

Alternative Allocation Methods for Greenhouse Permits: Pros and Cons

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Basic Description of Domestic Carbon Permit System

At COP-3 New Zealand agreed to limit average annual emissions between 2008 and 2012 to 1990 levels. The major instrument being considered in New Zealand to achieve this is a carbon permit system. For the purposes of this paper we define the permit system as an upstream (fossil fuel producers and importers) system where trading is unrestricted across sectors and anyone is able to participate in the secondary permit market. The alternative would be some form of “downstream” or hybrid system where some carbon usage would be measured at the level of heavy energy users, while small users (e.g.: transportation) would be captured “upstream”. Downstream systems are administratively complex, and tend to be ‘leaky’ because of measurement difficulties. A quantity of permits equal to five times 1990 emissions would be issued.¹ These could be used any time after 1 January 2008. Permits would be “borrowable” within the commitment period but not beyond. They would be indefinitely “bankable”.

Basic Allocation Methods

Three basic goals are potentially affected by the permit allocation method used.

- 1 Create clear, secure property rights, and hence promote economic efficiency;
- 2 Distribute wealth equitably; and
- 3 Reduce the need for permit trading after the initial allocation.

The two basic approaches to allocation are auctioning (selling permits) and grandparenting (gratis allocation).

Auctioning (any form of sale of permit)

An active secondary market in permits makes the method of initial allocation, and specifically the design of an auction, less important because the market price for all permits is largely set outside the auction. Good auction design will however compensate for any market failures and support a well functioning system.

In New Zealand, if no international trading is operating, the market will be quite thin. Although any one could trade permits, as with our foreign exchange and stock markets, we cannot expect the level of activity larger countries see. The possibility of entry to the market, combined with anonymous trades, will deter significant market manipulation, but inefficiencies are likely to remain in the secondary market.

Optimal Auction Design²

One option with strong potential for efficiency is a sealed-bid auction with a uniform price rule. Buyers would submit bids, the auctioneer would find the price that

¹ It would be possible and possibly advantageous to reduce the number of permits issued in each year, if there are concerns about the credibility of the target for the total commitment period. See Fischer, Kerr and Toman, 1998.

² See Cramton and Kerr, (1998) for a detailed discussion.

clears the market, and those who bid at least as much as the clearing price would receive permits at that price. Uniform pricing encourages participation by small bidders, since it is strategically simple. The usual concern with market power in uniform price auctions does not arise if the market is competitive.

Ascending auctions are more complex approaches that can yield some efficiency improvements over sealed bids. This advantage must be balanced against their complexity.³ They also offer fewer opportunities for market manipulation if market power exists. The repeated bidding process in an ascending auction reveals information about participants' valuations of permits, which improves the bidders' own valuation estimates and hence the efficiency of the final permit allocation.

Grandparenting

Grandparenting is here considered to be any form of free allocation of permits. There are two basic types and an infinite number of options within each type.

A. Based on 1990 output (or later year prior to 1998) – or an average over several years

This is the simplest and most efficient grandparenting option. Firms chosen to receive permits get a share of the total allocation depending on their production or fuel use in prior years. The allocation could be to any firms, fuel producers and importers, large energy users, or even small energy users. Economically, the level at which permits are allocated is independent of the level of regulation, upstream or downstream.

Use of a prior year (or combination of years) avoids incentives to increase output to gain larger permit allocations. The disadvantage is that with a dynamic industry structure, output levels in 2008 may bear little relation to those from 1990. In particular, new entrants since 1990 would not receive allocations. This has no significant efficiency effects but is unlikely to be politically acceptable.

B. Output Based allocation

In this system, output would be measured annually. Permits for the current year would be allocated depending on the level of output in the current or past year. The only advantage of this system is that it adjusts to new entrants and other changes in the structure of the economy.

³ An illustration of such an approach is the “ascending clock auction.” The “clock” indicates the current price. In successive rounds, bidders submit the quantity they are willing to buy at the price shown on the clock and are not allowed to increase their bids as the price rises. If the total quantity bid exceeds the quantity available the clock price is increased. The bidding continues until the quantity bid is less than the quantity available. The permits are then allocated at the immediately prior price (with rules for distributing them to those who reduced their quantity in the last round of bidding).

There are major economic and administrative problems with this system (Fischer, 1998). First, each firm's allocation would depend on other firms' activities because each receives a share of the total allocation. Enormous uncertainty is created about permit allocations from year to year. Second, firms would have an incentive to produce more output to receive more permits. While firms can individually benefit from this, the total permit allocation is fixed so they are simply competing for other firms' permits in an inefficient way.

The simplest and most damaging criticism of this system is that "output" is not comparable across sectors. Electricity output may be roughly comparable within the sector, but how can it be compared to steel or car manufacturing. Output cannot be measured as CO₂ or even energy use, which would be comparable, because that would defeat the purpose of the permit system. This would be an administrative and compliance nightmare.

Grandparenting in an "upstream" system

Grandparenting could be done at any level, or a mixture of levels of the economy. Its primary motivation is compensation on political economy grounds. If the regulatory system is efficiently designed as an upstream system, the obvious way to grandparent is to give permits to fossil fuel producing and importing companies. However, a fairly cursory look at the ownership structure of these companies in New Zealand suggests that this will not be politically attractive. Many of the companies are foreign owned.

Grandparenting in a "downstream" system

Regardless of how the regulatory system is designed, upstream or downstream, permits could be grandparented to "downstream" companies or consumers. Everyone in the economy uses CO₂ and will bear part of the cost of regulation, so it is not clear how far downstream we should allocate. This would be a matter for negotiation. The risks involved in downstream grandparenting are that the negotiation process could be complex and highly inequitable even among the parties considered as potential recipients. For a discussion of the process of allocating SO₂ permits in the US see Joskow and Schmalensee, 1997. Another cautionary example is the allocation of Spectrum rights in the US where the negotiations over allocation took so long that the industry eventually supported the auction of rights, simply to solve the allocation problem efficiently.

Different Characteristics of allocation methods

Permit Market Effects

Administrative Complexity

- Upstream systems are simpler than downstream, regardless of the allocation method, because fewer agents have to report.
- Complexity rises if the allocation has to change over time because of information costs if adjustments are based on measurable variables, and because of negotiation costs to the extent that adjustments are discretionary.
- More complex allocation methods face legal risks. For example, the NZ Individual Transferable Quota system faced multiple legal challenges over quota allocations.
- The simplest auction system would be the sealed bid, uniform price auction. The more infrequently auctions are held the less the administrative load. However less efficient and less frequent auctions may put more pressure on secondary market institutions. The reduction in government cost may lead to a greater than compensating increase in private sector costs.
- The secondary market institutions are identical under auctions and grandparenting and are generated by the private sector.

Market Power

- Auctions will reduce the risk of market power relative to grandparenting, by increasing liquidity in the market.
- If permits are homogenous, as described above, the market will be liquid. It would be extremely difficult for one player to corner the market in permits for 5 years of NZ's total carbon usage. Some attention may need to be paid to liquidity at the end of the commitment period if not many permits have been banked.
- Anonymous secondary market trading will make cartels impossible to sustain.
- Free entry to the permit market will increase the number of players and make manipulation more difficult.
- International trading would put NZ permits on the competitive world market.

Allocative Efficiency

If the secondary market is efficient, this is not an issue under any allocation method. If it is not perfectly efficient the allocation method makes a small difference.

- An auction can allocate permits close to efficiently, in one shot.
- If a grandparented system allocates permits in a way close to the efficient allocation, it avoids the need to trade again. If however, grandparenting is based on an out of

date industry structure, grandparenting is done downstream in an upstream system, or the economy rapidly adjusts to the higher price of carbon, the initial allocation will be far from the efficient allocation. Then the secondary market will need to be extensively used.

- In either system, brokers in the secondary market can provide more complex arbitrage options, derivatives such as options and futures contracts, and ‘streams’ of permits across multiple commitment periods.

Industry Efficiency

Effects on entry

- Grandparenting based on a prior year’s output creates a wealth bias against new entrants. This has efficiency effects only if new entrants face liquidity problems arising from problems in the capital market.
- Auctioning/ output based grandparenting treat firms within the industry equally.
- With auctions, it is impossible to exclude new entrants from the industry by refusing to sell them permits. It would, however, be extremely difficult to exclude competitors through the permit market in any case.

Dynamic Effects

- Research and development, innovation, and adoption are driven by current and future prices of carbon. These prices are not affected by the allocation method.
- If large amounts of capital are need to adopt a new innovation, and the capital market is imperfect, large companies are likely to adopt more rapidly. If grandparenting gave wealth to the small firms, it might have some value for dynamic efficiency, but no proposed grandparenting allocations are aimed at very liquidity constrained small firms. In any case, any liquidity problems could be more appropriately dealt with directly.
- To the extent that new entrants carry out innovation, any allocation method that disadvantages new entrants will hinder innovation.
- Grandparenting may reduce the incentive to innovate because part of the benefit of innovation is a fall in permit prices.⁴ Under grandparenting, this fall would lower the value of the permit assets firms hold.

Risk

Under carbon regulation, risk comes in two forms, price risk, and asset risk. Price risk is the risk of changes in the permit price, and hence the cost of fossil fuel based energy over

⁴ See Milliman and Prince (1989)

time. This is faced by everyone in the economy, employees, shareholders, and consumers. Asset risk is the risk of changes in the value of a permit that has been issued but not yet used. This is faced by whomever holds unused permits (government or private sector).

Risk arises from two basic sources. “External” risks come from outside New Zealand. They would include possible changes in the international protocol, and new international innovations that allow carbon replacement. “Internal” risks come from within New Zealand. These could be government induced, such as changes in the allocation method, from auctions to grandparenting, or changes in the way grandparented permits are allocated. These changes would not lead to inefficiency per se, but private sector actors may attempt to influence the changes, and their responses would create inefficiency. ‘Internal’ risks could result from unilateral government decisions to make carbon targets more or less stringent. These risks would increase uncertainty unnecessarily, and hinder efficient investment.

Risks could also be private sector induced, particularly when there is no international market. A large reduction in permit demand by a heavy energy user, or the building of a significant new renewable energy source could have a large impact on the permit price.

The creation and management of risk is affected by the allocation method in two ways. First, grandparented permits are more likely to be manipulated by government because they provide politicians with more discretion. Thus auctioning could reduce total risk. Second, the number of permits allocated to the private sector through any method determines the sharing of asset risk between the private and public sector. If the major risks are external, or internal but not government induced, the private sector can more efficiently handle the risk, and more permits should be allocated to the private sector (i.e. permits issued further in advance).

International competitiveness

The competitiveness of products across countries depends heavily on the marginal cost of production. The method of permit allocation does not alter the price of permits, or the price changes induced throughout the economy. Producer and consumer prices will be identical under grandparenting and auctions. A firm that holds a grandparented permit can use it to produce an extra unit of output or can sell it to another firm. The ‘price’ of using that permit is the opportunity cost of not selling. A firm that has not been grandparented permits must buy the permit and faces a direct cost equal to the opportunity cost. The marginal economic cost of output is the same. Thus the firm with grandparented permits gains no marginal advantage.

Grandparenting permits does lead to macroeconomic inefficiency because it forgoes the benefits of the reduction in taxes possible under an auctioned system. A country which grandparents permits will be less competitive overall than its counterpart because of the higher taxes. Grandparenting may allow an industry to continue even when it is no

longer economic by providing a capital asset. This would maintain that industry in the short run, but at the cost of its shareholders and the economy as a whole. This would occur only if the directors of the firm decide not to maximise the return on their assets, including the permit assets.

Multinationals

Multinational enterprises have the ability to transfer activity in reality or on paper (such as transfer pricing), to gain tax and possibly permit advantages. Moving real activity is expensive. Empirical studies generally suggest that responses to taxes happen on paper and in the timing of activities rather than through real shifts in output. Paper transfers are possible with CO₂ permits only if the monitoring does not accurately capture real activity. This is more of a risk in a downstream system than upstream where monitoring is more straightforward.

How could multinationals respond differently to auctions and grandparenting? If some countries grandparent on the basis of current output, multinationals will want to, if possible, focus their output in those countries to gain permits. If all countries grandparent permits based on prior output, auction permits, or use taxes, multinationals will have no allocation-based reason to move activity. Of course the usual incentive to move activity to countries with more lenient or no regulation will remain.

Macroeconomic Effects

- Any non-comprehensive permit system (such as a leaky downstream system), or system with high transaction costs (such as a downstream system), or system with incentives to behave strategically to alter permit allocations (such as an output-based grandparenting system), will reduce the efficiency of the macroeconomy.
- Grandparenting permits means that government forgoes revenue. This revenue could have been used to reduce distortionary taxes on capital and labor, and thereby increase the efficiency of the economy as a whole. In the US, auctioning permits and returning the revenue through tax cuts could halve the cost of CO₂ regulation.⁵
- On the other hand, if we think that government will waste the funds and not put them to good use or make tax cuts, reducing government revenue could be good. However, given the current emphasis on fiscal responsibility in New Zealand, the current orientation of the major political parties, and the relatively good financial management system in the public sector, this latter fear seems less of a concern than it may be in the US.

Distributional Effects⁶

⁵ See Bovenberg and Goulder (1996) and Parry et al (1997)

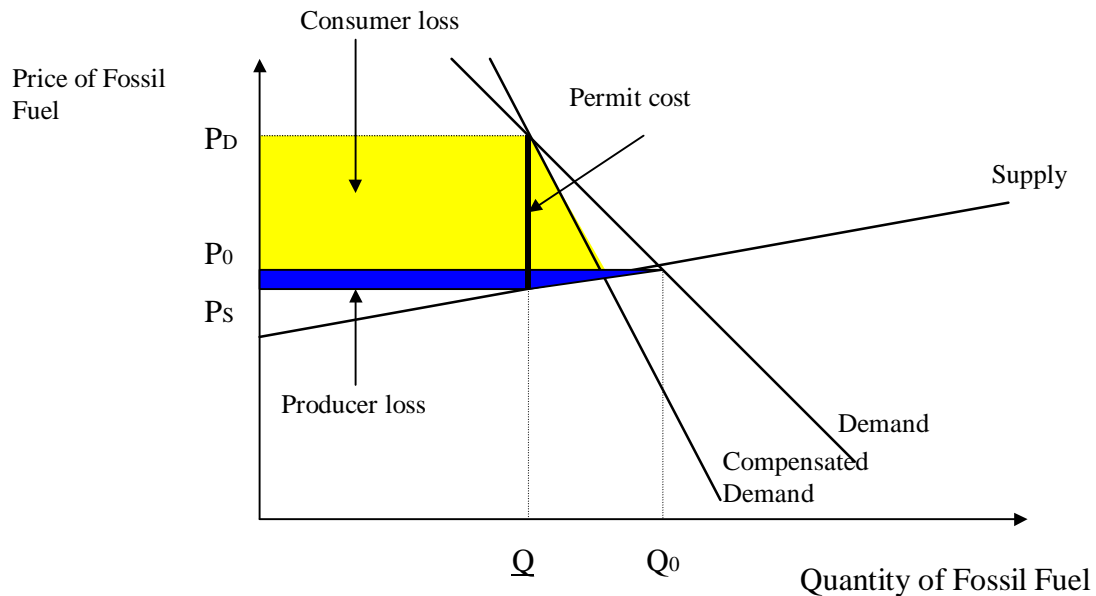
⁶ For more detail see Cramton and Kerr (1998)

The primary argument for grandfathering over auctions is generally a distributional one. It is argued that it is used to compensate 'affected industries'. The distributional concerns have some real justification, but the argument as commonly expressed is flawed. Here we briefly discuss the price effects of carbon regulation, and the wealth effects of different allocation methods.

Price Effects

Figure Two illustrates the price effects of carbon regulation and the losses to consumers and producers. Equivalent diagrams could be drawn to show the effects on employers and employees in the labour market, or capital owners in physical capital markets.

Figure 1 Fossil Fuel Price and Quantity Effects from Carbon Regulation



Two important points need to be understood here.

- First, the price effects in the economy are independent of the method of allocation. The price effects determine the way costs are borne throughout the economy. The method of allocation simply transfers wealth to whoever receives the permits.
- Second, three types of people bear costs, shareholders and other capital owners, workers, and consumers. 'Industries' and 'firms' do not bear costs; they pass them on to one of these groups of people.

Theory and empirical evidence in the United States suggests that with any efficient form of carbon regulation:

1. Consumers will bear all costs in the long run in a competitive industry;
2. Shareholders will bear costs in the short run (one capital cycle), because capital assets that are dependent on fossil fuel use will lose value;

3. Workers who are unable to move industries or away from areas dependent on fossil fuels may suffer concentrated harm in the short run (maybe up to one generation).

Shareholders in large firms tend to bear costs in a very diffuse way; many different individuals own each firm. In contrast, workers and owners of small firms will be harmed in a concentrated way. Among consumers, some will be more harmed than others. Those most harmed will be those with high energy demand. In the US, this is people in colder areas without access to hydro-electricity. Carbon regulation is slightly but not significantly regressive (proportionately hurts poorer people more) in most countries according to estimates.

I have no evidence on the distributional effects of non-carbon regulation.

Compensation Effects

Grandparenting can be used to compensate shareholders where they are seriously affected. It will tend not to reach the owners of small firms. It cannot help workers or consumers. The benefits of grandparenting will not be passed on in the long run in a competitive industry.

Auction revenue could be used to design limited compensation for acutely affected groups. Transitional tax credits to some industries (not output based), relocation and retraining assistance to affected workers and communities, and general tax breaks to benefit all consumers, are some of many options. Permits could be given directly to workers and consumers but this would be less valuable to them, less macroeconomically efficient and much more complex.

Neither grandparenting nor the return of auction revenue should be designed in such a way as to alter the price effects, as this would raise the overall cost of carbon regulation.

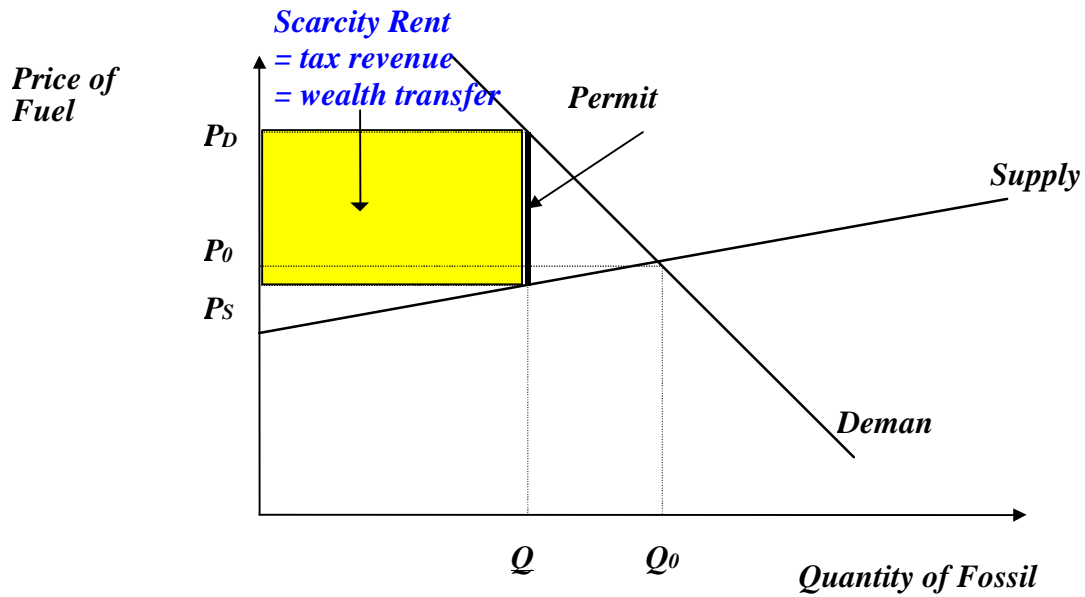
Transfer of wealth

Finally, the method of allocation does have significant effects on the transfer of wealth between the private and public sectors. Figure 3 shows the 'rents' created by the permit system's limit on carbon usage. The allocation method affects who gets this rent. Under grandparenting, specific parts of the private sector receive permit rents directly. Under auctioning, the rent is captured by the government and then returned to the private sector in general via tax cuts and debt repayment. These options create very different short-term flows.

One concern with auctioning is that an immediate auction of a large number of permits would strain the financial resources of the private sector. In the US one year's worth of

permits could be as much as 2% of GDP.⁷ Auctioning 5 years worth, in a small market such as New Zealand's may be infeasible. Permits may need to be sold, or at least paid for gradually, to match the benefits from the associated tax cuts, and with energy usage.

Figure 2 Scarcity Rents and Carbon Regulation



Possibilities for Combinations of Allocation Method

Grandparenting and auctioning are not mutually exclusive. It would be straightforward to auction a portion of permits and grandparent another. These fractions could be set to change over time. For example, if 100% auctions immediately were politically unacceptable, the percentage auctioned could start lower and gradually be moved upward. Whatever method or combination of methods is used, the less uncertainty about the process and the future process the better.

Allocation of non-CO2 gases

Non-CO₂ gases that can be accurately monitored and measured could be allocated in the same way as CO₂ permits. The same issues will apply but with different implications. The distributional implications would clearly be different and would be worth investigating. The options for indirect compensation through auctions followed by tax cuts will also be different.

⁷ See Cramton and Kerr (1998).

Non-CO₂ gases that cannot be accurately measured at a sub national level may have to be dealt with using different instruments. This is beyond the scope of the paper. The only direct implication, is that the number of permits issued to the private sector would be reduced by the amount of expected emissions from non-permit controlled sources.

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