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A Post Keynesian Perspective on Industry Assistance and the Effectiveness of Australia's Carbon Pricing Scheme

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Abstract

Australia's carbon pricing scheme protects the profits of polluters and, as a consequence, has a negligible impact on the carbon emissions emanating from Australian industries. I concentrate on the assistance given to emissions-intensive, trade-exposed industries and use a post Keynesian approach to explain that, despite the rhetoric, industries and firms will not move offshore under a carbon price and industry assistance is unnecessary. When assistance is given, profits are protected and could increase in certain industries, which occurred in the comparable European emissions trading scheme. In orthodox economic theory, despite this negligible impact on profits, any method of pricing carbon causes a reduction in emissions because firms seek to adjust technology and factor inputs at the margin and abate until marginal abatement costs equal the carbon price. However, from a post Keynesian perspective, the government's prediction of a transformed economy and clean energy future will not occur unless the carbon pricing policy reduces the corporate profits of emitting firms. Thus, complementary policies are required to take the burden of reducing emissions off the more symbolic carbon market established. I further argue that a carbon tax without any industry assistance is a preferred approach and that where plant shutdown does occur, carbon emissions around the world will fall and workers could be compensated at a far smaller cost than the adjustment assistance given to industries in the policy's current form.

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Keywords

Carbon price; industry assistance; Kalecki; mark-up pricing; post Keynesian economics; Salter; profits.

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1. Introduction[1]

Australia's carbon pricing scheme protects the profits of polluters and, as a consequence, has a negligible impact on the carbon emissions emanating from Australian industries. Profits could even increase in certain industries, which occurred in the comparable European emissions trading scheme. In orthodox economic theory, despite this negligible impact on profits, any method of pricing carbon causes a reduction in emissions because firms seek to adjust technology and factor inputs at the margin and abate until marginal abatement costs equal the carbon price. I follow a post Keynesian approach to argue that the government's prediction of a 'transformation of the economy towards a clean energy future' (Department of Climate Change and Energy Efficiency 2011: 21) will not occur unless it reduces the corporate profits of emitting firms. Despite the rhetoric, this reduction in profits will not lead to a mass relocation of industries overseas and where plant shutdown does occur, carbon emissions around the world will fall and workers could be compensated at a far smaller cost than the adjustment assistance given to industries in the policy's current form.

Australia's Clean Energy Future Policy (CEFP) (ibid.) establishes a price on carbon in a two-stage approach. The fixed-price or carbon-tax period runs for the first three years of the scheme with a price of $23 per tonne of carbon emissions (or their equivalent) (CO_2-e) in the first year rising by 2.5 per cent in real terms per annum. From July 2015, the price is determined in the market under an emissions trading scheme. The policy covers around 500 companies who must purchase permits equal to their annual emissions and around 50 of these companies are responsible for 75 per cent of the emissions covered by the scheme (ibid.: 21). Over half of Australia's emissions are directly covered with the main emission sources being stationary energy, waste, industrial processes and fugitive emissions (emissions emanating from the mining, processing and distribution of coal, oil and gas) (ibid: 27). Transport, farming and forestry remain outside the scheme. However, the farming and forestry sectors participate in the Carbon Farming Initiative (CFI) which is linked to the CEFP because industrial polluters can offset their obligations by purchasing CFI credits — that is, by purchasing reductions in carbon emissions elsewhere in the economy.[2]

The policy also has a strong international linkage with polluters able to offset their emissions by purchasing credits from 'credible international carbon markets and emission trading schemes' (ibid: xiii). Rather than abate domestically, polluters can pay for emission reductions elsewhere in the world or purchase permits from, say, the European emissions trading scheme, which implies that a European producer has not emitted an equal amount of carbon. International and domestic offsets are justified because they help polluters minimise the cost of carbon abatement and up to 50 per cent of a polluter's obligations can be met by purchasing international offsets during the flexible price period. However, this restriction is only guaranteed until 2020 and will be reviewed by the Climate Change Authority in 2016 (ibid: 107).

The CEFP aims to reduce Australia's emissions to 5 per cent below 2000 levels by 2020 and 80 per cent below 2000 levels by 2050 with the 2020 target corresponding to a reduction of 159 mega-tonnes (Mt) of CO_2-e from the projected

690 Mt. Mindful of 'supporting jobs and competitiveness as Australia moves to a clean energy future' (ibid 2011: 51), the CEFP includes generous levels of assistance valued at 9.2 billion dollars over three years (ibid: 51) for the so called emission-intensive, trade-exposed (EITE) industries with free permits provided based on an industry's historic emissions intensity (ibid: 55).[3] The dirtiest industries in terms of carbon emissions per dollar of revenue receive the greatest assistance. For example, high emissions-intensive industries — those emitting more than 2,000 tonnes of CO_2-e per million dollars of revenue, such as the raw steel, cement clinker, and aluminium smelting industries — receive 94.5 per cent of their permits free (ibid: 115). Medium emissions-intensive industries — those emitting between 1,000 and 1,999 tonnes of CO_2-e per million dollars of revenue, such as alumina refining and oil refining — receive 66 per cent of their permits free (ibid). Coal and natural gas producers also receive similarly generous concessions. The free permit allocations reduce by 1.3 per cent per year (a 'carbon productivity contribution') (ibid) and will be reviewed by the Productivity Commission in 2014–15. The government has guaranteed this level of assistance for five years and has committed to buy back any unused permits (except where a firm shuts down) during the fixed price period (ibid: 114).

The 40 to 50 industrial plants receiving free permits represent 80 per cent of emissions from the manufacturing sector (ibid: 54), and this can be justified in two ways. First, as a form of adjustment assistance, the free permits support jobs and allow industries time to adjust 'to keep our emissions-intensive industry onshore as we price carbon pollution' (ibid: 53). Second, free permits can negate 'carbon leakage', which occurs if Australian industries shut down and foreign companies who emit more emissions per unit of output increase production as a consequence (ibid). However, as explained in section 3, Australian manufacturers will not move overseas. Instead, the free permits are the result of the political and economic power of industry and the rhetoric of lost competitiveness.

I concentrate on the EITE industries and argue that by protecting the profits of polluters, the CEFP delays the transformation of these industries to a low carbon future. To do so, I draw on three main areas of post Keynesian economic theory (section 2): post Keynesian pricing models, Salter's vintage capital model of technological progress and obsolescence, and Kalecki's analysis of class struggle. In section 3, I discuss the impact of carbon pricing on industry profits and the likelihood of shutdown, with and without industry assistance, and show that the impact depends on the pricing regime in industries and the position of firms on the Salter diagram of technological vintages. I concentrate on four specific industries to provide context for the analysis: the alumina refining, thermal coal, metallurgic coal, and aluminium smelting industries. In section 4, I explain that because the CEFP unnecessarily preserves the profits of the EITE industries, or even improves them, the kind of transformation of the economy predicted by the government's modelling will not occur. Moreover, the policy could delay the obsolescence of home and foreign marginal producers and increase net emissions. I also explain why a strong carbon tax policy is preferred, which undermines the orthodox economics assertion that taxes and permits are equivalent in their effect on emissions. In section 5, I conclude the article and consider the way forward which includes a strong role for complementary policies to achieve the transformation of the economy and a discussion about the cost of any adjustment assistance needed for workers and communities.

2. Post Keynesian Theory Relevant for the Impact of Carbon Pricing on Australian Industries

Post Keynesian economists generally regard industries as consisting of large oligopolistic firms operating with excess capacity to deal with demand fluctuations and administering prices as a mark-up over costs (Lee 2003: 285). Many forms of the mark-up pricing rule exist, but in its most basic form firms set prices by marking up unit direct costs (average variable costs) which consist of wages and material costs. Kalecki uses this mark-up pricing rule and explains that the mark-up depends on the 'degree of monopoly' which reflects the process of industry concentration, sales promotion, the power of trade unions and the level of overheads (Sawyer 1985: 24-27). Thus, for each firm *i*, prices are determined by the following:

$$(1) \qquad p_i = k_i u_i$$

where p_i is price, k_i is the mark-up and u_i is unit direct costs. In Kalecki's later work, the mark-up for each firm in the industry is determined by the following (Kalecki 1971 [1971]: 160):

$$(2) \qquad k_i = 1 + f_i\left(\frac{\bar{p}}{p_i}\right)$$

where $\bar{p}$ is the weighted average price in the industry (weighted by the output of firms), and f_i, which reflects the degree of monopoly, is an increasing function such that a higher average price compared to the firm's price increases the mark-up. Thus, where unit direct costs increase for some firms but not others, only part of the cost increase is passed on and the firms experiencing an increase in costs suffer from a reduced mark-up while other firms experience an increase in their mark-up.

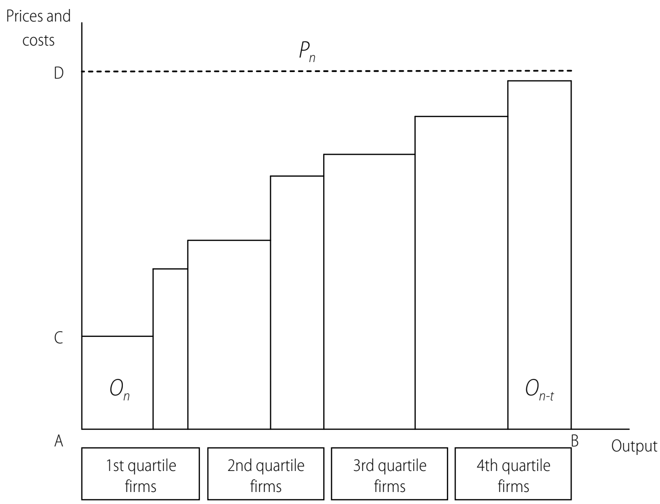
In more detailed post Keynesian pricing models, producers mark up average total costs (unit direct costs and overhead costs) at 'normal' output, which, due to excess capacity, is closely matched to actual average total costs except in extreme demand fluctuation events (Lee 2003: 286; Lavoie 2007: 47). In addition, the mark-up depends on a 'target return' to 'generate a volume of profits at normal output that will produce a specific rate of return with respect to the value of the enterprise's capital assets' (Lee 2003: 286). This provides a link between the pricing behaviour of firms and the financing of their investments. As Kenyon (1979: 39) states, the 'mark-up is linked directly with the need to finance planned investment expenditure'. Under a mark-up pricing rule, prices are relatively stable and cost increases experienced by all firms in an industry will be passed on to customers.

However, Kalecki emphasised the distinction between demand-determined and cost-determined prices, with raw materials and agricultural products singled out as demand-determined or 'flexprice' markets (Kenyon 1979: 34). In EITE industries such as alumina refining and metallurgic coal, prices do fluctuate and to some extent are demand-determined. However, they tend to fluctuate around a long-term average price which reflects costs, and these industries clearly do not have the characteristics of perfect competition assumed in Kalecki's original discussion of demand-determined markets. In fact, resource and manufacturing giants such as Rio Tinto, BHP, and Alcoa/Alumina dominate the markets (for example, see Turton (2002) on market power in the aluminium smelting industry). That is, the industries are composed of global megacorporations who own various plants in different countries, all of which have different productivities and operating costs based on their access to resources, distribution costs, and their vintages. Salter's (1966) vintage capital model of technological change and technical obsolescence is therefore useful for describing the industries and analysing the impact of carbon pricing.

In Salter's (1966) model, production plants are of different vintages and different productivities.[4] The most recently built plants embody 'best-practice' technology and those built last period embody the 'best-practice' technology of that period which has now become 'outmoded' (ibid: 52–54). Improvements in industry productivity and long-term changes in prices depend on the obsolescence of old, unproductive plants — 'plants which are sufficiently outmoded to be profitably replaced' (ibid: 54) — as new efficient plants are built. Thus, Salter (ibid: 52) states that given 'a continuous stream of improvements in techniques of production, the plants in existence at any one time, are, in effect, a fossilized history of technology'.

Salter orders plants from the most recent and therefore most efficient to the oldest and least efficient (*n*, *n*-1, *n*-2,….*n*-*t*) to produce the following step diagram.

Figure 1: The Salter diagram



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In Figure 1, the output of each plant O_n, $O_{n\text{-}1}$ and so on, is given on the horizontal axis such that total industry output is AB. The vertical axis in Salter's (1966) work measures the unit labour requirements of each plant (or another measure of productivity such as unit fuel or material requirements (ibid: 54) or unit carbon requirements) or, as shown in Figure 1, the per unit operating and total costs of each plant along with industry price (ibid: 59). Operating costs 'include all purchases from other trading enterprises on operating account — materials, fuel, etc. — and expenditure for wages, salaries, and supplements' as well as expenditure on repairs and maintenance and can be related to 'normal' average variable costs (ibid: pp. 51–52). For firm *n*, the newest firm, the unit operating cost is AC. Other 'supplementary' costs are grouped together with profits in the 'surplus', which is 'approximately equivalent to the gross trading margin (ibid: 52) or mark-up, and indicated by CD for firm *n*. Supplementary costs include depreciation and interest charges on capital or as Courvisanos et al. (2009: 282) suggest 'amortisation charges consequent on investment in best-practice capital equipment'. In contrast to new firms, old plants at the 'margin of obsolescence' (Salter, ibid: 74) such as firm *n-t* have very high operating costs with negligible amortisation charges as the older capital has been depreciated and loans paid off.

The price level is also indicated in Figure 1. In competitive markets, the price depends on the operating costs of the firm at the margin of obsolescence but also the unit total costs (operating costs plus capital costs including normal profit (ibid: 58) of the newest firm such that no firm in the industry makes abnormal profits. Thus, in a sense, all firms are at the margin and the price equals the 'best-practice unit total costs' and equals 'unit operating costs of plants on the margin of obsolescence' (ibid: 74).

As new techniques of production are developed, new best-practice plants are constructed which embody the latest innovations. This adds a firm producing O_{n+1} to the left of O_n and the price falls to the new plant's unit total costs. This pushes older plants into obsolescence and the productivity of the industry on average improves. For markets where producers have market power, the price is obviously higher and output lower than the competitive market situation and producers can earn abnormal returns (ibid: 90–93). However, the mechanism continues to apply with the obsolescence of marginal plants occurring when marginal revenue falls below their unit operating cost due to the production of new plants. This analysis suggests that while prices in EITE industries may fluctuate according to demand, they fluctuate around a long-term average which reflects the costs of the best-practice or marginal firms, depending on the market. Thus, the impact of a carbon price on domestic industries depends on their position on the Salter diagram, and how prices are determined.

To determine the long-term impact of changes in costs on firm's profits, I also consider Kalecki's analysis of class struggle. The post Keynesian theory of class struggle explains the determinants of income shares at the industry, sector and macroeconomic levels and the macroeconomic impact of changes in the distribution of income (Kalecki 1971 [1971]; Asimakopulos 1988 [1975]; Kregel 1979; Weintraub 1988 [1981]). Here, I concentrate on the mechanics of changes in prices and the mark-up at the firm and industry level in response to increases in costs. In the context of a closed economy, where mark-up pricing prevails, a rise in wages in all industries, seemingly a good result for workers, is marked up and passed onto consumers in the form of higher prices. As a result, the share of wages and profits in industry value added do not change because the mark-up remains stable. A rise in environmental control costs would also be marked up by oligopolistic producers and in Perry (2010) I analyse the impact of a rise in environmental taxes on the distribution and level of national income as a consequence.

However, in the context of an industry exposed to international competition where the price is set in the world market based on the best-practice or marginal firm's costs, or completely demand determined, prices may not respond to an individual firm's cost increases and Blecker (1999) extends Kalecki's analysis to suggest the following concerning a rise in wages:

> If wage increases in the domestic industry made national products more expensive compared with foreign products, oligopolistic firms that are about maintaining their market shares (in either the domestic market or export markets) would cut their profit mark-ups and restrain their price increases in response to the wage increases. (ibid: 125)
>
> While this is likely to be the response in the short run, firms whose profit margins have been thus squeezed may eventually attempt to weaken their unions, possibly by relocating (or threatening to relocate) production to non-union sites either at home or abroad. Thus, in the long run, it is more likely that competitive pressures will take their toll on wages than on profit mark-ups. (ibid: 144)

Following this approach, when environmental control costs rise for a domestic firm or industry and they face a fixed world price, profits will initially fall. Assuming no obsolescence of the firm, and therefore a continued existence in the market, the producer will respond to this reduction in prices in future periods by attempting to weaken union bargaining power using the threat of moving overseas and thus increase their mark-up. In such a scenario, profits can be maintained. This threat, of course, has been witnessed in the debate surrounding the CEFP and its failed predecessor, the Carbon Pollution Reduction Scheme (CPRS). For example, the Australian Aluminium Council executive director suggests that environmental policy such as carbon pricing 'will simply shift investments and operations offshore to countries without these costs' (Australian Aluminium Council 2009), and similar threats have been made by other industry chiefs (for example, see Yeates and Murphy 2011). However, as explained in the following section, this threat is unlikely to be realised and thus constitutes a strategy to receive improved levels of assistance and protect corporate profits based on the industry rhetoric of lost competitiveness.

3. Australia's Carbon Pricing Scheme Unnecessarily Protects the Profits of Polluting Industries

Even without any industry assistance, the profits of polluting industries would not suffer to the extent that they move overseas. Except for a small minority, firms would remain in operation and where shutdown is possible, carbon leakage is unlikely. The impact of carbon pricing on firm and industry profits, with and without industry assistance, depends on the position of the firm and domestic industry on the Salter diagram and how prices are determined. I consider three main alternatives and contextualise these with reference to the alumina refining, metallurgic coal, thermal coal, and aluminium smelting industries. First, I focus on domestic industries in the first quartile of the Salter diagram and where long-term average prices reflect the costs of these firms or the costs of foreign marginal producers who pay carbon costs. Second, I consider the case where these first-quartile industries face fixed world prices. That is, prices are demand-determined or the long-term average price depends on foreign marginal producers who do not pay carbon costs. Third, I assume the domestic industry is in the third or fourth quartiles of the Salter diagram and prices are demand-determined or reflect the costs of first-quartile firms in foreign countries. In addition, a Kaleckian analysis reveals that the long-term impact on profits depends on the ability of firms to control wage growth and this depends on union bargaining power.

3.1 First-Quartile Industries with Prices Reflecting Carbon Costs

In industries such as alumina refining and thermal coal where Australian industries are in the first quartile of the Salter diagram, it is likely that long-term average world prices will reflect carbon costs. In the case of alumina refining, Daly and Edis (2010a: 14), in their comprehensive study of the impact of carbon pricing on the EITE industries, indicate that 'Australia's alumina refineries are some of the lowest cost in the world' due to their proximity to extensive domestic deposits of high quality bauxite. Assuming a carbon price of $35 per tonne and no industry assistance, Daly and Edis (ibid: 16) produce a Salter-like diagram (with cash costs per unit of alumina produced on the vertical axis) to show that Australian producers will remain in the first two quartiles when the carbon price is imposed. They argue that the Australian industry 'will remain competitive even when they pay carbon costs' and that they 'are likely to continue to have substantial profit margins' (ibid: 14).

Alumina prices are generally set using alumina price indices (Alumina Limited 2010) and thus reflect both supply and demand conditions. However, long-term average prices will reflect the cost structure of producers, especially given the oligopolistic nature of the industry. In fact, Alumina Limited (ibid) explains that historically the price for alumina was set as a per centage of the aluminium price[5] but this failed to reflect the cost structures of alumina production and led to the establishment of separate alumina price indices. This indicates that the alumina price indices do now reflect these cost structures. Moreover, post Keynesian pricing models such as Kalecki's (equation 2) suggest that when costs

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rise for some producers and not others, average prices in the industry increase although the mark-up for the producers experiencing cost increases will fall. That is, cost increases are passed on to a certain extent. In the Salter analysis, because the Australian producers are in the first quartile and experiencing increases in operating costs, the industry price also increases. Like the Kalecki analysis, the price increase improves the mark-up for foreign marginal producers and this delays their obsolescence. Daly and Edis (2010a: 14) suggest that in the alumina refining industry, the costs of the marginal producer determine prices, rather than the costs of the low cost producer. However, they also note that 'international alumina prices may increase to reflect carbon costs, as several of the marginal global alumina producers in Europe pay carbon costs' (ibid).

Thus, both the best-practice and marginal producers will experience cost increases and long-term average prices will reflect carbon costs. As a consequence, the Australian industry will remain competitive and free permits are unnecessary because production and jobs will remain onshore. The only negative impact may be a small reduction in profits if some of the cost increases cannot be passed on. Moreover, Daly and Edis (ibid: 14, emphasis in original) suggest that 'in the unlikely event that Australian production reduced, this would probably *reduce* global carbon emission' as the most vulnerable Australian producer (who remains in the low-cost area of the Salter diagram) has relatively high carbon intensity.

In the case of thermal coal[6], Australia is the second largest exporter in the world (ibid: 32) comprising 20 per cent of the export market in 2007 (ibid: 33). While Australian producers are scattered across the horizontal axis of the Salter diagram, they again represent the lowest cost producer and a number of other low-cost producers (ibid: 39). In terms of pricing, Australia has a significant capacity advantage over foreign competitors due to capacity limits overseas and substantial increases in mining capacity expected in Australia in the future, and 'competition from producers in other countries is limited by shipping costs [and] quality differences' (ibid: 39). This places Australian thermal coal in a price leadership position and indicates that long-term average prices will reflect carbon costs. Daly and Edis (ibid) suggest that carbon costs could be passed on to customers and they conclude that industry assistance is unnecessary and that it only delays the movement of production from the gassy thermal coal mines to less carbon emitting mines (ibid). That is, it delays obsolescence and increases net emissions relative to the no assistance case. They also indicate that this movement would have occurred within Australia, rather than to overseas mines. Thus, the free permits provided to industry do not stop carbon leakage but serve only to 'protect profits of emissions intensive mines' (ibid: 32).

When free permits are allocated to producers of goods such as alumina refining and thermal coal, the industries could actually profit from carbon pricing and these windfall gains occurred in the European emissions trading scheme established in 2005 (Martinez and Neuhoff 2005).[7] For example, Spash (2010: 177) points out that Europe's largest emitter received profits of USD 6.4 billion for the first three years of the scheme and Euro 1.8 billion in one year by charging for permits they had received for free. Hepburn et al. (2006: 139) state that the 'great majority of participants in phase I (as measured by turnover or emissions) are making substantial profits from the system of free allocations' because they pass on to consumers the opportunity cost of permits despite never actually paying for them. In particular, profits in the electricity sector increase unless prices are directly regulated (ibid: 140). However, even the profits of trade-exposed industries such as cement and steel increase (see Smale et al. (2006) for a summary) depending on constraints such as the extent of import competition and government regulation of prices (Grubb and Neuhoff 2006: 11).

In the post Keynesian pricing models discussed above, free permits will increase the mark-up firms employ because the opportunity cost of using the permits to produce and pollute increases the required return on capital. Alternatively, free permits increase actual plus implied unit direct costs over which firms employ their mark-up pricing rule. In the Salter diagram, free permits equate to an increase in unit operating costs and therefore unit total costs of the low-cost producers. Where industries have some market power due to their market share, low costs or capacity limits, such as thermal coal, or where prices in the industry reflect carbon costs paid by other producers, such as alumina refining, free permits will increase the profits of domestic polluters.

3.2 First-Quartile Industries with Prices Demand-Determined

In industries with cost advantages over foreign firms, but where prices are demand-determined or determined by marginal producers who do not pay carbon costs (such as the metallurgic coal industry), a domestic carbon price reduces domestic profits. However, the domestic producers do not shut down and production does not move overseas due to their significant cost advantages. Australia is 'the world's largest exporter of metallurgical coal' (Daly and Edis 2010a: 32) comprising 58 per cent of the export market in 2007 (ibid: 33) and dominates the low cost end of the market with a superior quality of coal and significant profit margins (ibid: pp. 37–40). In terms of the Salter diagram, Australian mines represent almost the entire 1st and 2nd quartiles with roughly 10 per cent of Australian mines being high cost mines (ibid: 37). Daly and Edis (ibid: 36) suggest that the profitability of these 10 per cent of the really 'gassy mines' could be impacted, but for 90 per cent of Australia's coal mines the 'carbon costs will not undermine margins such that economic competitiveness would be threatened'.

Despite Australia's substantial dominance of the Asia and European markets, Daly and Edis (ibid: 38) explain that the operating costs of the marginal producer generally determines the world-market price and therefore carbon costs cannot be passed on (ibid: 38). However, the Kaleckian analysis of class struggle suggests that producers will react to the reduction in profits and profit share from the rise in carbon costs by attempting to weaken union bargaining power and increase the firm's mark-up in future periods using the threat of moving overseas. In such a scenario, the likelihood of which is exacerbated when any one producer does shut down, profits can be maintained in the long term. Thus, free permits are unnecessary for jobs and competitiveness because the viability of 90 per cent of the mines would not be threatened (ibid). However, they do protect corporate profits in the short term and delay the obsolescence of the gassy mines in Australia. A more appropriate form of assistance would target workers in the gassy mines and protect workers in future periods from wage falls.

3.3 Third and Fourth Quartile Industries

In industries such as steel and aluminium smelting, prices are demand determined or determined by low cost producers elsewhere in the world and carbon costs cause a reduction in profits for the domestic industry. The most vulnerable plants in these industries may, in the medium term, be forced to shut down depending on demand conditions. For example, the aluminium smelting industry, with six plants in Australia employing 5,000 people, may experience plant shutdown if they pay the full cost of the carbon price.[8] The Australian industry is dominated by Alcoa/Alumina Ltd and Rio Tinto who also have several smelting operations elsewhere in the world (ibid: 71; Turton 2002) and while Australia is the fifth largest producer, their share of the world market is a mere 5 per cent with China dominating at 34 per cent (Daly and Edis 2010a: 65). With more than 50 per cent of world production situated in countries without carbon pricing, and with prices being demand-driven or reflecting the costs of the first-quartile firms, higher carbon costs are unlikely to be reflected in prices (ibid), although given that five companies control 52 per cent of the market outside of China and former communist-bloc countries (Turton 2002: viii), a certain amount of cost mark-up should be expected.

In terms of the Salter diagram, Australian plants have been protected by state-based electricity subsidies which were the result of this market power (ibid) and they currently occupy the first and second quartile with one plant in the third quartile (ibid: 68). However, with the potential removal of state-based electricity pricing subsidies, all plants move along the Salter diagram to the third or fourth quartile (Daly and Edis 2010a: 73). The impact of carbon pricing similarly places the firms into the higher quartiles and with both the removal of subsidies and carbon pricing, all firms move to the fourth quartile (ibid) and one plant in particular becomes potentially obsolete (an older plant built in 1967 (ibid: 69)). However, carbon leakage is not likely in the medium term should Australian plants close down as 'Australian smelting capacity is likely to be replaced by lower emission plants overseas' (ibid: 72). Moreover, Daly and Edis (ibid: 72) claim that restructuring is inevitable because of the expected removal of existing subsidies and due to the construction of more efficient plants overseas. Thus, carbon pricing only speeds up the inevitable and free permits delay the obsolescence of inefficient plants in Australia.

The Kaleckian analysis of class struggle adds an extra dimension to this story. Although firms in these industries would reduce their mark-ups to maintain market share in the current short-period, in future short-periods they will use the threat of moving overseas to slow wage growth and recover the profit share of value added. This is especially the case if there is evidence of the shut-down of the most vulnerable plants in the domestic industry. Thus, in the medium term, the profits of remaining firms would be expected to recover and the main impact of the carbon tax would be felt by workers. This is perhaps why there has been such strong support by the labour unions for the assistance package under the CEFP. For example, Coorey (2011) reports on the powerful Australian Workers Union demanding that the 'steel industry be given complete exemptions from the carbon scheme' and 'that there be generous compensation for aluminium, cement and glass sectors' and Fyfe (2011) reports on union threats to withdraw support for the carbon pricing scheme if 'one job' is lost in the EITE companies.

In conclusion, without free permits, one or two plants in this industry might be vulnerable to shutdown while others could maintain profits by reducing wage growth over the medium term. Firms that do shut down employ a small number of workers in the context of the Australian workforce and protecting these workers would require a far smaller cost than the extensive industry assistance given, in the main, to protect short-term industry profits. Free permits also delay the obsolescence of inefficient firms and allow polluting industries to grow and prosper and this undermines the government's assertion that the CEFP will transform the Australian economy, as discussed in the next section.

4. A Transformation of the Economy Requires a Change in Relative Profits

The government readily accepts that most businesses affected by the carbon price will be able to 'pass on some or all of their carbon costs to customers' but that some 'big polluters will have trouble passing the cost on to their customers because the prices of goods and services they sell are set on international markets' (Department of Climate Change and Energy Efficiency 2011: 23) and it is these industries which have been supported and discussed above. They argue, however, that this assistance will 'maintain a strong price signal for industries to reduce the pollution intensity of their products' (ibid: 53), 'encourage industry to invest in cleaner technologies' (ibid: 51) and that carbon pricing 'will create a powerful incentive for businesses across the economy to cut their pollution by investing in clean technology and finding more efficient ways of operating' (ibid: 21). They claim that 'introducing a price on carbon will trigger the transformation of the economy towards a clean energy future' (ibid).

These statements are based on orthodox economics principles which hold that a price on carbon will cause firms to adjust inputs and technology at the margin and abate until their marginal abatement costs equal the carbon price. This incentive, in theory, exists even when allocations are received freely and even when carbon costs can be passed on to consumers. In orthodox theory, a permit scheme with auctioned permits, a permit scheme with free permits, and a carbon tax scheme are all identical in terms of their incentive effects. As Garnaut (2008: 331) states, the 'manner of permit allocation will not affect the price of permits or the costs of adjustment to the scheme' and 'the price of goods and services is independent of the approach adopted for allocating permits'.

However, even the Treasury's own modelling undermines the transformative features of carbon pricing. The modelling suggests that with carbon pricing and domestic abatement, emissions are maintained at roughly the same level as far out as 2050. While this corresponds to a lower level of emissions than an economy without carbon pricing (estimated to be roughly 1000 Mt by 2050), reaching the target of 80 per cent below 2000 levels by 2050, requires internationally sourced offsets (Department of Climate Change and Energy Efficiency 2011: 24). Nonetheless, the Treasury's modelling does include a reduction in the emission intensity of Australian industry. For example, the emission intensity of Australia's GDP falls from roughly 0.45 kg CO_2-e/$GDP to 0.15 kg in 2050 and the emission intensity of mining and high emission manufacturing falls from roughly 0.55 kg and 0.45 kg CO_2-e/$output to roughly 0.3 kg (Treasury 2011: 94).

From a post Keynesian perspective, even this modest transformation is optimistic because firms are not simply responding to relative price changes at the margin. As implied by Salter's vintage capital model, the technology and production processes of firms are fixed or difficult to change (Kronenberg 2010: 1490) and firms have a vested interest in the return on existing capital (Courvisanos 2003: 195). Producers satisfice rather than maximise profits and there is very little reason to change (if they can) their production processes if profits and market shares are stable.[9] In contrast to orthodox theory, relative profit changes in favour of clean producers and technologies are required for the transformation of the economy. This would reduce the financing constraints of green firms and industries relative to those of dirty firms and industries and allow the expansion of green firms. For example, Kalecki's (1971 [1937]) principle of increasing risk suggests a strong link between profits and the expansion of firms through capital accumulation because profits provide a source of internal financing and also help procure external financing. As Asimakopulos (1988 [1975]: 384) states, a 'firm's ability to grow thus depends on the profits it can generate to finance its investment plans both directly (retained earnings) and indirectly through borrowing related to its internal funds'.

In Steindl's (1952) analysis of firm growth and industry concentration, 'progressive' firms have lower unit production costs and greater profit margins than 'marginal' firms (Bloch 2000: 95). As a result, they have the 'greatest access to finance to undertake research and development activities with uncertain payoffs' (Bloch 2006: 299). Thus, 'higher profits earned by progressive firms therefore lead to expansion of their productive capacity relative to marginal firms. Eventually, the progressive firms become the largest firms in the industry' (Bloch 2000: 96). The consequence of the post Keynesian view of firm growth and industry composition is that a long term change in industry composition requires changes in relative profits such that green firms become low-cost and high mark-up firms, and dirty firms become marginal. Simply maintaining current relative profits impedes this transformation of industry despite the government's assertions to the contrary.

Salter's analysis confirms this. The carbon pricing policy must change the operating costs of dirty producers relative to the total cost of new 'best-practice' technology. Courvisanos et al. (2009: 280–284) explain that a tax policy has an impact on innovation if it increases 'the after-tax operating (material and labour) cost of existing capital equipment relative to the after-tax total cost of the best practice capital equipment' (ibid: 282). In other words, it must accelerate technological obsolescence while stimulating new firms or plants with best-practice technology to enter the industry. This is clearly not the impact of the CEFP. It

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has been designed to maintain after-tax operating costs of existing capital and its effect is to delay obsolescence. The end result is more minor or 'incremental innovations' rather than 'transformative innovations' (Courvisanos 2011). In the context of aluminium smelting, Daly and Edis (2010a: 70) support this claim when they suggest that it is probably 'uneconomic' to substantially improve Australian plants to employ best-practice technology and that only 'incremental improvements in energy efficiency may be possible'. The transformation in the technology of this industry will occur overseas and supporting the industry simply delays the obsolescence of inefficient Australian plants.

In contrast, a carbon tax policy with a much higher carbon price, or a tradeable emission permit scheme with full auctioning of permits would change the relative profits of the EITE industries and affect their financing and growth potentials. Thus, a carbon tax would have a much stronger claim of transforming the economy because it would force the obsolescence of the dirty industries and firms and encourage lower world-wide emissions through a process of technological innovation. This indicates that contrary to orthodox economic theory, the different approaches to pricing emissions are not equivalent in their effect. In addition, the tax or auctioning policy creates more revenue to be used to support innovation.

5. Conclusion and the Way Forward

The CEFP creates a carbon market and offers generous concessions to industry. While Australia's net emissions fall by 2020 and 2050, they do so, even in the Treasury's own modelling, by sourcing emission reductions overseas. At this stage, only 50 per cent of a polluter's obligations can be met by purchasing international offsets in the flexible price period while other domestic offsets from the Carbon Farming Initiative are also allowed. These offsets are problematic especially in the case where carbon sinks are created using, say, forest regrowth, because actual reductions in emissions cannot be guaranteed due to the difficulty of monitoring, the future impact of forest fires, and the issue of additionality — whether the overseas actions would have occurred without carbon pricing (see Spash (2010) for a summary of the arguments). It is also worth noting that the future of the 50 per cent limit on international offsets is subject to corporate manipulation. The restriction is only guaranteed until 2020 and will be reviewed by the Climate Change Authority in 2016 (Department of Climate Change and Energy Efficiency 2011: 107). Moreover, the extent of industry assistance in the form of free permits will be reviewed periodically by the Productivity Commission and could increase or decrease in the future. Because the CEFP maintains or improves the profits of dirty firms, it also maintains or increases their economic and political power, which suggests that greater rather than less concessions are likely in the future. It is conceivable that with 100 per cent international offsetting, Australia could increase its emissions to the roughly 1000 Mt predicted for 2050 when carbon pricing is not present and the target of 80 per cent below 2000 levels by 2050 would be achieved entirely by offsets. While this undoubtedly poses an ethical issue, at a more simplistic level it does not achieve the claims the government makes about transforming the economy towards a clean energy future. There is, in effect, no transformation of the Australian economy.

In the post Keynesian framework presented, this lack of transformation occurs fundamentally because the policy is not allowed to impact the profits of the dirtiest industries and firms. At a general level, environmental policy must be allowed to reduce the profits of the dirtiest firms and industries. To the extent that profits have been earned by exploiting a common resource, this seems perfectly reasonable. Profits should fall and corporations should be responsible for reducing emissions. The only way for them to recover lost profits should be through a reduction in emissions. The lack of impact on profits suggests that the CEFP is symbolic of a transformed economy at best and that complementary policies such as strong renewable energy targets are needed to perform the task of transforming the economy. Garnaut (2008: 353) suggests that with 'the advent of a broad-based emissions trading scheme, other emissions reduction policies become largely redundant'. However, these conclusions rely on orthodox economics assumptions which view firms as adjusting their technology smoothly at the margin to reduce emissions. In a post Keynesian world, no such substitution of technology occurs.

Thus, a carbon tax (with no industry assistance) is more likely to achieve the task of encouraging the obsolescence of high emitting firms because it impacts directly on profits. This illustrates that permits (with free or 'grandfathered' permits) and taxes are not equivalent in the post Keynesian model in contrast to the orthodoxy. Of course, the obsolescence of a small number of firms will cause unemployment and could have some regional effects and these workers and communities must be provided with adjustment assistance from the tax revenue. However, Daly and Edis (2010b: 14) point out that the cost of the Jobs and Competitiveness program — $9.2b over three years or $22b in the next decade — equates to a very expensive jobs protection program 'far exceeding the cost of other employment schemes'. For example, they show that the free permits cost over $65,000/employee per annum and in the aluminium industry the cost is $160,000/employee per annum. With the revenue earned from the carbon tax, cheaper alternatives could be used to help workers adjust.

In addition to a carbon tax, strong renewable energy targets, and different assistance measures, the financing of green firms and technologies has a stronger role to play under the post Keynesian perspective due to the link between financing and firm growth and the differential access to financing of existing, large firms compared to new firms. Thus, the Clean Energy Finance Corporation (a green loans fund) established by the Australian government as part of the CEFP must be increased in scope from its current $10 billion over five years (see Department of Climate Change and Energy Efficiency 2011: 121). This increase in scope could be financed using revenue from a carbon tax. In addition, by removing industry assistance, even at the initial price of $23 per tonne, this releases an additional $9.2 billion which is currently used to support the profits of polluting industries.

Finally, while the concept of minimising abatement costs is important, this objective cannot simultaneously undermine the transformation of Australian industry. Thus, international offsets must be limited to a small per centage such that offsets are 'supplementary to domestic action' (as required under the Kyoto Protocol) (Spash 2010: 184) rather than a facilitator of domestic inaction, and this limitation must be fixed and not reviewed. In the absence of this, industry will use the rhetoric of lost competitiveness to argue for concessions and, seemingly, the government will comply as they have done with the CEFP. As Pressman (2007: 80) suggests, 'Post-Keynesian analysis proposes regarding the state as a key economic player' and 'the state must make sure that the economy runs well and that the power of large corporations does not lead to undesirable outcomes'. The state must 'counter the power of large business firms' (ibid: 84). It is obvious from Australia's carbon pricing policy that the state is failing in this charge.

Notes

1. I would like to thank two anonymous referees for their insightful comments. I also appreciate advice given to me by Harry Bloch, Geoff Harcourt, and Jerry Courvisanos on a related paper I presented at the 2010 Society for Heterodox Economists conference and I thank Gillian Hewitson for her excellent comments on an earlier draft of this article.
2. The CFI credits must be 'Kyoto compliant' and under the fixed-price period there is a limit such that only 5 per cent of a source's emissions can be offset. This limit is removed during the flexible price period.
3. In Australia, the main industries are steel, aluminium, coal, cement, liquefied natural gas, and oil refining which collectively produce one-fifth of Australia's carbon emissions (Daly and Edis 2010a: 5).
4. Salter's model was suggested by an anonymous referee.
5. Alumina (or aluminium oxide) is retrieved from mined bauxite in the alumina refining stage of production and converted to aluminium in aluminium smelters.
6. Brown coal and higher moisture black coal is not exported. It is used for domestic energy production and higher carbon costs are likely to be passed through to electricity prices (ibid: 32). Other black coal is exported — metallurgical coal used for steel making and thermal coal used for power generation overseas.
7. In the Carbon Pollution Reduction Scheme, there was a test referred to as the 'no windfall gain' test which would review whether polluters were selling free permits that had been overallocated and gaining profits for doing nothing. This test was removed from the CEFP because the government has committed to buy back free permits which supposedly encourages firms to reduce emissions. It should be noted that the windfall gains discussed in this section refer instead to profits made by marking up the opportunity cost of free permits for which there is no provisions or tests.
8. To put this employment number into context, Chapman and Lounkaew (2011) analyse the real economic impact of 23,500 jobs claimed by the Minerals Council of Australia to be lost in the mining industry due to carbon

pricing. For example, the authors point out that around 370,000 people move into and out of employment on average every month (ibid: 10). They also highlight the growth in employment in renewable energy industries due to carbon pricing, citing the Climate Institute's claim that 34,000 new net jobs will be created in the power sector due to the shift to cleaner energy by 2030 (ibid: 4).

9. Behavioural economics also concurs with this concept that producers (and consumers) satisfice and Daly and Edis (2010b: 14) use this to argue that 'free permits represent an opportunity to gain rather than a serious competitive threat which forces a response'.

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