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Empowering the EU ETS allowance market: safeguarding against price volatility and carbon leakage

Abstract

Based on the experiences in phase 1 of the EU Emission Trading Scheme and the emerging evidence in phase 2 we suggest complementary activities within the framework of the decisions of December 2008 that empower the carbon market in phase 3. We analyse the controversies about price volatility and suggest an auctioning procedure with a reserve price. For the assessment of the risk of carbon leakage we state the difficulties for categorising the relevant industries and suggest a cooperative procedure with an active involvement of subsectors which also helps distributing the free allowances based on benchmark criteria.

Keywords

EU Emission Trading Scheme

Price volatility

Carbon leakage

JEL codes

Q54 Q53

1 Introduction

The decisions of December 2008

After the Commission had presented the Climate Change and Energy Package on 23 January 2008, it was adopted on 11 December 2008 by the Council and six days later by Parliament. As a part of the package, the Directive amending the Emissions Trading Directive contains the new framework for the EU Emission Trading Scheme (ETS) in phase 3 that starts with 2013. This paper contributes to two items that still need to be made operational within this framework: the identification of those industries that are exposed to carbon leakage and the allocation of free allowances based on benchmark criteria.

The controversies about carbon leakage and price volatility

The heated debates with stakeholders between the presentation of the Commission proposal in January and the finalization of the Directive in December mainly reflected the controversies about adequate indicators and thresholds for categorising a sector or subsector as being exposed to a significant risk of carbon leakage.

During the negotiations that set the framework for the EU ETS carbon market in phase 3 another issue emerged: Does the market besides a quantity cap for allowances also need some provisions that prevent excessive volatility of the carbon price? This issue was soon put aside but emerged again after the significant fall of allowance prices that started in the last quarter of 2008.

Options for enhancing the carbon market

We put forward the proposition that the remaining activities needed for making phase 3 effective would benefit from a rethinking of the understanding of the carbon market and operational procedures for handling carbon leakage.

The paper is therefore organised as follows: We start out with the framework of EU ETS in phase 3 as adopted in the December 2008 decisions. We continue with an analysis how the carbon leakage and the carbon price issues have evolved since the presentation of the package by the Commission in January 2008. Finally we suggest how within the existing framework the EU ETS carbon market could be enhanced by a deliberate design of the auctioning method and a cooperative procedure for dealing with sectors exposed to a significant risk of carbon leakage.

2 The framework of EU ETS in phase 3 after the December 2008 decisions

Substantial innovations in phase 3

The EU ETS exhibits in the third phase that starts in 2013 a number of substantial innovations, above all

- an EU-wide emissions cap and
- a reliance on auctioning as the main mechanism for allocating allowances.

We summarise briefly the issues that emerged after the presentation of the package by the Commission in January 2008 until the final decisions about the framework by Council and Parliament in December 2008.

2.1 Key elements of the final outcome

2.1.1 Shares of auctioning

As in the Commission proposal three sectors are distinguished for the shares of allowances to be auctioned:

Electricity sector

For the electricity sector the full auctioning rate of 100 % starts with 2013 as suggested by the Commission.

Exemptions, however, are added for Member States with a high share of coal and gas based electricity generation (Poland and Hungary). The auctioning rate for these countries starts at 30 % in 2013 and increases to 100 % in 2020.

The Commission proposal suggested full auctioning for the electricity sector without any exemptions.

Industrial sectors not exposed to carbon leakage

For the industrial sectors that are considered not exposed to carbon leakage the auctioning rate starts at 20 % in 2013 and reaches 70 % in 2020 with a view to reaching 100 % in 2027.

In contrast the Commission proposed full auctioning already for 2020. According to preliminary estimates by the Commission not more than 4 % of industrial sectors could remain in this category.

Industrial sectors exposed to carbon leakage

Industrial sectors that are exposed to the risk of carbon leakage now dominate by far in the classification for the shares of auctioning.

Installations in sectors or sub-sectors which belong to this category will be allocated 100 % of allowances free of charge at the level of the benchmark of the best technology available until 2020.

By the end of 2009 the Commission will present a list of sectors and subsectors that qualify as being exposed to the risk of carbon leakage. This list will be reviewed every 5 years. For creating this list the following indicators will be used:

- A cost intensity indicator, expressed as the sum of direct and indirect (due to increases in electricity prices) additional costs induced by

costs for allowances would lead to an increase in production costs exceeding 5 % of Gross Value Added

and

a trade intensity indicator, expressed as the total value of exports and imports divided by the total value of its turnover and imports exceeds 10 %.

- Alternatively, the sum of direct and indirect additional costs induced by costs for allowances would lead to an increase in production costs exceeding 30 % of Gross Value Added

  or

  the total value of exports and imports divided by the total value of its turnover and imports exceeds 30 %.

The level of disaggregation for calculating these indicators will be level 3 NACE code or, where appropriate and where the relevant data are available, at level 4.

By 30 June 2010 the Commission will issue a report on the impact of future international agreements and of future commitments on non-EU countries. As a consequence this report may contain adjustments to the proportion of allowances issued free to sectors.

The missing assumption about the carbon price

The currently available documents do not indicate the assumptions made for the carbon price when cost impacts are calculated. This leaves considerable uncertainty about the procedure for calculating the indicators for carbon leakage.

2.1.2 Other provisions

Allocation of revenues from auctioning

The revenues from auctioning will be divided up as follows:

- 88 % will be allocated between Member States in proportions identical to the verified emissions in 2005.
- 10 % will be allocated to certain Member States in the interest of solidarity and growth.
- 2 % will be allocated to Member States which had achieved in 2005 at least a reduction of 20 % in greenhouse gas emissions compared with the reference year of the Kyoto Protocol.

Funding for CCS technologies and renewable energy sources

300 millions of emission allowances will be made available for innovative carbon capture and storage technologies and renewable energy sources.

Clean Development Mechanism and Joint Implementation

3 % of verified 2005 emissions are the limit of the quantity of credits each Member State may use from the Clean Development Mechanism (CDM) and Joint Implementation (JI).

Certain Member States, including Austria, will be able to use an additional 1 % of verified 2005 emissions for credits from projects in least developed and small island developing states.

Political statement concerning the use of reve-

In a political statement the European Council tied the use of revenues from auctioning to EU efforts for providing finance for actions to mitigate

nues from auctioning

and adapt to climate change in the context of international agreements.

Small installations

Rather overlooked but of considerable potential impact are the new rules for the inclusion of small installations. Installations with emissions of less than 25.000 tons per year and combustion installations with a rated thermal input below 35 MW may be excluded from the ETS by Member States as long as measures equivalent to the ETS are in place. These rules may reduce the number of installations in the ETS up to 60 %.

2.2 How the negotiations evolved

The issue of carbon leakage

Major controversies centred around the issue of carbon leakage, the potential adverse impacts of the EU ETS on energy intensive industries and the related issue of allocating free allowances for compensation.

Compared to the Commission proposal the final version of the package maintains the overall emissions cap, the 21 % reduction of emissions by 2020 over 2005.

Approximately cut by one third, however, was the volume of allowances that needs to undergo auctioning. In addition to derogations for the electricity sector in a few new Member States, according to estimates by the Commission almost the whole industry sector will obtain free but capped allowances. This is motivated above all as a protection against carbon leakage.

Evaluating the shift from auctioning to free allowances

It is this shift from full auctioning in the Commission proposal to almost complete free allowances for industry that has caused controversies about the efficiency and the effectiveness of the final version of the reformed EU ETS design.

We call for a differentiated evaluation of the final version of the energy and climate package and summarize our findings in the following statements:

- The overall reduction target for installations that are subject to the EU ETS remains unchanged, i.e. emissions in the ETS sector need to be reduced by 21 % in 2020 compared to 2005. This is in line with the 20 % overall reduction target of all sectors and Member States for 2020 compared to 1990.
- The almost full free allocation of allowances to industry obviously eliminates the carbon leakage issue. Other, more sophisticated procedures for tackling this issue would have been available for protecting the competitive position of industry with a lower need for free allowances but these procedures have not become politically acceptable.
- The major impact of the reduction of the volume of allowances to be auctioned is on the revenues from auctioning but not on the carbon price. This statement rests on the economic theory of emissions trading that the perception of abatement opportunities by participants in the carbon market is not changed by more generous free allocations.
- Increasing the volume of free allocations means that fewer installations will be exposed to the price signal of the carbon market in the allocation phase and thus probably will obtain fewer incentives for technological change. No direct costs occur for the acquisition of al-

located allowances, although holding allowances implies opportunity costs for the firm. The likely diminished incentive for technological change is definitely a drawback of a free allocations procedure.

- The vast volume of free allowances for industry generates the need for sound procedures to allocate these allowances to installations on an EU-wide level. It is this stage of the allocation mechanism of the reformed EU ETS where additional incentives for technological change can be introduced by benchmarking procedures. Surprisingly, information that is relevant for evaluating the exposure to carbon leakage returns again for creating benchmarking rules that are able to substitute price signals.

3 The evolution of the carbon leakage issue

Since the publication of the Commission documents for the energy and climate package the issue and understanding of carbon leakage has undergone substantial changes.

3.1 The search for operational indicators

The temptation of the "exposed" sector

The classification of sectors in the Commission proposal into the categories electricity, "normal" industries and also an "exposed" sector created incentives for sub-sectors and installations to qualify for this sector since up to 100 % of free allowances were promised.

Qualitative assessments of the risk of carbon leakage

The Commission proposal stimulated a number of notes and papers notably the most important ones produced by Commission services.

At a first stage the following qualitative assessments emerged as being relevant for considering a sector or sub-sector being exposed to negative impacts from a price for allowances:

- the change in production costs,
- the ability to pass-through these costs and
- the trade intensity with Non-ETS countries both with exports and imports.

The total impact of participating in the EU ETS finally should show up in the change of profits.

Non-operational indicators

Not before long a number of difficulties have become visible when attempts were made to convert the proposed qualitative assessments into quantitative indicators.

Rather soon it was realised that impacts of the carbon market on profits cannot be identified because of the many other factors that make profits very volatile (and because of the uncertainty of the carbon price itself).

Similarly pass-through indicators turned out to be non operational because of the comprehensive market analysis that would be required.

A number of additional qualitative indicators were identified as being worth considering but were also dismissed because of their limited quantitative

applicability as, e.g.

- the abatement potential of a sector or sub-sector,
- transportation costs,
- barriers to trade,
- market structure and
- price elasticities.

Two operational measures

Finally only two indicators emerged as being able of becoming operational measures for carbon leakage:

- carbon cost intensity and
- international trade intensity.

3.2 Measuring carbon cost intensity

Two types of indicators for measuring the carbon cost intensity can be defined.

Value indicators of carbon cost intensity

A value indicator relates the increase in carbon costs triggered by a given carbon price (e.g. € 20 per ton of CO_2) to Gross Value Added (GVA).

In addition a distinction can be made between the direct carbon costs caused by the amount of carbon attributed to the production activity and the indirect carbon cost attributed to the increase in electricity prices.

This is the carbon cost indicator agreed upon in the energy and climate package for identifying sectors and sub-sectors exposed to the risk of carbon leakage. Surprisingly in the documents no carbon price is visible for calculating the carbon cost impacts.

Quantity indicators of carbon cost intensity

A quantity indicator relates the amount of carbon to a unit of Gross Value Added (GVA).

This indicator was proposed by Germany in the final negotiations of the package but got no acceptance.

Table 1: Direct carbon cost intensities for steel

	Relative carbon cost impact CITL %	Relative carbon cost impact UNFCCC %
Austria	12%	13%
Belgium	8%	10%
Bulgaria	91%	94%
Czech Republic	10%	23%
Denmark		
Estonia		
Finland	9%	9%
France	17%	13%
Germany	7%	14%
Greece	4%	4%
Hungary	15%	28%
Ireland		
Italy	8%	6%
Latvia		
Lithuania		
Luxembourg		
Netherlands		
Poland	11%	22%
Portugal	5%	5%
Romania	58%	37%
Slovakia		
Slovenia	3%	4%
Spain	6%	8%
Sweden	5%	4%
United Kingdom	29%	31%

Source: Own calculations based on CITL, UNFCCC and Eurostat production statistics.

Problems and deficiencies

Table 1 exhibits direct carbon costs calculated as carbon costs based on a carbon price of € 20 per ton of CO_2 in relation to gross value added. This table reveals substantial problems that emerge in an international comparison. Similar results were obtained for other sectors. Obviously the fluctuations of this indicator among Member States highly question the usability of the numerical results obtained.

This limited usability can be linked to different causes. One is the volatility of Gross Value Added with respect to product prices, profit margins and different accounting rules for capital costs but also cyclical fluctuations. Another is the inhomogeneity of steel products that calls for further disaggregation which probably is limited due to data restrictions.

3.3 Measuring trade intensity

Trade intensity as defined in the package

In the package the indicator for measuring trade intensity is defined as the total value of a sector's / subsector's exports and imports divided by the total value of its turnover and imports.

A more specific trade intensity

Basically the trade data are available in several international data bases, e.g. the UN Trade Statistics. Nevertheless a more specific indicator for

trade intensity would calculate separate trade intensities for exports and imports in order to get a better understanding of the relative importance of export and import competition.

3.4 An example of highly aggregated carbon leakage indicators for the EU ETS

Indicators for the EU ETS

The Austrian Institute for Economic Research (WIFO) maintains a comprehensive database of the EU ETS. Based on these data we present a set of trade and carbon cost intensity indicators for a breakdown of seven sectors we could identify in the EU ETS Community Independent Transaction Log (CITL).

Cost intensity indicator

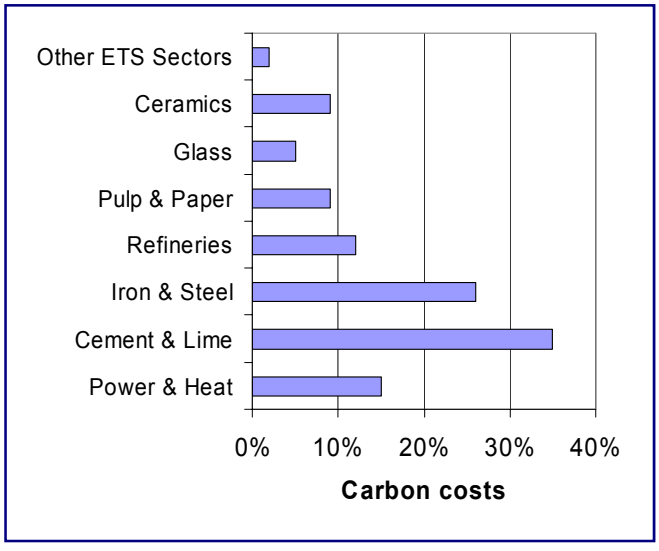
For the carbon cost intensity indicator we rely on direct and indirect cost estimates for UK as presented in Hourcade et al. (2007). The cost effects are based on a € 20 per ton of CO_2 carbon price. Figure 1 depicts these carbon cost intensities with cement leading, followed by iron and steel. On this level of disaggregation almost all sectors have costs intensity indicators beyond 5 % of Gross Value Added.

Trade intensity indicators

Figure 2 indicates the amount of import and export competition with Non-ETS countries for each sector defined as trade flows over the value of production.

In addition the cost indicator is marked by colouring the marks of the trade indicators.

Figure 1: Carbon cost intensities



Source: Own calculations based on Hourcade et al. (2007)

Relating these indicators

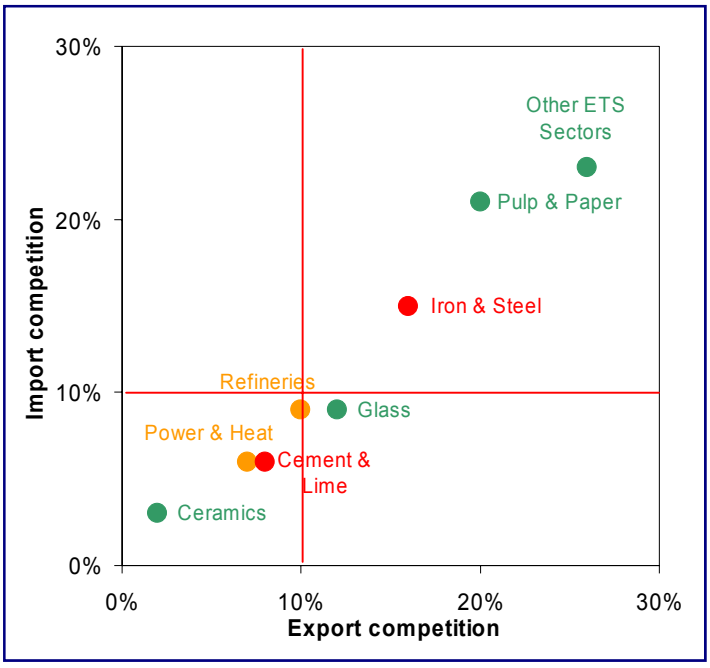
Figure 2 enables a first judgement about the thresholds defined in the en-

to the indicators in the package

ergy and climate package. Almost all sectors – at least on the level of disaggregation used – will pass both the carbon cost and trade intensity criterion.

In addition we can identify sectors that show either an excessive carbon cost intensity, as cement, or an excessive trade intensity, as pulp and paper.

Figure 2: Trade and Carbon cost intensities in the EU ETS



Source: Own calculations based on WIFO databases

4 The evolution of the price volatility issue

4.1 Early and recent controversies

In view of the high fluctuations of the ETS carbon price in phase 1 and the final break-down caused by an excess of allocated allowances, several Member States took up during the negotiations for the package the issue of price volatility. Carbon price developments and their effects on the efficiency of emission trading schemes are also extensively discussed in economic theory (see e.g. Grubb 2008a, Philibert 2008, Pizer 2002).

Proposed actions for preventing excessive price volatility

A number of Member States, in particular Poland and at a later state the French Presidency suggested actions for preventing excessive price volatility. These actions included market monitoring and a target price corridor. Suggested were regular reports by the Commission about the carbon

market and a price corridor with boundaries of € 15 below and above the assumed carbon price of € 24 in 2013 and € 39 in 2020 as stated in the Impact Assessment document by the Commission.

The non-paper from Commission services on price volatility

A non-paper from the Commission services took up the issue of price volatility in the EU ETS by stating the following main positions.

Changes in allowance prices occur as a consequence of changing market fundamentals and as a result of policy uncertainty. Market interventions that disturb the adjustments to changing market fundamentals would cause distortions and therefore inefficiencies. A well designed regulatory framework avoids price volatility due to policy uncertainty.

This position of the Commission is underlined by a number of new design elements for the EU ETS market in phase 3 as:

- Verified emissions data have become available for several years.
- Banking of allowances is ensured from period 2 to period 3.
- A predictable cap is fixed well ahead before the beginning of period 3 in 2013 that covers 8 trading years.

New controversies

The debate about price volatility intensified again after the December 2008 decisions in view of the rapid decline of carbon prices that started in the last quarter of 2008.

EDF Energy, e.g., warned that "speculators risked turning carbon into a new category of sub-prime investment" (The Guardian, 30 January 2009). Evidence is reported from big companies that cash their carbon credits in order to bolster their balance sheets (The Guardian, 27 January 2009).

In a guest commentary in Point Carbon on 30 January Jos Delbeke reiterated the position of the Commission that there is no role for public authorities to intervene in the carbon market.

4.2 Attempting to understand the carbon market

Another attempt to understand the carbon market

We propose that the persistence of the controversies about price volatility deserves another attempt to understand the carbon market. It is our opinion that many arguments put forward so far are based on a too simplistic paradigm of the carbon market that requires a bit more reality.

4.2.1 The simplistic carbon market paradigm

A quantity cap and abatement costs determine the carbon price

Starting point for an understanding of the mechanisms of the carbon market is the vision that a quantity cap and abatement costs determine the market price for emission allowances as depicted in Figure 3.

This paradigm rests on a number of rather courageous assumptions: all actors in the market know about the marginal abatement costs and there are no barriers with respect to the necessary abatement investments and price adjustments.

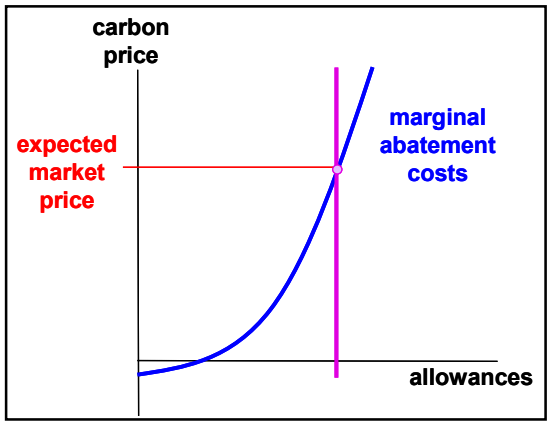
Why this paradigm might fail

The economics of emissions trading assumes that in a perfect market situation the allowance price is identical with an environmental tax. The underlying assumption for this is that all market actors have equal information and uncertainty is of minor importance. With respect to the carbon market this might be questioned due to the following arguments:

The long term cap might not be binding. This fact occurred already in the first trading period of EU ETS and led to carbon prices near zero. Also evidence for the current second trading period shows that overall economic development translates rapidly in a loosening cap which already shows up in the price movements for carbon in the last few months. Thus volatile prices give different abatement signals during the trading period. This can pose a problem for long term investment by enterprises.

In addition different market actors may have different information about the carbon market or different possibilities to influence the carbon market. Again this can lead to more volatile carbon prices with adverse effects on abatement investment and technological change. We take up these arguments in more detail by proposing a bit more reality for understanding the carbon market.

Figure 3: The simplistic carbon market paradigm



4.2.2 The carbon market and a bit more reality

Perceived abatement costs may vary

All assumptions that constitute the simplistic carbon market paradigm turn out to be highly questionable. Most vulnerable is the assumption of to all actors in the market well known marginal abatement costs

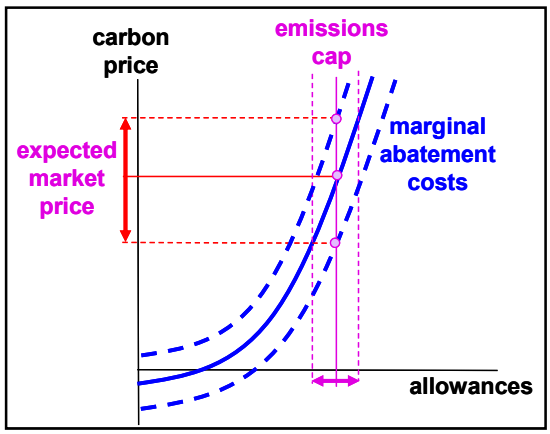
First of all it should be realized that abatement reflects investment costs which in turn are influenced by all kinds of prices, interest rates and rates of depreciation. It is highly questionable if all market participants share the same information for these ingredients that are the building blocks for marginal abatement costs and we therefore better talk about perceived marginal abatement costs which might vary not only between actors but also over time.

Second it should be mentioned that whenever we have a so-called joint production structure, i.e. when we are dealing with multiple outputs, it is not possible to attribute the costs of technology changes uniquely to the various outputs. An example for this phenomenon is the switch from

stand-alone to co-generation production of heat and electricity.

The impact of this informational uncertainty causes price volatility and is visualized in Figure 4.

Figure 4: The impact of differences in perceived abatement costs

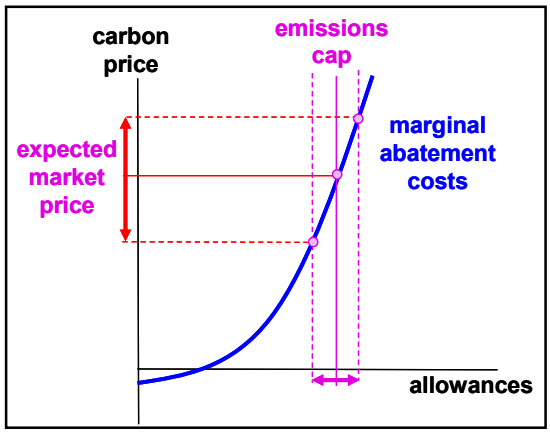


Perceived supply of allowances may vary

Although it seems obvious that all market participants should know the exact amount of allowances that determine the emissions cap this number might not match the perceived available allowances on the market.

This might be due to strategic traders who either buy excessive amounts of allowances for pushing up the price or sell allowances for lowering the price. There is currently evidence about the latter phenomenon in the EU ETS market.

Figure 5: The impact of differences in perceived supply of allowances



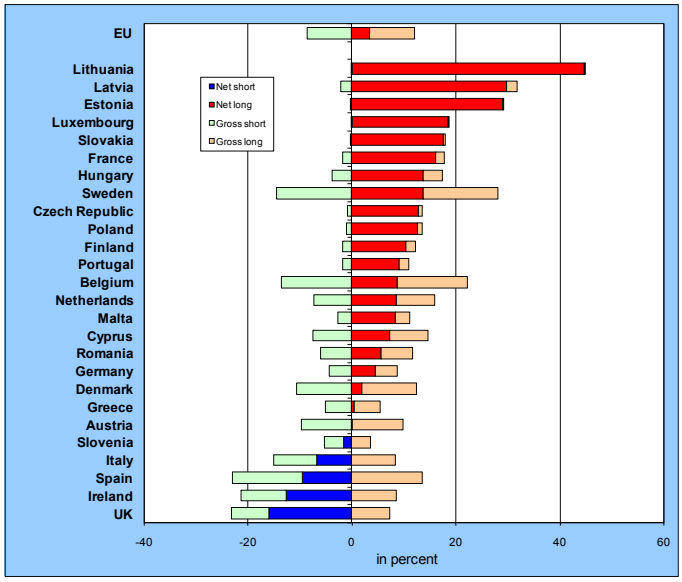
Failures to aggregate information

Actors in the market may have difficulties to aggregate correctly information they observe from other actors to an aggregate total. An example of this potential information failure are the experiences from phase 1.

Figure 6 illustrates not only the net discrepancies between allocated and

used allowances over Member States but also the amounts that belonged to installations that were in a long and a short position, the gross allocation discrepancies. In some countries the dispersion of allocation discrepancies were considerable thus making it difficult to judge the aggregate allocation discrepancy.

Figure 6: Gross and net allocation discrepancies in phase 1 of EU ETS



Source: Own calculations based on WIFO databases

4.3 Evaluating the controversies

The observed carbon price may not reflect long-run fundamentals

Given the arguments we proposed for bringing a bit more reality into the understanding of the carbon market we draw a few preliminary conclusions.

There are many reasons why the observed carbon price might not reflect the long-run fundamentals. For at least two reasons this is a cause for concern:

- Market prices may lose their credibility in terms of providing signals for long-term decisions. This has a particular bearing for investment decisions that have an impact on the supply and use of energy.
- As a consequence this may lead to wrong decisions which create excessive costs.

Thus we propose to reconsider the current framework for the EU ETS in phase 3 for opportunities to empower the carbon market against these potential market inefficiencies from price volatility.

5 Empowering the EU ETS within the framework of the decisions of December 2008

Conventional indicators for carbon leakage

Within the framework of the decisions of December 2008 there is still plenty of opportunities for shaping the EU ETS market in phase 3. In view of safeguarding the market against price volatility and carbon leakage we provide the following suggestions.

5.1 A cooperative procedure for carbon leakage assessment and benchmarking

Problems with assessing carbon leakage

Although the package contains definitions and thresholds for carbon cost intensities and trade intensities which are supposed to determine the status of a sector or subsector as to its exposure to a significant risk of carbon leakage, these definitions are far from being operational.

Examples, as demonstrated in section 3.2 for steel indicate, that the required data are not only partially available in the public data bases but also of very limited comparability between Member States.

In addition it is still highly questionable if a disaggregation by NACE 3 or 4 categories is adequate in terms of homogeneity of sectors of subsectors.

Summarizing these findings it seems inconceivable to solve the task of assessing carbon leakage just on calculations based on publicly available data.

A cooperative Carbon Monitoring Mechanism

For these reasons we suggest a cooperative procedure that takes care of both the assessment of carbon leakage and the allocation of free allowances by benchmarking.

This cooperative procedure could contain the following elements:

- Sectors and subsectors can opt-in for an assessment as to carbon leakage by participating in a Carbon Monitoring Mechanism (CMM)
- The CMM essentially collects the relevant information needed for calculating the adopted cost and trade intensities
- In addition the CMM collects the information needed to allocate free allowances on the basis of benchmarks.

A justification of this mechanism

This cooperative procedure avoids controversies about the adequacy of the disaggregation by NACE Disaggregation, lowers the administrative transaction costs and puts more responsibilities to the representatives of the sectors and subsectors in the implementation of the directive.

5.2 A deliberate design of the auctioning procedure

A coordinated procedure for auctioning

The current framework of the EU ETS in phase 3 mainly decides about the distribution of revenues from auctioning but is still open as to the details of the auctioning procedures.

We suggest the following elements for the design of the auctioning procedures.

- Instead of individual auctions by each Member State all auctions should be coordinated.
- A floor price should be considered for the auctioning of allowances.
- Timing and volume of auctions can be adjusted according to the state of the carbon market.

A justification

Coordinated auctioning definitely lower the transaction costs. The distribution of revenues from auctioning is not affected since this is already agreed upon in the December 2008 decisions.

A floor price should be the least controversial instrument for reducing price volatility. At a later stage also a ceiling price could be considered.

If there is a consensus about a more active management of the carbon market an obvious choice is the use of timing and auctioning volumes as a strategic instrument.

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