The central analytic issue, having established that the two set of results are sufficiently similar for this approach to be valid, is that the benefits of reform are proportional to the revenue available for income tax reform. The TCI 2007 modelling results suggest that the economic benefits grow strongly as total available carbon revenues exceed $4 billion and rise to $8-12 billion, stabilising around a maximum benefit of around 0.7% of GDP (see Figure 6 below).

The value of carbon revenues available for targeted tax reductions will depend on the carbon price trajectory, coverage, and decisions on the allocation of assistance across households, businesses and sectors. Nevertheless, it appears likely that total revenues will exceed the revenues assumed in the TCI modelling from 2012 or 2013, providing a stable source of potential public revenues that could be used to fund efficiency enhancing tax reforms. It is difficult to identify alternative revenue sources capable of funding tax reductions of this scale over the next five or more years. This implies that the allocation of potential carbon price revenues may be the determining factor in the availability of revenues for targeted tax reform.

Key Finding 3

Linking the introduction of carbon pricing with targeted reductions in personal income tax would provide a stable source of public revenues to fund efficiency enhancing tax reforms.

Figure 5 above presents two stylised alternatives of how potential carbon revenues might be allocated, drawing on the 2009 assistance modelling. The first panel is based on the assistance arrangements outlined in the 2008 CPRS White Paper, assuming agricultural emissions are not subject to a carbon price or emissions trading obligation. A strict interpretation of this information would imply that targeted tax reform would not be able to be funded from carbon price revenues under a CPRS-like approach to the use of carbon revenues until at least the early 2020s, when transitional industry assistance is reduced. This contrasts with scenario set out in second panel, where the use of carbon revenues is assumed to provide very little assistance to industries (including trade exposed industry), with more than 70% of revenues being used to fund untargeted general reductions in personal income tax.

In practice, however, targeted tax reform could be funded within the level of household assistance provided under a CPRS-like approach if a substantial share of this household assistance were to be provided as tax reductions in personal income tax. This is illustrated by the 'Middle Ground' approach set out in Table 3, which has the same level of household assistance in 2012-15 as the 2009 modelling of the White Paper approach. Household assistance increases from an estimated 53% of total expenditure in 2012-2015 to an estimated 57% in 2016-2020. Importantly, this illustrative middle ground provides around $4 billion per annum for personal tax reductions in the first four years, rising to around $6 billion per annum in the five years to 2020, which is broadly consistent with the minimum level of revenue required to implement the targeted tax reductions in the TCI 2007 analysis.

Table 3. Illustrative potential allocations of carbon tax revenues, CPRS*-12 scenario

	Average 2012-2015 (a)			Average 2016-2020		
	White Paper	Middle Ground (b)	Tax Focused	White Paper	Middle Ground (c)	Tax Focused
Direct household assistance	7.51	3.85	3.38	8.44	4.13	3.80
Personal tax reductions	0.41	4.14	10.77	-0.23	6.21	14.60
Fuel price insulation (d)	0.73	0.65	0.00	1.22	0.61	0.00
Direct industry assistance	6.93	6.93	1.43	9.18	7.67	0.23
Sub-totals:						
household assistance (d)	8.28	8.32	14.15	8.83	10.65	18.40
industry assistance (d)	7.29	7.26	1.43	9.80	7.97	0.23
Total expenditure	**15.58**	**15.58**	**15.57**	**18.63**	**18.63**	**18.63**
Personal tax reductions as a share of household assistance	5%	50%	76%	-3%	55%	79%
Household assistance as a share of total expenditure	53%	53%	91%	47%	57%	99%

Notes: (a) Data for White Paper and Tax Focus scenarios as per Figure 5, with the carbon price in 2012 adjusted to $22/tCO2e (doubling the revenue for that year). (b) In 2012-2015, the Middle Ground illustration maintains overall household assistance at the same level as the White Paper scenario but assumes personal tax reductions account for 50% of this assistance, with fuel price insulation at 90% of White Paper levels. (c) In 2015-2020, the Middle Ground illustration increases direct household assistance by 7% and tax reductions by 50% in real terms (above inflation) relative to 2012-2015 levels. Fuel price insulation is 50% of White Paper levels. (d) Fuel price insulation expenditures are attributed to households and industry on a 50:50 basis. Source: data from TCI 2009

This implies that it would be possible – but challenging – to allocate $4-6 billion to targeted reductions in personal tax reductions within the broad division of assistance between households and industry proposed under the CPRS. While this would be likely to involve allocating a larger share of available revenue to targeted tax reductions than was assumed in the TCI 2007 modelling, it appears that partial implementation of tax reforms along these lines could achieve worthwhile benefits with more moderate revenue requirements. For example, the moderate revenue allocated to tax reductions in the illustrative 'middle ground' scenario in Table 2 is estimated to result in an increase in GDP of around 0.6%, once phased in, while options involving much larger revenues would be expected to increase GDP by around 0.7% as part of proving more general reductions in income tax. The relationship between available revenues and estimated reform benefits is shown in Figure 6 below.

Key Finding 4

Achieving the benefits of targeted tax reductions would be likely to require at least one quarter of projected carbon revenues over the first four years, equivalent to around half the value of household assistance outlined in the CPRS (Carbon Pollution Reduction Scheme) 2008 White Paper. Full implementation may require this share to rise to around a third of total revenues over the period to 2020, depending on the carbon price. This implies that there would be more flexibility to implement these tax reductions with lower levels of industry assistance, or a more rapid decline in industry assistance over time. Decisions on this issue would need to consider the economic and social consequences of different levels and approaches to direct assistance, which have not been analysed in this paper.

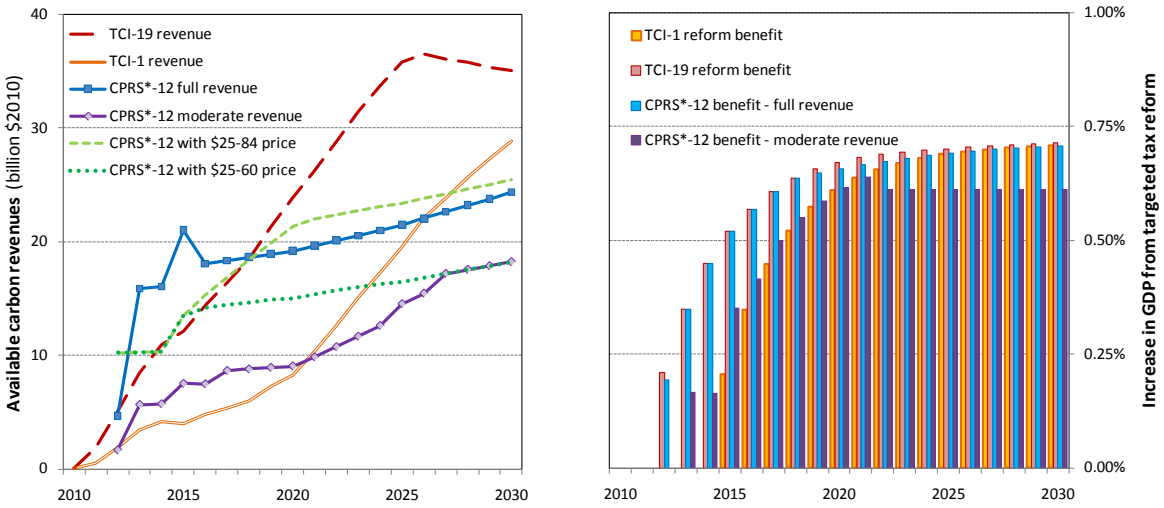
Applying estimated tax efficiency benefits to the Treasury modelling results

Taking account of this range of revenue outlooks, it is possible to estimate the combined effect of moving from direct assistance to targeted tax reductions. For illustrative purposes, moving from direct assistance to general tax reductions is estimated to increase GDP by 0.35% after a few years, but then trends down to near zero. (This is consistent with a presumption that the GDP boost would decline over the longer term, as direct transitional assistance is wound down or subsumed into wider tax and transfer arrangements.) Having established sufficient revenues for personal tax reductions, ensuring targeted tax reductions occur as part of the wider mix of tax changes is estimated to increase GDP by 0.5-0.7% of GDP, over the medium term, depending on the quantum of revenue available. The relationship between available revenue and the estimated GDP impact is shown in Figure 6.

As the effects of moving from direct assistance to untargeted tax reductions and from untargeted to targeted tax reductions are likely to interact to some degree, the benefits of moving from direct assistance to general tax reductions has been discounted by one third in calculating the upper bound combined benefit estimate. Results are shown in Figure 7 below. The lower bound combined estimate assumes more modest revenues, and disregards the benefit of moving from direct assistance to general tax reductions.

Figure 6. Available carbon revenues and estimated increases in GDP from targeted reductions

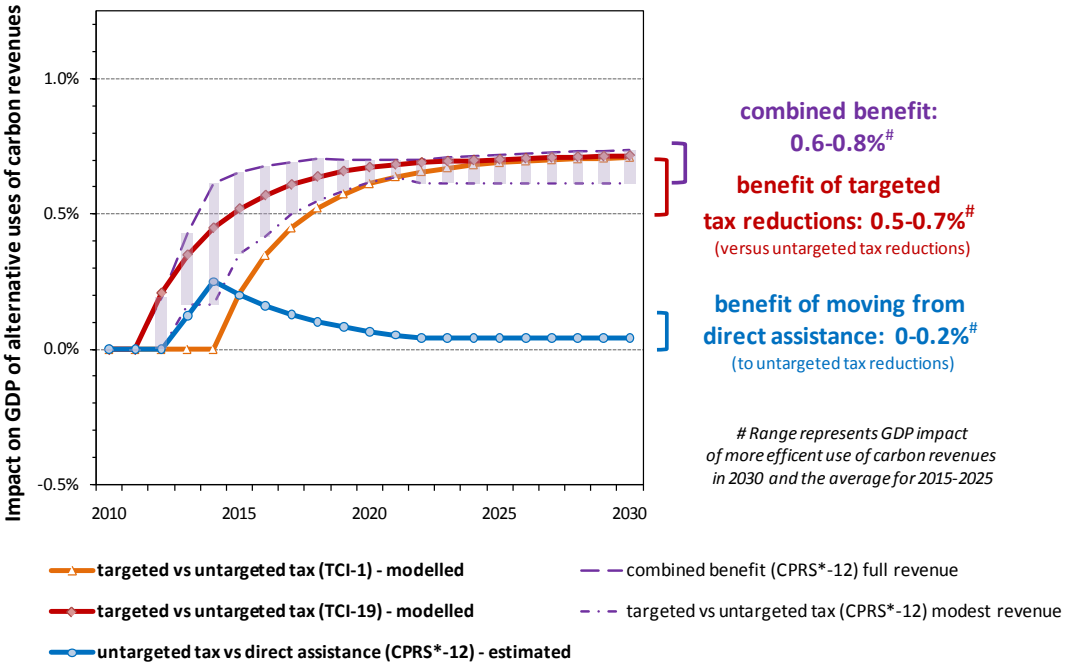
(a) Carbon revenues *(b) GDP benefits of targeted tax reductions*



Notes: 'CPRS*-12 full revenue' assumes targeted tax reductions are unconstrained by available revenue, 'moderate revenue' assumes revenues in line with Middle Ground illustration in Table 3, 'CPRS*-12 with $25-60 price' adjusts the CPRS*-12 permit volume for a carbon price starting at $25 and rising at 4% to 2015 and then transitioning to the CPRS-5 carbon price, while the '$25-80 price' transitions to the CPRS-15 carbon price.

Sources: TCI 2007, 2009, Australian Government 2008 and calculations as described

Figure 7. Estimates of the impacts of different approaches to using carbon price revenues



Notes: bold variables are based on direct modelling results, other variables are estimates as discussed in the text.

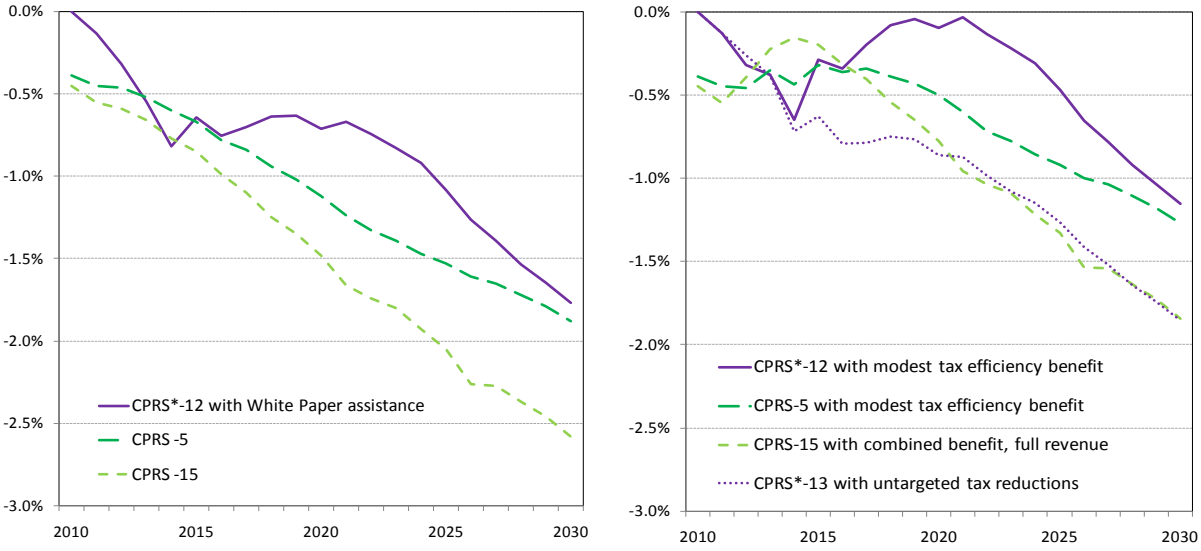
Source: calculated from data in TCI 2007, TCI 2009

Applying these results to the headline economic impacts from the Treasury modelling suggests that using a portion of carbon price revenues to fund targeted tax reform rather than only providing direct assistance (with no personal tax reductions until after 2020) could halve the GDP impact of achieving the CPRS-5 and -15 emissions reductions in the period to 2020, reducing the projected impact from 1.1-1.5% down to 0.5-0.8% in 2020, and from 1.9-2.6% down to 1.3-1.8% in 2030, as shown in Figure 8 below. These smaller economic impacts are achieved without any diminution of abatement outcomes, with near identical emissions allocations for the targeted and untargeted policy scenarios.[5]

Figure 8. GDP impacts of emission reductions with and without tax reductions

(a) GDP impacts without tax reductions before 2020 (relative to reference case)

(b) GDP impacts with tax reductions (relative to the reference case)



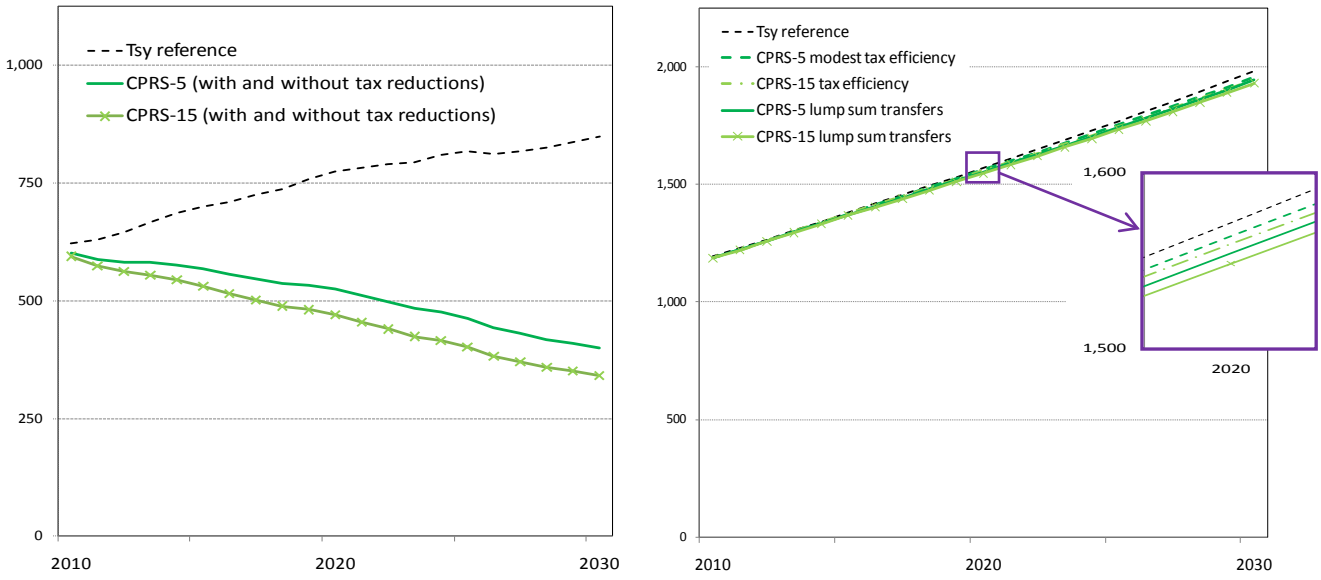
Notes: (a) assumes lump sum transfers (CPRS-5 and -15) or direct assistance to 2020 followed by untargeted tax reductions (CPRS*-12), (b) CPRS-5 modest tax efficiency benefits assumes constrained available revenues, CPRS-15 assumes greater revenues and includes benefit of moving from direct assistance to tax reductions.
Source: calculated using data from Australian Government 2008, TCI 2007, TCI 2009.

[5] Analysis of the 2007 modelling indicates that emission allocations vary by less 0.002% across policy treatments on average over the period to 2030, with a maximum variation of less than a 0.01% (less than 0.04 MT CO2e) in any one year.

Another perspective on the results is that targeted tax reductions would allow Australia to achieve a 15 percent national emissions target in 2020 with around the same projected economic impact as achieving a 5 percent national emissions target without reductions in income tax (as shown in Figure 9).

Figure 9. Emissions trajectories and GDP growth with and without tax reductions

(a) Emissions allowances (MT CO2e) *(b) GDP ($2010 billion)*



Notes: as for Figure 8.

Source: calculated using data from Australian Government 2008, TCI 2007, TCI 2009

Results presented in Figure 9 and Table 4 set out how using a portion of carbon price revenues to address existing disincentives within the tax system has the potential to achieve the environmental goals of climate policy with smaller short run economic impacts.

Over the longer term, using carbon price revenues for targeted tax reductions has the potential to even further decouple economic growth and rising incomes from our levels of carbon pollution. With targeted tax reductions GDP is projected to be around $10 billion higher in 2020 than it would be without tax reductions, equivalent to an increase in GDP of around $500 per person, with a cumulative GDP 'tax reform dividend' of over $150 billion over the years to 2030. GDP per person increases by more than $10,000 over the period to 2020 in all the scenarios, and by $20,000 per person by 2030 in the scenarios with targeted tax reductions.[6] This strong trend growth in GDP and average income is achieved while making substantial reductions in national emissions, with emissions allocations falling to 28-39% below 2000 levels by 2030 – representing a 50-60% reduction from the reference case.

Table 4. Headline results for policy action with and without targeted tax reform, CPRS-5 and CPRS-15 scenarios

	lump sum transfers and no tax reductions (a)		targeted tax reductions (b)	
	CPRS-5	CPRS-15	CPRS-5	CPRS-15
Historical levels - at 2008				
Domestic emissions	583	583	583	583
GDP $b ($2010)	1,303	1,303	1,303	1,303
GDP per capita, $000 (c)	60.3	60.3	60.3	60.3
Medium term – at 2020				
Emissions allocation, change from 2000 level	-5%	-5%	-15%	-15%
Emissions allocation, deviation from reference	-32%	-32%	-39%	-39%
Domestic emissions, Mt CO2e (MMRF)	585	585	529	529
GDP, $b ($2010)	1,802	1,795	1,813	1,808
GDP, deviation from reference	-1.1%	-1.5%	-0.5%	-0.8%
GDP per capita, change from 2008 level, $'000 (c)	+11.2	+10.9	+11.6	+11.4
GDP per capita, change from 2008 level	+19%	+18%	+19%	+19%
Longer term – at 2030				
Emissions allocation, change from 2000 level	-28%	-28%	-39%	-39%
Emissions allocation, deviation from reference	-53%	-53%	-60%	-60%
Domestic emissions, Mt CO2e (MMRF)	575	575	480	480
GDP $b ($2010)	2,255	2,239	2,269	2,256
GDP, deviation from reference	-1.9%	-2.6%	-1.3%	-1.8%
GDP per capita, change from 2008 level, $'000 (c)	+19.9	+19.4	+20.4	+20.0
GDP per capita, change from 2008 level	+33%	+32%	+34%	+33%

Notes and Source: (a) calculated from Australian Government 2008 data for population, reference case GDP and deviations from GDP, emissions allocations and domestic emissions; (b) estimates calculated from Australian Government 2008, TCI 2007, TCI 2009 as described in the text; (c) see footnote [6].

While actual impacts and benefits would depend on the scale, timing and detail of proposed tax reductions, this implies that there is potential to achieve a significant 'period of grace' where the benefits of targeted tax reductions can substantially reduce the macroeconomics impacts of introducing a carbon price.

The results also imply that implementing targeted tax reductions over the medium term could also allow Australia to commit to deeper emissions reductions than it otherwise might, as part of supporting global climate policy action consistent with Australia's national interest.

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[6] GNP (Gross national Product) or GNP per capita are conceptually more appropriate indicators of income and current and future consumption possibilities than GDP (Gross Domestic Product) and GDP per capita, as GDP reflects that value of economic output, while GNP also captures international income effects arising from changes in Australia's terms of trade and net trade in international emissions permits (see ALPF 2008 *Summary Report* p.14). This paper, however, uses GDP per capita as a proxy for income because focusing on GDP this avoids potential complications arising from differences in the terms of trade effects and in the share of abatement achieved through the use of international permits across the TCI 2007 and ALFP 2008 modelling.

Key Finding 5

Using carbon price revenues to fund targeted tax reform could halve the GDP impact of achieving the CPRS-5 and -15 emissions reductions in the period to 2020, reducing the projected GDP impact from 1.1-1.5% down to 0.5-0.8% in 2020. While the precise benefits would depend on the scale, timing and detail of the tax reductions implemented, this implies that there is potential to achieve a significant 'period of grace' where the benefits of tax reductions can substantially reduce the growth inhibiting effect of introducing a carbon price. Another perspective on the results is that targeted income tax reductions would allow Australia to achieve a 15 percent national emissions target in 2020 with around the same projected economic impact as achieving a 5 percent national emissions target without tax reductions.

Key Finding 6

Over the longer term, using carbon price revenues for targeted tax reductions has the potential to further decouple economic growth from carbon pollution. With targeted tax reductions, GDP per person is projected to increase by more than $10,000 over the period to 2020, and by $20,000 per person by 2030 – with an estimated cumulative GDP 'tax reform benefit' of more than $150 billion by 2030. This is achieved while national greenhouse gas emissions fall by up to 39% from 2000 levels by 2030, representing a 50-60% reduction from the reference case.

Section Three: Interpreting the benefits of using carbon price revenues to support targeted tax reductions

The benefits of targeted tax reform estimated in this paper are equivalent to reducing the growth inhibiting impact of emissions reductions by 30% to 70% over the first two decades of carbon pricing (see Figure 10), depending on the quantum of revenue available for targeted tax reform, the details of proposed tax reductions, and the alternative approach to providing assistance. One way of interpreting this finding is that combining tax reform with emission reductions provides a design advantage on par with the benefit of allowing international linking and the use of international emissions credits – which is estimated to reduce Australia's domestic carbon price and associated economic impacts by around 50% relative to scenarios which do not allow linking (see Section 2 above).

Figure 10. Avoided GDP impacts from targeted tax reductions as a proportion of projected impacts emissions reductions without tax reductions

Source: data from Australian Government 2008, TCI 2009 and calculations as described in the text.

It should not be surprising that the benefits of targeted tax reform are substantial. Prominent economists and others have been calling for reforms along these lines for at more than a decade – calls that have been echoed in recent years by the Henry Tax Review (Dawkins et al 1999, Dawkins 1999, ATSF 2010). It is also important to note that, in addition to the improvements in GDP estimated here, reductions in involuntary unemployment are intrinsically valuable – enabling individuals to contribute and be valued – and would provide a range of social benefits and avoided societal costs (Feldstein 1978, Schapiro and Ahlburg 1982).

That the calls for tax reform remain unanswered is a testament to the very real difficulties that can prevent the implementation of worthwhile reforms – and suggests a potential substantive case for linking 'revenue positive reforms' (such as the introduction of carbon pricing) with 'revenue negative reforms' such as reductions in high effective marginal tax rates and associated disincentives to labour market participation.

The benefits of linking these separate reform agendas flow both ways: worthwhile improvements can be made to tax arrangements earlier than they otherwise might be achieved, due to the availability of carbon price revenues; and using a share of carbon price revenues to fund targeted tax reductions further decouples economic growth from our national emissions trajectory – so that GDP per person rises by more than $20,000 per person by 2030 while emissions fall by up to 39% from 2000 levels.

It is important to note, however, that the analysis in this paper focuses on the GDP effects and efficiency benefits of using a portion of carbon price revenues to reduce income taxes (rather than fund direct assistance outlays), and to fund targeted tax reductions rather than across-the-board or untargeted reductions in personal tax. As such, the paper does not provide a comprehensive assessment of the relative merits of different uses of potential carbon price revenues, such as the equity and distributional goals that may be achieved through direct household and industry assistance. These other goals and considerations are legitimate and important, and must be weighed carefully in decisions on policy priorities and the use of carbon revenues over time.

There is no doubt that it would be challenging to secure the revenues required for substantial reductions in personal income tax – particularly in the first few years of the adjustment to the introduction of a carbon price, when the needs for transitional assistance are greatest. Nevertheless, the indicative analysis presented in this paper suggests there could be substantial benefits over the medium to long term from addressing existing tax disincentives as part of the introduction and early evolution of carbon pricing arrangements.

Appendix A: Terms of Reference

Context

The Garnaut Review Update is interested in commissioning a quantitative assessment of the degree to which using carbon price revenues could boost employment and economic activity (relative to other options for the use of carbon price revenues) through addressing existing high effective marginal tax rates and related disincentives.

This issue was explored in 2007 by Hatfield-Dodds et al using the Monash MMRF CGE model, before the development of the CPRS and associated Australian Government analysis undertaken by Treasury and presented in *Australia's Low Pollution Future* (ALPF 2008). As there is not sufficient time and resources to repeat and re-model the 2007 analysis, the results from the 2007 analysis can be updated drawing on unpublished MMRF modelling results from 2009 exploring the economic impacts of different approaches to assistance.

Terms of Reference

Drawing on available modelling results:

(1) Relate the targeted tax reform approach modelled in 2007 to the modelling assumptions in ALPF (2008) and the findings of the 2009 *Australia's future tax system* review ('the Henry Review');

(2) Compare key results from the 2007 and 2009 economic modelling with ALPF 2008 results;

(3) Estimate the carbon price revenues available for targeted tax reform, assuming a July 2012 start date;

(4) Estimate the impacts of targeted tax reform on economic activity (GDP or GNP), given the broad approach and framework articulated by the Government and the MPCCC, relative to assistance arrangements that do not involve significant reductions in personal tax rates.

(5) Document this analysis in a concise report suitable for public release as part of the Garnaut Review Update 2011.

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