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EU-ETS: From Tax Exemptions to Cap Exemptions

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1. Introduction

In 1987 the Brundtland Commission put climate policy on the political agenda. One year later the Intergovernmental Panel on Climate Change (IPCC) was formed, and, then, the United Nations Framework Convention on Climate Change (UNFCCC), with the goal of stabilising the concentration of greenhouse gases (GHG) in the atmosphere, was adopted by most of the world's governments before going into effect in 1994. The Convention has now been signed and ratified by 186 countries.

In 1997 the parties of the Convention took the first step towards an agreement on mandatory rules for limiting GHG emissions: the Kyoto Protocol. However, it was not until 2001 that a detailed rulebook for this policy, the Marrakesh Accords, was designed. The mandatory rules of the Protocol only apply to countries with developed economies (so-called Annex I countries). The US, followed by Australia, decided not to ratify the Protocol (although Australia has relatively recently decided to ratify). The Protocol did not go into effect until it was ratified by Russia in February 2005, since with Russia's ratification, the countries that had ratified the Protocol represented more than 55% of the emissions from Annex I countries (UNFCCC Climate Change Secretariat, 2002). A main feature of the Kyoto Protocol is that participating countries should reduce their emissions of six greenhouse gases by at least 5% in the first phase, 2008-2012, compared to the levels in 1990, which is used as the base year (European Environment Agency, 2008).

The Kyoto Protocol includes three flexible mechanisms: the emissions trading system (ETS), joint implementation (JI), and the clean development mechanism (CDM) (UNFCCC, 2002). JI is an investment in emissions reductions in one Annex I country made by another Annex I country. In return, the investing country is given Emission Reduction Units (ERUs). CDM is an investment in emissions reductions in a Non-Annex I country, generating Certified Emission Reductions (CERs) for the investing country. Both JI and CDM require permission from the host country and must be approved by the UNFCCC special CDM and JI boards (See UNFCCC, 2002;

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Mechanisms, Joint Implementation and Mechanisms, Clean Development Mechanism).

In the European Union (EU), the EU-15[2] accounts for about 15% of the total global emissions. In the Kyoto Protocol, the EU-15 has a burden-sharing commitment of reducing emissions by 8% by 2012, compared to the 1990 levels, and there is also an internal allocation system for lowering emissions based on each individual country's structure, energy consumption, industry and emissions per capita. The EU-27 countries (EU-15 plus Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia) do not have a common base year under the Kyoto Protocol, and allow new EU members to make individual commitments.

Since the Kyoto agreement, the EU has been developing its own climate policy with the objective to find cost-effective ways to reduce emissions. One of the most important steps was the Emissions Trading Directive agreed upon in 2003 with a purpose to "…establish a scheme for greenhouse gas emission allowances trading [a cap-and-trade system] within the Community..." (Directive 2003/87/EC of the European Parliament and of the Council, Article 1, 2003).

Because of the large differences in abatement costs among the EU countries, efficiently designed emission permit trading will substantially decrease the cost of climate policy. Viguier, Babiker and Reilly (2003) compare the costs of meeting the Kyoto targets without trading in four different general or partial equilibrium models. They find a large variation in abatement costs per tonne CO_2 across countries, with the highest costs in Scandinavia and the Netherlands, ranging between 74 € and 105 €, and the lowest in Germany and the UK at 32 € and 25 € respectively. The welfare effects of meeting Kyoto are lowest for Germany and highest for the Netherlands. These results are broadly consistent with other studies. Germany and the UK tend to be 'cheap countries', while Sweden seems to have the highest marginal abatement costs.

The EU CO_2 emissions trading system, EU ETS, accounts for about 30-50% of the national GHG emissions, depending on the economic structure. The system includes the minerals industry (cement, limestone, ceramics and glass), iron and steel, pulp and paper and refineries plus the energy sector. As a result of powerful lobbying, some energy intensive sectors were not included due to competitiveness arguments, e.g. the chemical industry, aluminium production and industrial gases (See Michaelowa & Butzengeiger, 2005). This sectoral differentiation comes at a relatively high cost – according to some estimates the costs of achieving the Kyoto target are doubled, while the excluded sectors end up not gaining much (See Kallbekken, 2005). With small emissions reductions in the trading sector, the burden for the non-trading sectors increases. Cost efficiency requires that the marginal abatement costs are equal in the trading and non-trading sectors.

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[2] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, Spain, Sweden and the United Kingdom (UK).

Although the first period, 2005-2007, was a test phase, it is widely regarded as a success from a technical point of view. After all, a functioning carbon market was put into place. However, the highly volatile price development, with very high CO_2 prices (>30 €/tonne CO_2 in April 2006) during one phase of this period and the close-to-zero price level towards the end, constitutes less impressive features of the system. The main reason behind this price pattern was a large uncertainty about the ratio between the allocation of allowances and the actual emissions, which turned out to be greater than 1 when the uncertainty eventually disappeared at the end of the period. Although the emission data was not fully accurate, it was probably the best available considering the short time frame. The emissions data used for the second trading period is made up of verified emissions for 2005; hence, over-allocation is supposed to be avoided. The tighter cap is reflected by the present price level (at the beginning of 2008) of about 20 €/tonne CO_2.

The second EU ETS period from 2008-2012, called the *commitment* period, has now begun. The commitment refers to the undertaking to reach the national Kyoto targets by the end of 2012. The EU ETS currently comprises 27 countries and about 11,500 CO_2-emitting units – in EU terminology so-called *installations*. The implementation of the cap is based on national *allocation plans* (NAPs) designed by each country within the EU ETS and, to create a level playing field, assessed and approved by the European Commission.

In the international discussion among economists, EU ETS has gained a reputation as a successful and cost-effective system in climate policy. The objective of this paper is to review the emissions trading system and address several inefficiency and inequity aspects. Although the generous cap during the first period may depend on the large uncertainty about historical emission levels, the point I want to make here is that a generous allocation even in the future is necessary for the system to survive politically – unless the system is radically changed. Powerful lobby groups in most countries seem to be able to influence permit allocation in their favour and grab sizeable rents. The political concern for industry competitiveness with an ambition to protect the carbon intensive manufacturing industry will probably drive up both the CO_2 price and the electricity price to unacceptable levels if the cap becomes 'too tight'.

2. EU Climate Policy – A Paradox

The most impressive aspect of EU climate policy in my view is the somewhat paradoxical EU climate policy agreement in itself. One may wonder why it was so easy to agree on climate policy with strong implications for energy prices while it took the EU members decades to reach an agreement (at about the same time in 2003) on minimum energy taxes at very low levels (about 0.05 eurocents/kWh) and still with exemption possibilities. Does EU climate policy represent a break with the past, with its extensive protection of the energy-intensive industries from higher energy taxes? Was it because the politicians did not understand the consequences of a cap-and-trade system, or were they of another more environmentally concerned breed? Or did they design a cap-and-trade system that does not look like the textbook model but more like the energy taxation system, where no energy-price sensitive activity should get hurt? These questions will be discussed below.

For any single country or single region developing its own climate policy, there is a serious dilemma between domestic efficiency and global efficiency. For a small open economy like Sweden (but also for the EU), the demand elasticities for energy intensive products in the export markets are large, while the global demand elasticities are much smaller for products like steel and cement. Domestic efficiency in climate policy implies the same marginal abatement costs in all activities. Thus, we should expect a rather large impact on industry structure with extensive closures of GHG-intensive plants when all activities meet the same CO_2 price. On the other hand, the reduction in world demand will be much smaller since it is much less price sensitive. Hence, from a global point of view GHG emissions may have decreased some, although much less than the domestic initial emissions reduction. If the average world technology is less efficient than the domestic technology, then global emissions may even have increased. This has been the classical argument for tax exemptions for energy-intensive industries. The problem, however, is that in a cap-and-trade system there is a cap that makes the game totally different from taxation.

3. An Efficient Market Design of a Cap-and-Trade System

Several aspects of the EU trading system have been analysed in economics research, but the results from this do not yet seem to have reached outside a close circle of specialists and obviously not into the general economics or environmental-political debate. The latter seems to be based on the presumption that the EU ETS is designed as an efficient system according to the standard textbook model, with its clear separation between equity and efficiency. Moreover, most general or partial equilibrium analyses of the economic impact of the introduction of a carbon market seem to be based on the assumption of an efficient market design where all activities are exposed to the same carbon price, which equals the marginal abatement costs.

In the standard textbook model the market price of the permits is independent of the initial allocation and equals marginal abatement costs. All activities are exposed to the same CO_2 price, and the cost of meeting a certain emission target is minimised. According to this model, an *efficient* emissions trading system, with permit auctioning or grandfathering, i.e. allocation of permits for free, works in the following way. The allocation of emission allowances is a transfer of wealth from EU to the capital owners of the plants in the system. This transfer of wealth may be regarded as a compensation for windfall losses incurred by the emission cap, and it will 'only' strengthen the balance sheets (and not the income statements) of the companies concerned. The market permit price does not depend on the specific allocation of permits among plants. Instead, it is determined by total supply and total demand in the entire European permit market. Total supply is determined by the EU, while demand is determined by the companies´ willingness to pay for the marginal units. The costs at market prices of the permits used in production appear on the income statements of the companies.

In the textbook model, the opportunity cost of permits used is the market value of the permits. The permits allocated for free have the same character as own power plants or own forests in the forest-based industries – they are part of the company wealth. However, correct costing implies that such inputs are valued at opportunity costs, i.e. at market electricity prices and market timber prices respectively, in the production process, and not as a free or subsidized input.

Thus, the permit market price does not depend on the allocation principles, and it is this price that determines which plants are profitable, which are not and which should be closed down. It is this textbook model, where allowances are either auctioned or distributed in a lump-sum manner (in practice indefinite allocation of free permits to a plant), that most economists seem to presume is the EU model.

4. The Design of EU ETS

A closer look at the EU ETS design reveals that it includes allocation rules that create an additional set of incentives not consistent with an efficient system. Although there are noticeable differences among the country-specific so-called National Allocation Plans (NAPs), their most important features are shared. While there is still (in February 2008) uncertainty about the NAPs for the current period (2008-2012), there is no reason to expect any important changes compared to the first period. The basic principle behind the trading system is not efficiency but a sort of equity. Almost all permits are allocated through grandfathering, i.e. for free. Similar to energy tax policy, the major objective has been equity in the sense that nobody should get hurt and industry competitiveness should be maintained.

On the other hand, the Commission has to make certain that the national allocations can not be considered state aid. Although there have so far been no established cases of state aid, Sweden may be such a case since the Swedish allocation plan for 2008-2012 (not yet approved by the Commission) allocates all free permits to the manufacturing sector and none to the energy sector.

Incumbent plants

Concerning efficiency there are three important and partly interrelated aspects that deserve to be discussed:

- Allocation of free permits among plants (NAP) at the start of a trading period.
- EU rules for allocation of permits in the case of closure.
- EU rules (or rather the lack of such rules) for updating between trading periods.

All these aspects contribute to carbon market inefficiency. Compared with an efficient market design, the EU rules make the market less flexible, which in turn makes the CO_2 price exceed the marginal abatement cost.

A general problem in all multi-period systems, well-known from the planning systems in the former Eastern Europe, is the rules for updating. Since it is difficult to allocate allowances in a lump-sum manner for longer periods of time, updating is a serious problem in EU ETS. Moreover, pressure-group lobbying makes it even more serious. Currently there are no formal rules for updating between trading periods, making investment profitability highly uncertain. While little attention has been paid to this before, there is emerging research addressing the incentive properties of different allocation rules and investigating the possibilities of finding allocation schemes that combine cost-effectiveness and a high degree of competitiveness (See Åhman, Burtraw, Kruger, and Zetterberg, 2006).

The EU (updating) rules for allocation of permits in the case of closure or reduced capacity utilisation within a period vary a lot between countries, but in principle the rule is, no production - no emission allowances. A policy that conditions the allocation of emission allowances on the continued operation of a plant has very different incentive properties than a lump-sum allocation or auctioning. Under the former policy, companies will not regard the market price of CO_2 as their opportunity cost. If future allowances are based on current emissions (as in EU ETS), this will reduce the profitability of abatement measures and closures of plants. The value of the allowances a firm will lose from closing a plant will be taken into account and it may be profitable for firms to act strategically and keep or even increase their emissions today to keep or increase their future quota of free permits. To diminish the impact of updating on company behaviour, Åhman et. al. (2006) propose a ten-year rule, i.e. a company that closes a plant should keep its allocation of free permits during a ten-year period.

From an efficiency point of view this means that the market price of CO_2 will not enter as a production cost for the trading plants. There is strong evidence that this also seems to be the case in Sweden, as well as in Europe in general (See Energimyndigheten, 2007).[3] In a selection of annual reports, I have not found a single company accounting for the market price of CO_2 as a production cost of the permits it has received for free. This kind of accounting, of course, makes sense if emissions reduction in the current period means a corresponding reduction in free permits in the next period.

A less flexible market means a higher price. Compared with an efficient market, there will be less supply of permits, and the market price of CO_2 will exceed the marginal abatement cost. In fact, the result in Rosendahl (2007) suggests that the permit price may be several times higher than the marginal abatement costs.

A skewed allocation of free permits may work in the same way. This would be the case if the most CO_2 price-sensitive plants were protected from the CO_2 market price. The trading sector consists of the most carbon-intensive manufacturing plants plus the energy sector. The manufacturing plants compete in the world market with rather price-sensitive products in export, while the energy sector competes in more or less domestic markets with low price-sensitivity and with substantial market power in most markets. From an equity point of view it may seem reasonable that the manufacturing plants get their permits for free while firms in the energy sector have to buy theirs in the market, since it is easy for the energy firms to get compensated by price and profit increases. It would also be tempting from a political point of view, as in the proposed Swedish allocation plan, to favour the manufacturing firms through generous allocation of free allowances.

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3 This is also confirmed by a selection of annual reports from European manufacturing companies.

While such a skewed allocation of allowances would not affect the CO_2 price in an efficient market, it does do so in EU ETS, since there it means that the manufacturing plants are more or less excluded from the trading system, because of updating enjoying the same protection as in energy taxation. The 'real' CO_2 market consequently consists of the least price-sensitive plants, which means that in contrast to an efficient market, the CO_2 market price exceeds the marginal abatement cost.

Again, the problem here is not the skewed distribution of free permits per se, but rather that the permits are handed out for a certain period of time and that the future allocation depends on the current emissions; no emissions – no allocation of free permits.

Regarding closures and decreases in capacity utilisation in general, different countries have different definitions of closures, and the treatment of 'left-over' permits resulting from closures varies among countries. Emitting plants are generally compensated with free permit allocation and plants that do not emit lose their permits; however, the way this principle is implemented varies.

- In most countries, the allocation is reduced if an installation is closed or production reduced (e.g. Germany, Poland, Denmark, Finland and Spain). Most of these countries put the resulting 'left-over' allowances into the new entrant reserve.
- Plants that reduce their emissions lose their permits after three months in some countries (e.g. Germany), in the following year in most countries and in the following period in others (e.g. Sweden and the Netherlands).
- In some countries it is possible for a plant owner to transfer allowances from a closing plant to another plant (e.g. Germany, Poland, Austria and Italy).

The efficiency consequences will be further discussed in Section 5.

New plants

The allocation of free permits to new plants has another character than allocation to incumbent plants. Since there are no windfall losses in the former, it is difficult to find any equity argument, and from an efficiency point of view there is no reason to subsidise new CO_2-emitting plants. In general, the subsidies, in the form of free permits, do not favour the shareholders; instead the subsidies 'disappear' in less efficient investments and discriminate less CO_2-intensive plants relative to more CO_2-intensive ones. The basic technology in most energy-intensive plants is generally embodied and not possible (or is at least very expensive) to change after the investment. Thus, perverse investment incentives have long-lasting effects and may cause more serious distortions than the rules for incumbent plants.

Although allocations to new entrants vary among countries, they all have a reserve quota of free permits to new plants. Most countries use the 'first come, first served' principle, and the total reserve is either divided on a yearly basis or used as a whole for the entire trading period. The most common methodology when it comes to deciding how much to give the new entrant for free is benchmarking, either based on best available technology (BAT) or technology multiplied by expected production or new capacity. This differs not only among countries but also sectors (Åhman et. al., 2006).

Countries have dealt with running out of reserves in two different ways (Naturvårdsverket and Energimyndigheten, 2006):

- New installations have to buy their permits (e.g. Sweden, UK, Austria, Belgium, Greece, Hungary, Lithuania, Netherlands, Portugal and Czech Republic).
- Country governments have to buy permits to be given to new entrants (Belgium, France, Germany, Italy, Luxemburg and Poland).

If not the whole reserve is handed out to new entrants, the following options have been chosen:[4]

- Remaining allowances in the reserve are auctioned or sold (Estonia, Finland, Greece, Ireland, Italy, Luxemburg, Poland, UK, Czech Republic, Hungary and Austria).
- Remaining allowances in the reserve are annulled (Denmark, Lithuania, Spain and Germany).
- Some countries have wanted to give the remaining allowances in their reserves to existing installations, but this was not approved by the Commission.

As in the case of incumbent plants, the basic rule for new plants is 'no emissions – no permits'. Thus, a new fossil-fuelled plant obtains free permits, while hydro, nuclear and wind plants do not. This means that new gas or coal plants are subsidised, which, of course, creates perverse investment incentives. The nuclear and renewable-energy suppliers are simply discriminated against.

5. Inefficiency and Inequity

All aspects discussed in Sections 4 and 5 contribute to the inefficiency, and some also to the inequity, of the trading system. The major problem is not free permit allocation per se, but rather the principle of no emissions – no free permits. This direct link between emissions and free permits that most countries use in their NAPs implies that plant closure results in lost allowances, which creates perverse incentives since it encourages firms to keep inefficient plants instead of closing them down. (Moreover, if one part of the trading sector gets 'full protection' from the CO_2 price, then only the least price-sensitive part of the system remains.) Although such a principle may seem to make sense politically, it is devastating for the efficiency of the system. In an efficient system, the allocation of free permits does not affect efficiency since it is just a transfer of wealth. In the EU ETS this is no longer the case. Here there is an interaction between allocation and efficiency, implying that non-uniform allocation of permits across countries will cause inefficiency.

This means that in terms of efficiency,

[4] ibid.

1. the profitability of emissions reduction for a certain technology varies greatly across EU countries;
2. the incentives for emissions reduction are relatively weak compared to a system with permit auctioning or indefinite allocation of free permits;
3. due to the updating rules, the carbon-intensive industry is in reality removed from the system in the Swedish allocation plan or has small incentives to reduce emissions in most countries;
4. the weak incentives for emissions reduction means that the demand side becomes much less flexible, which requires a much higher market clearing permit price to meet the cap than in a system with auctioning;
5. a higher permit price will also translate into a much higher electricity price;
6. new CO_2-emitting plants are subsidised through the allocation of free permits to such plants. This creates perverse investment incentives, especially in the energy sector where the cost differences in most EU countries are small between nuclear, gas and coal;

and in terms of equity that

1. most capital owners in the trading system are more than compensated;
2. capital owners in the energy sector are compensated through much higher electricity prices resulting in large windfall profits;
3. no capital owners outside the trading system are compensated, not even in the electricity-intensive industry;
4. because of the weak incentives for emissions reduction (and in combination with the skewed allocation of allowances in some countries), the burden of climate policy will spill over to the non-trading sector, which will be hurt more than in a trading system with permit auctioning.

One obvious conclusion is that it is hard to design an efficient trading system without auctioning all permits. Grandfathering seems to always generate inefficiency with permit prices higher than marginal abatement costs, spilling over into high electricity prices. Yet, from an equity point of view, it does not really make sense to allocate free permits indefinitely to plants that may not emit (or may not even exist) in the future. The "ten-year rule" suggested by Åhman et. al. (2006) would only solve part of the problem.

Another conclusion is that a number of policy analyses are wrong since they are based on the assumption that the permit price reflects marginal abatement costs.

6. Will EU ETS survive?

Many economists seem to feel that EU climate policy represents a break from the past, with its extensive protection of the energy-intensive industries from higher energy taxes, and that EU now has designed an efficient cap-and-trade system. This is obviously not the case. EU ETS has a design that generates a carbon market with very little flexibility, with zero opportunity emission costs for some plants and too high emission prices for others – and too high electricity prices for everybody. Because of the production structure, high emission and electricity prices generate huge rents within electricity generation.

Thus, the EU ETS design is such that a tight emission cap would probably lead to:

- a zero permit price for some plants or sectors,
- very high permit prices for non-sheltered plants in the trading sector,
- very high electricity prices,
- huge profits in electricity generation,
- a profit squeeze in electricity-intensive manufacturing.

The protection of some plants or sectors may come at a high price. Instead of closure of the least efficient of the most carbon intensive plants within the trading system, we should expect a more random pattern of closure (or relocation outside EU) of plants within the trading system. Outside the trading system we should expect closure (or relocation outside EU) of the least efficient of the most electricity intensive plants. This would probably not be accepted from a political point of view and may hence induce political pressure for a more generous emission cap and/or re-regulation of the electricity market with subsidised electricity prices for some industries.

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