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Pathways to European Greenhouse Gas Emissions Trading History and Misconceptions

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Summary

We develop and discuss the three pathways to European Greenhouse Gas Emissions Trading: a top-down scheme based on the Kyoto Protocol of the UNFCCC, a bottom-up scheme linking national trading systems of EU Member States, and an EU-wide regional scheme based on the founding principles of the European Union. We review how the debate on greenhouse gas emissions trading has evolved in Europe since the adoption of the Kyoto Protocol in 1997 in three phases. We also review a set of influential misconceptions in the European discussion concerning emissions trading and, while dispelling them, try to establish why such misconceptions have arisen.

Keywords: Climate policy, emissions trading, greenhouse gases, Kyoto Protocol, European Union

JEL: D61, H23, Q25

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1. Introduction

The 3rd Conference of the Parties to the UN Framework Convention on Climate Change and the Kyoto Protocol adopted at this session in December 1997 has put “emissions trading” as an environmental policy instrument on the European political landscape. Up to that point in time the concept of emissions trading was known only in narrow scientific circles encompassing professors and students of European environmental economics and to a very limited audience of environmental policymakers and administrators in environmental agencies. However, due to the Kyoto Protocol emissions trading featured all of a sudden prominently on the agenda of environment ministries, finance and economy ministries, business associations, individual companies, environmental pressure groups, lawyers, political scientists and many more.

By entering the center-stage without any real preparation the emerging public policy debate was characterised by various misconceptions of many participants. After almost four years of discussions in Europe and the first steps towards implementing the concept of emissions trading with greenhouse gases, it is timely to take stock, recoup and draw some lessons. This is the core of this paper.

The discussion concerning emissions trading in greenhouse gases is complicated in Europe. One important reason for this is the fact that there are various pathways available to the introduction of trading in greenhouse gas (GHG) permits in Europe. These routes constitute an additional fundamental layer of choices to be made among many other design variables to be tackled in putting together an emissions trading scheme.

In the paper we first define the three major options or pathways for implementing greenhouse gas emissions trading in the European Union (section 2.) In section 3, we outline three distinct, partially overlapping phases in the short but lively history of the European public policy debate since 1997. In the central part (section 4) we present and critically validate many misconceptions of emissions trading that have shaped the European discussion. In the final chapter we draw conclusions.

2. Three Pathways to European Trading in GHG Permits

Since the adoption of the Kyoto Protocol three major pathways are available to introduce European trading in GHG permits as one of the policies to implement the commitments under the Kyoto Protocol:

- (a) Top-down UN scheme
- (b) Collection of bottom-up Member State schemes
- (c) Regional EU-level scheme

In the following the three pathways will be explained in turn. The definition will be complemented by a brief review of merits and drawbacks and available experience in environmental or other policy areas. It should be noted that the schemes need not be mutually exclusive. For instance, a top-down UN scheme could be superimposed on either of the other two schemes and a bottom-up based scheme needs to have elements of a regional EU-level scheme (and *vice versa*). However, for clarity, the possible links or overlaps between these schemes will not be discussed.

In the discussion, we have assumed that private entities would carry out the exchange of allowances. In other words, even in the case of international emissions trading under the Kyoto Protocol (the Top-down UN Scheme, see 2.1), we assume that the assigned amounts to Parties to the Protocol would be devolved to entities (i.e. firms). The assumption is justified in the sense that governments are not in an informed position making the decisions of where to reduce greenhouse gases by how much.

2.1. Top-down UN Scheme

The first pathway is to develop the complete design at the UN level in the context of the negotiations on Article 17 of the Kyoto Protocol among the international community of nations.

The Conference of the Parties shall define the relevant principles, modalities, rules and guidelines, in particular for verification, reporting and accountability for emissions trading. The Parties included in Annex B may participate in emissions trading for the purposes of fulfilling their commitments under Article 3. Any such trading shall be supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments under that Article. (Art. 17, Kyoto Protocol)

In its extreme version this requires that all design choices, including e.g. the selection of participating sectors and companies, level of the overall cap, allocation methods and exact rules in any one country, need to be agreed by about 180 countries in a UN process based on consensus.

The advantage of following this pathway is that a very coherent system will be put in place with a maximum degree of harmonisation in all choices and no forward compatibility problems at all. The major disadvantage, which renders this option in its pure form rather theoretical, is the fact that the consensus principle in the international negotiations will create endless delay and probably weak compromises that may not result in a robust system.

While the Montreal Protocol on the global phase-out of ozone-depleting substances contains some elements of trade in production and import quotas, there is no precedent in international environmental policy of a trading or quota scheme of the potential dimensions an international GHG permit scheme could take.

2.2. Bottom-up Member State Schemes

The second pathway is the very opposite of the UN-scheme. Under this alternative all the design choices are taken by sovereign Member States of the European Union in the set-up of national (i.e. domestic) trading schemes at company level. This implies that Article 17 of the Kyoto Protocol serves only as a loose framework and emissions trading is treated as a domestic policy not constrained in its conception in any way by the Kyoto Protocol. Of course it could be constrained by other international and European law and policy.

The advantage of this route is the maximum flexibility given to individual Member States in taking into account national circumstances and preferences. In addition, in the early phase of implementing a new instrument, competition between various national solutions can spur learning effects. However, following this pathway is likely to result in a set of national schemes that may not be compatible in some crucial choices so that the linking of these schemes into a Common European market in GHG permits will be complicated if not made impossible, unless the one or other scheme or several are adapted. Such adaptation may be difficult, if Member States meet internal political resistance to modify the features of their national trading schemes to allow EU-wide trading to take place.

Experience with emission or quota trading as a domestic or sectoral environmental policy instrument is more widespread. However, most applications have not been implemented in EU Member States or even on the European continent, but rather in other countries, most prominently the United States, the major proponent of emissions trading in the Kyoto negotiations.¹

2.3. Regional EU-level Scheme

The third pathway towards EU-wide trading in GHG permits is the most direct and possibly most obvious route via a scheme designed at the level of the EU and implemented in EU Member States. This implies again that Article 17 of the Kyoto Protocol serves as a framework and emissions trading is treated as a domestic policy, this time at the EU level, not constrained by the Kyoto Protocol. Of course it could be constrained by other international law and policy and would be designed respecting relevant European law and policy. An EU level scheme can be designed more or less prescriptive and one can harmonise or co-ordinate all design choices or only those seen as absolutely crucial for a smooth functioning of the EU-wide market.

The advantage of this route is that a minimum degree of co-ordination or harmonisation is needed and many, if not all, of the interface problems related to domestic schemes are anticipated and avoided. While such a scheme can be put in place quicker than a UN scheme, European decision-making nevertheless requires usually more time than in the

¹ For a comprehensive overview see OECD (1999).

Member States. However, the possibility of engaging all Member States at once may outweigh the short-term advantage of quicker national decision-making.

Besides some experience with the European implementation of the production and import quotas under the Montreal Protocol, no precedence for such policy exists at EU-level in the environmental realm. However, some useful experience to draw on is available from e.g., European Common Agricultural Policy (farmers can buy and sell milk quotas) and Common Fisheries Policy (fishermen can transfer catch quotas for individual species).

3. Three Phases in the European Public Policy Debate

Europe has witnessed an intense public policy debate on the merits and drawbacks of trading in GHG permits since 1997. Being mindful of the difficulties of generalising and categorising this discussion we attempt to define three distinct phases of the discussion. These phases are not to be viewed as sequential ones and no specific time periods are attached to them. However, we believe that they reflect well the three steps in which the attitude and thinking of many actors in this discussion has evolved over the past four years.

3.1. The First Phase: Focus on Building a UN Scheme

The immediate phase after Kyoto was characterised by a full focus of the debate around how to make international emissions trading under Article 17 of the Kyoto Protocol operational. At this stage a number of participants joined the debate in an “emerging industry” trying to understand what the Kyoto accord meant, most of them with a modest understanding of the subject of emissions trading. However, that did not matter as other discussion partners were just as new in the field. This was the phase where first misconceptions were born.

In this stage critical voices largely outnumbered proponents. The “new kid around the block” was seen as a competitor to existing policy instruments – like environmental taxes and voluntary/negotiated agreements. An argument that was very popular in this stage was to relegate emissions trading to a category that is of exclusive use for governments as Parties to the Kyoto Protocol and not for companies and other economic actors as the actual polluters in

an economy. This served the purpose of safeguarding the existing instruments and interests behind them. This issue will be revisited in section 4 as a misconception.

Another factor contributing to the attitude in this phase was that emissions trading was not discussed on its own merits. Rather emissions trading was often approached as a possibility of buying “hot air” emissions from Russia and Ukraine. In the Kyoto Protocol, Russia’s and Ukraine’s commitments are to stabilise emissions on the 1990 level in the years 2008 to 2012. Due to a dramatic decline in industrial production from communist era in these two countries, GHG emissions fell considerably. Almost all GHG emission projections for Russia and Ukraine show that they are not likely to reach even the 1990 emission levels and thus, in the Kyoto Protocol they are granted a quota of GHGs that is “too high”. This generous quota was widely referred to as “hot air” by environmental pressure groups. Many of these associated with emissions trading mainly the possibility for “polluters to buy themselves out” (by buying “hot air”) without undertaking any actual GHG emission reduction. This slogan was frequently embraced in the media. Some even went as far as to state that, because of hot air, emissions trading will result in emission reductions lower than the 5.2 % foreseen in Article 3 of the Kyoto Protocol. It doesn’t take a lot of mathematical sophistication though to work out that implementation of the Kyoto Protocol in the absence of acquiring hot air would result in emission reductions - beyond the 5.2 % as some of the allowed emissions in Annex B countries would remain unused. European concerns went as far so that the EU decided to fight for the quantification of the supplemental nature that emissions trading was given in Article 17 by means of proposing a quantitative constraint both on the buying and selling side. The EU proposed that each country would have to comply with the so-called “concrete ceiling”, similar to trading bands in managed exchange rate regimes like the European Exchange Rate Mechanism (ERM).

What kept the debate alive at this stage and the issue on the agenda were a number of factors. For one thing, it was the sense of inevitability as emissions trading was considered particularly important by the United States as a major force in the international negotiation process. The US has even gone as far as leveraging the adoption of the Kyoto Protocol on the inclusion of the Article that carried the number 16bis in the paper version of the Protocol adopted in Kyoto and was only renumbered weeks later to Article 17 in the final editing by the UNFCCC Secretariat. It was expected that further decisions on emissions trading would be a pre-condition for moving towards ratification of the Protocol in the US and some of its

partner countries in the negotiations. This was confirmed in the Buenos Aires Plan of Action adopted at the 4th Conference of the Parties in Buenos Aires in November 1998. While Europe and many other countries entered the Buenos Aires negotiations with the objective to finish the rule-making process for the flexible mechanisms (comprising also Joint Implementation as per Article 6 and the Clean Development Mechanism as per Article 12), CoP-4 was a sobering experience and substantial decisions were postponed not to the 5th but to the 6th Conference of the Parties, i.e. by about two years.

Another factor that nurtured interest was the misconception of emissions trading as the cheap buy-out. This perception induced some business associations and companies fearful of effective climate policy to develop a strategic interest to continue the dialogue about the widely unknown and misunderstood instrument.

Thirdly, market intermediaries and other potential service providers (auditing companies, consultants, lawyers, academics, commercial conference organisers) saw a potential market arising and were more than willing to invest some resources under the header of business development.

A final important factor was the active involvement of experts from the US in the European debate, as the country not only with the biggest interest, but also with the broadest experience in applying the instrument. The US was eager to make up for the strategic mistake it had made in the run up to the Kyoto Conference. The US forgot to promote emissions trading to its strategic partners when preparing the ground for successful negotiations. This was a critical oversight which nearly resulted in a failure of the 3rd Conference of the Parties. Immediately after the Kyoto conference US actors with an interest, but also real-life experience, in emissions trading (EPA staff, the environmental pressure group Environmental Defense, the think tank Center for Clean Air Policy, researchers at the Massachusetts Institute of Technology and other academics etc.) invested a lot of time and resources in participating in the European debate.

3.2. The Second Phase: Turning towards the Bottom-up

In view of the slow progress in the UN climate negotiations that materialised with the CoP-4 decision, various actors were reconsidering their approach and questioned themselves

whether it would really make sense to wait for the UN-scheme to “fall down from the sky” some day in the near future. This triggered a change of focus from top-down to bottom-up. A slow but growing interest led some to the belief that “if we want to have European trading in GHG permits as a stepping stone to international trading, we have to make it happen at home first”. The change of approach weakened also prevailing concerns about the supplemental nature of the instrument and rendered the discussion somewhat more practical and less principle-based. This phase of the discussion benefited clearly from the increasing understanding of participants, as people with experience gained an increasing audience to complement the talk among grand policy architects.

A major driver in the focus to the bottom-up was the speech delivered by the CEO of then British Petroleum (today BP Amoco) Sir John Browne on September 18, 1998 at the Yale School of Management, in which he announced that BP would work with high priority on the establishment of a company-internal ET pilot scheme for a limited number of business units. This pilot scheme was implemented as of September 1998. A major factor in the decision to embark on this route was the lobbying of BP by the US environmental pressure group Environmental Defense, the most active supporter of emissions trading on the environmental side in the United States for many years.

The early days of this phase saw the start of a number of initiatives at the domestic level in Europe and outside, including the initiation of the UK Emission Trading Group (ETG) in June 1999, the constitution of Parliamentary Commissions in Sweden in the summer of 1999 and Norway in October 1998, and the work on Danish energy sector reform (with a first draft legislation formulated in May 1998). A number of studies to complement these exercises and inform other domestic actors were commissioned.

The interest in domestic trading resulted in an extension of the vocabulary in the trading discussion as new terms like upstream vs. downstream trading, allowance vs. credit trading, auctioning vs. grandfathering, absolute vs. relative targets, or caps on growth emerged. Unfortunately, some of these fashionable terms were based on new misconceptions that replaced the slowly but surely outdated “trading is only for governments” and “trading is a buy-out of responsibility” misnomers.

This second phase is still ongoing and was at some stage complemented by the overlapping third phase discussed below. While the early stage saw still the involvement of US participants, over the months and years the public policy debate was increasingly

Europeanised. In view of the different institutional, cultural, legal, and administrative nature of EU Member States the value of the contributions by US experts declined steadily. A factor that contributed to the loss of American thinking and input was the hesitation of the Clinton Administration to actively work on the establishment of a national GHG trading scheme in the US. The general lessons they could transfer from existing and evolving trading schemes in the air quality realm (EPA Sulphur Allowance Trading, North-Eastern state-level NO_x schemes, and the Californian RECLAIM programme) were more and more limited. Increasingly the particularities of developing a trading programme aimed at GHGs dominated.

Over time the finalisation of reports and studies, the publication of consultation documents² and the emergence of the first Member State based trading scheme, the Danish CO₂ quota scheme in the power sector provided new impetus to the debate and made those “sitting on the fences” think harder whether they were in a comfortable position.

The implementation of the BP pilot and the extension to cover all the 150 business units world-wide as of January 2000 constituted increasingly powerful drivers in the discussion. Representatives from BP gave a fresh airing in various discussion fora as they enriched the policy discussion with actual experience from trading in GHG permits in a major multinational enterprise. Experience from the BP pilot signified for many stakeholders in Europe a first exposure to a company implementing the much discussed concept in practice.

While the Danish CO₂ quota scheme was hardly noticed in circles outside those very interested in the subject, the finalisation of the recommendations by the business-led UK ETG to the UK government in October 1999 and the publication of a consultation document on “A Greenhouse Gas Emissions Trading Scheme for the United Kingdom” by the UK Department for the Environment, Transport and the Regions in November 2000 induced an even wider recognition of emissions trading as a real policy alternative. Various actors in Germany – one of the most reluctant participants – started to rethink and reposition themselves in the debate. This culminated at the end of 2000 in the constitution of a national stakeholder group under the chair of the German Federal Environment and Economics Ministries to investigate domestic emissions trading. The developments in the UK convinced many that the discussion about European trading in GHG permits is no longer about whether

² See (Swedish) Ministry of Industry, Employment and Communication (2000); (Finnish) Ministry of Trade and Industry (2001); and for a general overview NHO (2001).

to use it or not, but rather when and how it will be implemented. The possibility to be involved in the early stages and influence the rule development was a major engine to power the German interest in the new and coming instrument.

In the discussion focused on the bottom-up route, however, a new term of potentially crucial importance entered the process: namely the issue of linkage of schemes and related interface or compatibility issues. In addition, some small EU Member States (e.g. Austria, Finland, and Ireland) recognised that trading in GHG permits was in principle something that would be interesting to pursue, but estimated that trading volumes would be relatively small and domestic markets quite narrow. Thus, they concluded, that it would not make sense to create a national trading scheme.

This attitude may be paradoxical, when one considers that Denmark, another small EU Member State, was the first country to implement a domestic scheme. Encouraging a maximum number of Member States to develop bottom-up domestic level schemes and allowing a large degree of freedom made some worry, whether the national schemes would be compatible or the flourishing European GHG market would be doomed to fragmentation. At this stage the third phase in the evolution of the European policy debate kicked in.

3.3. The Third Phase: The European Dimension of GHG Trading

The merits of having a market as broad as possible - with the long-term aim of a global market in GHG permits - was confronted with the reality that setting up an EU-wide market is already quite an endeavour. Such an effort nevertheless appeared more tangible in the medium-term and created an increasing interest in the European dimension of GHG trading. The European Community is in the unique position of being a symbiosis of a test laboratory for international trading among 15 Parties as foreseen under Article 17 of the Kyoto Protocol, but also a large domestic GHG market. This is due to its status as a Party in Annex B of the Protocol outlining the commitments.

The European Commission took up the challenge and adopted in March 2000 a Green Paper on “Greenhouse gas emissions trading within the European Union” sketching out some first ideas what a European scheme could look like, besides highlighting the bottom-up pathway (European Commission, 2000). This stakeholder consultation document alluded to

the attractiveness of finding a solution in the middle ground between harmonising or co-ordination of some design features and decentralised decision-making in the Member States on other features, where diverting choices were not thought to cause frictions in the EU-wide market for GHG permits. The document also called for answers to questions on crucial choices posed to stakeholders. Finally, it highlighted the importance of competition and state aid policy for some design choices as the initial allocation of GHG permits.

Very soon the Commission supplemented the ongoing consultation process in the Green Paper with a multi-stakeholder working group in the European Climate Change Programme. This group met 10 times between July 2000 and May 2001 and discussed in detail all the crucial issues in relation to the establishment of European trading in GHG permits via the two pathways available. In May 2001 the stakeholder group concluded its work with the clear recommendation that European trading in GHG permits should be established “as soon as practicable”. Astonishingly, the group – bringing together diverse interests with about 30 representatives from some Member States, industry, and environmental pressure groups – achieved a high degree of consensus and failed only to adopt a consensual recommendation in very few issues. These were highlighted as areas of diverging opinions in the final report (European Commission, 2001a).

In October 2001 the European Commission advanced the debate to a new level by adopting a proposal for a directive on EU-wide trading in GHG permits (European Commission, 2001b). The proposal foresees the mandatory introduction of trading in GHG permits in all EU Member States as of 2005. It is proposed to include consistently across Europe a number of activities in certain sectors (power and heat generation, iron and steel, oil refining, pulp and paper, cement and other building materials) and focus in the first step on CO₂ emissions only.

The details of the initial allocation decisions are widely left to Member States, on condition that in the first phase all permits are to be grandfathered to participants. Member States are required to prepare and submit to the Commission ex-ante national allocation plans. Non-compliance triggers a financial penalty of at least double the market price for permits and the obligation to make up the missed tonnes in the subsequent period. As a first step two phases are foreseen (1st phase from 2005 to 2007 and 2nd phase from 2008 to 2012). The Commission announced in the explanatory memorandum accompanying the proposal also the intention to open the scheme to JI and CDM credits in the near future and the draft

directive contains further an article that allows for the linking with other schemes on the basis of a mutual recognition agreement.

An increasingly important driver of the European dimension of GHG trading was the crisis in the international negotiations with two major events in late 2000 and early 2001. In November 2000 the 6th Conference of the Parties, summoned in The Hague to adopt the rules for emissions trading under Article 17 and other flexible mechanisms, failed even after a two-year intense negotiation process to achieve a consensus on these and other important matters in relation to the implementation of the Kyoto Protocol commitments. The second shock wave was the announcement of newly-elected US President George W. Bush jr. in March 2001 that his Administration was no longer interested in the international rule development under the Kyoto Protocol and would not submit the Protocol for ratification to the US Senate, as would be required under the US Constitution. These events united Europe and triggered further interest in the establishment of an EU-wide market in GHG permits and other measures to rebuild momentum in international climate mitigation efforts.

The developments in the US imply the paradoxical possibility that trading in GHG permits, which was first pushed into the Kyoto Protocol by the insistence of the US (and against the will of several EU Member States) in 1997 turns out to be implemented either nationally, EU-wide or even internationally without participation of the US.

4. Major Misconceptions of the European Emissions Trading Debate

We turn now to a discussion and critical evaluation of the major determinants that have shaped this debate. Several of the driving factors in the European debate are the result of misconceptions some of which have been put forward forcefully but erroneously. Unfortunately some of the misconceptions have taken a life of their own and have become almost persistent in the European debate on emissions trading. In this section we describe the misconceptions and show why they are wrong.

4.1. Hot Air as the Easy Way Out

It seems that most of the early resistance to or popularity of trading in GHG permits was due to the powerful argument about hot air in relation to the generous allocation of emission rights given to Russia and Ukraine (see also Section 3.1). Unfortunately, both those who argue that trading will result in less reductions than otherwise and those who see an attraction in this had misunderstood the emissions trading instrument.

The key element of trading in GHG permits, which makes it special compared to various other policy instruments in the environmental field, is the definition of a cap of total allowed emissions in a time period. Implementing such a cap or total target via trading or in a less flexible way does not change the overall environmental outcome *per se*. The only valid counter-argument that can be made from an environmental point of view is, assuming the overall target and the individual countries' starting positions constant, implementation without trading would result in more reductions than originally foreseen (the "hot air"). Avoiding such an effect is obviously attractive to those expected to contribute to achievement of the overall target.

In economic terms trading encourages efficiency in the achievement of the target. The starting positions of individual countries or companies are of distributional concern, but should have little or no influence on the ultimate purpose of trading as an instrument – achieving an environmental target at least cost to society. This issue has now been widely understood at the country level, but less so at the sectoral and company level.

4.2. Only Sellers Win

Connected to the hot air issue is the next determinant that can best be dubbed as the perception that "only sellers win". Again this factor has to be categorised as a misunderstanding. It is perhaps interesting to note that similar claims were made about 200 years earlier by mercantilists before David Ricardo demonstrated in the 19th century that not only exporters gain in international trade. "Winning" must always be seen as a situation that can be realised via trading in GHG permits, which is not attainable in the absence of trading.

The seller of GHG permits needs to reduce emissions by more than required. As he will now emit less greenhouse gases than he has been allowed, he can sell the difference (or

save for later – “internal selling from one time period to the next”) to others. He will only sell, if the price he gets covers at least the cost he has incurred to reduce emissions and free up permits. The bigger the difference between the permit price and the control costs, the better for the seller. In case trading in GHG permits is not used to implement a given emission target, the company would try to cut emissions exactly to the level prescribed by the regulator and would forego a financial reward for any tonnes that might be (even unintentionally) cut below that level. So it is clear that trading makes a seller better off.

The buyer of permits can choose between (i) cutting emissions on his own site for a certain cost per tonne and (ii) seeking through the permit market a partner who undertakes an equivalent cut at lower cost per tonne. So trading in GHG permits is also a winning strategy for the buyer, as he can reduce the cost to comply with regulation, by having part of the abatement activity carried out elsewhere (“outsourced”) at lower cost.

There are situations where a buyer would gain more from trading in GHG permits than a seller. However, both will always gain from trading relative to equivalent emission standards³. A participant in a GHG trading programme can form reasoned expectations whether he will be a likely buyer or seller once the initial allocation has been specified. Moreover, trading may be more attractive to buyers than to sellers, because buyers would have to disburse more money to achieve a given emissions level on-site, if not granted access to the permit market. Seller would only forego the opportunity to cut more and get a reward for these additional cuts. Thus, while there is a perception that “sellers win”, this could actually more be the case for buyers.

The assignment of quantitative amounts to countries in the Kyoto Protocol had the important effect that from the very day of the adoption of the Protocol it was clear who would be the major sellers in the market, namely Russia and Ukraine. This easily comprehensible fact has decisively shaped the perception of trading in GHG permits among experts, the media and the European public at large. One could argue from a fairness point of view, that in a policy seeking to reduce overall emissions beyond the level that would otherwise be realised (the “business-as-usual” emission level), no single country, sector or company

³ It is possible to have a situation where there is no trade in GHGs (i.e. there are neither sellers nor buyers). If the required reduction of each site would be divided up so that the cost of reducing an additional tonne of GHG emissions would be exactly the same, no trading would take place. This kind of situation could theoretically take place for one period of time (e.g. a year) but is unlikely to be the case both due to information constraints (the

should be given a starting allocation substantially above its needs. From an economic point of view this is a matter of secondary importance, as it concerns only distribution and not efficiency. For this very reason economists may have been too silent on this issue.

4.3. The Illusion of the Country-Level Marginal Abatement Cost Curve

Economists have tried to inform the debate and policy-making on international climate policy on the economic implications of GHG reduction. While successful in some cases, they have failed by giving an illusion that each country would face a marginal abatement cost (MAC) curve. Almost all the economic analysis undertaken in preparation of Kyoto and since thereafter starts from the country as the polluter to cut GHG emissions giving an impression that “countries pollute”.

It might appear somewhat philosophical, but a country as such is not polluting expect for emissions due to activities of government, like energy use in government buildings. Henceforth it is also not “the country” that has to cut GHG emissions under an international treaty. Rather the country is negotiating as an intermediary for all the economic actors in its constituency contributing to total emissions. It is evident that bringing together all contributors to GHG emissions at the global level – car-drivers, households, farmers, industry etc. – would not make sense. Therefore, governments representing their countries is the most effective way to negotiate climate policy at least at the international level.

Economic analysis on the usefulness of trading in GHG permits in support of European policy-making and international negotiations has been consistently presented based on country-level MAC curves and the benefits from trading have been assessed against this country-level MAC curve. For the economist a MAC curve is a clear-cut concept and a basic tool, similar to the gyroscope for a pilot, but it is hard to understand for those who have not studied economics.⁴

What is now behind a country-level MAC curve or more exactly behind a cost estimate based on the country-level MAC curve? Implementing a national GHG target at the cost the country-level MAC curve suggests, would necessitate in practice that the country

government would not know how to allocate the reduction requirements so that all costs would be the same) and because of changes in the market in several years.

⁴ As a lot of the work on climate change revolves around issues relating to natural science, it would be important to improve the mutual understanding among economists and natural scientists so that the negotiation positions would take into consideration all relevant information.

achieves in a political process a cost-minimum national abatement policy mix, so there is no other way policy at national level could be re-organised to reduce compliance costs.

Negotiations about emissions trading at international level – starting from such a minimum national cost estimate – clearly underestimates the potential cost savings trading in GHG permits offers. This is because, in reality, a policy mix constituted by various measures at the national level will not result in a cost-effective outcome. A policy mix is in practice sub-optimal due to the fact that the dynamics of a political process and the influence exerted by special interests will not bring about an economically efficient outcome. In addition, a central planner would never possess the information to steer the policy mix to the economically efficient outcome. Further, even if a perfect policy mix were to be developed at one point in time, it would have to be adjusted repeatedly along the way to take into account developments like new technologies becoming available, changes in demand patterns etc. The country-level MAC curve shows how a country would reach its Kyoto target in a least cost manner. However, it is very unlikely that a real-world policy mix at the domestic level would bring about a least cost allocation of reduction options, unless all sectors were included in an emissions trading scheme. As this is unlikely to be the case, the use of the MAC curve underestimates the costs that a country would incur in practice.

As a consequence the economic analysis upon which advice has been given to negotiators on the merits of international emissions trading has systematically underestimated the cost saving potential as it was based on a very unlikely counterfactual of cost-effective policy at the national level. Capros et al. (2002) demonstrated that the impact of such a starting point bias can be crucial. They showed that the gain from an EU-wide GHG trading could be over four times higher, if the starting point was assumed to be a situation where Member States would not enter an EU-wide trading scheme from an internal equilibrium⁵.

In defence of the economists who have labour restlessly to produce input for climate negotiations it needs to be stated that country-level MAC curves are not used because of ignorance but due to a lack of detailed information and data on the costs of reducing emissions at individual facilities.

⁵ In the case when each Member State was assumed to start EU-wide trading from an internal equilibrium (i.e. with its MAC curve) the gain from EU-wide trading was estimated at €3 billion per annum. It was assumed that the Member States carried out sub-optimal policies by allocating the same reduction target (in percentage terms) to all sectors, the gain from EU-wide trading was estimated to be €14 billion per annum, i.e. over four times higher.

4.4. The Government Would be the (Main) Trader

Another “unintended side-effect” of the country-level MAC curve used by economists was the early conviction by many participants in the debate that government has the central role of the “trader” in an international market in GHG permits. For the economist analysing emissions trading, the implicit and unspoken assumption was that trading would be carried out by cost-minimising economic actors (first and foremost companies) at national level, once the initial allocation of permits has been shared out by the government. In other words, the economists assumed that the government would not take part of the emissions trading but rather negotiate (on behalf of the companies operating in its territory) to establish acceptable rules that govern emissions trading. It now seems that this misconception has been widely overcome in the EU, and the government is understood to take role of setting up the rules for the permit market and monitoring and enforcing compliance.

One issue that has not been yet discussed is the possibility that the government could be an active participant in the market in the same fashion as a central bank is ensuring by trading in government bonds that a set short term interest rate is maintained. In the case of Kyoto Protocol, the government can carve out from its initial allocation a specific amount of tonnes of emissions for the trading sector and (through monitoring, verification and if required, financial penalties) see to it that this cap holds. However, the government cannot ensure that the non-trading sector would keep to its implicit cap (i.e. the amount of tonnes the non-trading sectors can emit which is the difference between the initial allocation and the amount carved out to the trading sector). It could well be that the non-trading sector would not meet its cap. In this case the government (whose policies to reduce emissions have not been fully successful) could act as a lender of last resort and purchase the required permits from the trading sector (either from the national trading scheme or by importing permits from abroad). This would naturally drive up the price of GHG permits in the trading scheme and thus, increase the compliance cost of those participating in emissions trading. However, the trading sector would also be compensated (by the government) for this increase because of the income that they would receive from the selling of additional permits. And as the government would finance the purchases from tax receipts, such act of a lender of last resort would resemble an indirect CO₂ tax.

4.5. A Cap on Each Plant

A very persistent perception that is widely lingering after almost four years of debate is the thought that trading in GHG permits is about caps at the individual company or even source level. Some have erroneously claimed that it would not be possible to transfer the permits that a plant is allocated. In other words, emissions trading has been dubbed by these opponents to trading as “caps on (economic) growth”. Let us look at these two issues in turn.

A particularity about trading that makes it so different from most other instruments is the overall absolute cap as one of the central design elements. This cap defines the total allowed level of emissions in a given period and hence also the total number of permits distributed. This quantity certainty is a characteristic that cannot be achieved with environmental taxation, as the regulator always has incomplete information about abatement possibilities and companies' abatement costs. Another popular environmental policy instrument – standards in its various forms – suffers from the same weakness. Setting a limit value of x grammes of polluting substance per operating hour renders the total quantity of pollution in a time period dependent on the number of plants operated and the actual hours of operation.

The perception of business stakeholders in the debate that trading is inflexible because it imposes a cap at the plant level is only partly true. Voices suggesting so have taken half a step in the understanding of the instrument, but another half is missing. What is true is that there exists a cap – i.e. an absolute constraint on emissions over the universe of all sources participating in the trading scheme. What is, however, a misconception is that this would introduce a hard constraint – similar to a technical standard – at the company or source level. The very opposite is the case: trading in GHG permits allows a company more degrees of freedom in choosing for itself how to comply with the regulation. The only constraint a company is subject to is to cover the actual emissions in a given time period with a sufficient number of permits. The level of these actual emissions or the production level of the company is not directly affected by the regulation.

With this in mind we can also easily show that trading in GHG permits is not a “cap on growth”. Only under the extreme assumptions may trading in GHG permits have the effect of acting like a temporary cap on product output growth. This would be the case if a company decided to take the permit allocation as a fixed target, i.e. not intending to make use of the

permit market after the initial allocation, and when it simultaneously has no leeway whatsoever to change the GHG intensity of its production in the current investment cycle. In other words the company would no longer act to minimise profits or to innovate. With or without emissions trading it is hard to see how such companies could survive in a competitive market.

4.6. Relative Targets are Better than Absolute Ones

Surprisingly many companies and regulators in Europe have a perception that relative targets (e.g. emissions of CO₂ per tonne of steel produced) on GHGs would be better than absolute ones (e.g. tonnes of CO₂ emitted). This discussion of company-level caps has shaped the European debate and emerging programme design decisively. The excessive focus on the individual starting points and the perceived sacrifice a company makes to “accept a cap” has e.g. induced the UK government to offer a financial subsidy for capping volunteers. It remains to be seen, if this demand arises also in other parts of Europe.

Most industries in the EU have been almost obsessive in their demand that they would participate in emissions trading only on the basis of relative targets. Industry representatives sees this as a remedy to avoid the cap on growth (see misconception 4.5 above). Furthermore, such thinking is also rooted in the way voluntary or negotiated agreements have been developed in some Member States. These agreements are frequently based on relative sector targets, such as energy efficiency improvements. At the same time the relative targets would imply that the quantity certainty – as the major advantage of the instrument – would no longer exist. For this reason environmental pressure groups oppose relative targets in the emissions trading context.

The parallel between relative targets and Kornai’s “soft budget constraint” (e.g. 1999, 2001) is evident⁶ and helps to understand that if a system of relative caps is installed, the

⁶ If government sets a “soft budget constraint” to its firms (through state subsidies, soft taxation, non-performing loans, the accumulation of trade arrears between firms, and the build-up of wage arrears), they would no longer make correct investment decisions and they would allocate resources inefficiently. The analogy of a “soft budget constraint” to a relative cap in emission trading is that, if the overall GHG constraint is not binding (either because the cap is relative to production, or because the government increases the cap to avoid to have the price of a GHG emission rise “too high”), the market price for GHG permits would not reflect the real scarcity. Thus, a wrong signal would be sent to the markets: prices would be lower than what would be required to reach the target that the trading sector would need to (implicitly) reach. In other words, there would be no certainty of the trading sector to reach any target.

political economy works effectively against removing it⁷, even if it functions perhaps to the benefit of some, but to the detriment of most.

In our view, relative targets make life more complicated for both government and business. For the government as the designer of a trading scheme with relative targets, some precautions have to be taken to prevent emission inflation in the trading programme. Emission inflation happens, if product output growth is persistently higher than the carbon efficiency improvement. In such a case emissions are ever growing instead of declining. A particular problem arises, if a scheme has a mixed universe of participants, some under an absolute total cap, others only willing to sign up to a relative commitment. This has led to “innovations” in trading programme design such as the UK “gateway” mechanism.

Being a trading participant in a scheme with a gateway provision could prevent some companies from realising profitable trading opportunities and therefore also has the potential to harm companies in the scheme. The major drawback for sectors and companies and a potential source of harm is the fact, that a company with a relative target will not obtain a guarantee that government will not introduce additional regulation at a later stage in order to comply with the national Kyoto target. All those living under and complying with the total absolute cap are less prone to such action. Last but not least, the fixing of the denominator for a relative target may turn out not to be an insurmountable hurdle to implement such an approach in practice.

4.7. Belief or Disbelief in Markets

An important factor shaping the debate and interest in emissions trading as a market-based instrument is the attitude of various stakeholders to markets. The connotation of “trading” and “markets” has both motivated some to be interested in emissions trading and turned away others. This ideological judgement implies that the instrument is not judged on its own merits but based on a superficial assessment. A similar perception-based phenomenon

A “soft budget constraint” (i.e., a relative target in an emission trading case) could work only in case the government would guarantee that the overall national assigned amount (i.e., hard cap) would not be busted. In this case, the government would need to raise additional taxes to buy the excess permits from the trading sector. While this would probably work in a domestic trading regime, however, in an international trading regime, this could create an arbitrage situation where the government is committed to a fixed target while the sector having the relative cap would not be constrained to that target. Thus, either the government (i.e., taxpayers) or the non-trading sectors (due to a hardened de facto cap) would be squeezed.

⁷ Kornai (2001) illustrates this in particular in post-Soviet Russia.

of the instrument driven by ideological attitudes has been identified in the United States by Kelman (1981).

Belief or disbelief in markets seemingly has nourished the interest in trading in GHG permits primarily among the business community and those Member States most open to the “Anglo-Saxon” way of thinking⁸. Disbelief in markets has caused disinterest and even resistance among several environmental pressure groups and several other EU Member States.

Very often European environmental policy can be characterised by North-South differences. Northern Member States (with higher per capita GDP) are traditionally more progressive in environmental policy, while Southern Member States (with lower per capita GDP) are less so. In the debate about trading in GHG permits this rift cannot be observed. The fault line was more of an ideological nature, with some environmentally progressive Member States (e.g. Germany and Austria) taking a hesitant approach in the early phase of the debate.

4.8. Faulty Fixation on Trading Volumes

Somewhat related to the ideology is also the attitude by some stakeholders that could be called “fetish about trading”. This is to say that the act of exchange (buying or selling) of GHG permits itself is seen as the purpose of the instrument. This has made many market intermediaries (stock exchanges, brokers etc.) interested in emissions trading. However, this fixation on trading volumes has also induced negative reactions. Some concluded trading (i.e., exchange of permits) will not result in any emission reductions and asked where the environmental added value of emissions trading lies.

The exchange of permits will create business opportunities for market intermediaries and a certain race takes place to establish marketplaces for GHG permits. Nevertheless, “trading is not primarily about trading”, but rather about creating a mechanism that allows or increases the likelihood of realising a given environmental target (the capped quantity) at the lowest compliance cost. The creation of a market by government intervention (to enable the proverbial “invisible hand”) is not an end itself, but just a technical tool to the end of achieving an environmental target at lower cost.

The lobbying activity of market intermediaries can be compared to the chartered accountant lobbying for a complex tax regime, so to create more business. So the interest of market intermediaries is important, but one should not lose sight and see also some conflict of interest. A market intermediary is likely to be interested in more complex rules, so to increase transaction cost and to create business opportunities. Furthermore, the market intermediaries are also interested in maximizing the number of permit transactions, if a commission is earned on each and every tonne exchanged in the market.

From the point of view of the individual company and society overall, however, the number of tonnes exchanged is not an important indicator for the success of the instrument. A more liquid market is clearly better, as it produces a lower bid-ask spread. But the real success indicator of trading in GHG permits is the cost savings achieved for all participants in comparison to the alternative policy instrument that could have been used to implement the target. Such an assessment is difficult to carry out, as it requires a hypothetical counterfactual.

4.9. The “False Yardstick” Syndrome

Finally, a powerful element in the discussion is the existence of some “false yardsticks” that have been used to form opinions about trading in GHG permits. This effect has already been described in the US literature (Hahn and Stavins, 1991). In fact, any environmental policy instrument developed in a theoretical framework, turns out to suffer from the one or the other obstacle that needs to be overcome in implementation. So while something might be perfect in theory, this is never the case in practice. The phenomenon observed in the US and reappearing in the European debate, is that trading in GHG permits is judged not in comparison to other alternatives with their real-life deficiencies but strictly to the theoretically ideal environmental policy.

One example to demonstrate this is the early but frequent claim that the trading can not be implemented in practice because of insufficient monitoring of GHG emissions. It is true that trading in GHG permits requires accurate emissions measurement or calculation at the plant level. However, the very same remark is important, when levying a tax per tonne of

⁸ In addition to the US and the UK, Nordic countries as well as the Netherlands (which are small open

CO₂ emitted. Carbon taxes are seen as attractive by many European participants in the trading debate and are implemented by some Member States. The problem of emissions monitoring seems not have ever featured prominently as an argument against carbon taxes, though.

Another element of the “false yardstick” syndrome is that trading – as an instrument – is frequently opposed on the grounds that it requires the setting of targets (the overall cap). However, the setting of targets and the choice of instrument are two different decisions in the preparation of environmental policy. In the particular case of the debate about trading in GHG permits as an instrument to implement the targets as agreed in the Kyoto Protocol, the objection to trading on the grounds that it necessitates setting of targets reflects the false yardstick applied by these voices in the debate.

4.10. Summary of Misconceptions

The European debate on emission trading has been shaped by many misconceptions. We have observed the following ones: (i) “Hot Air” being seen as an easy way out and thus being a reason for not to embark on emissions trading, (ii) the misconception that only sellers gain in emissions trading, (iii) the illusion that countries would have marginal abatement costs (and cost curves), (iv) the misconception that the government would be the (main) traders, (v) the erroneous belief that there would be many individual caps (on production) in an emissions trading scheme, (vi) a belief that relative targets are better than absolute ones (vii) an obsessive ideological belief or disbelief in markets driving the perceptions of the instrument (viii) a faulty fixation on trading volumes and finally (ix) the “false yardstick” syndrome, where emissions trading is not compared with other (imperfect) instruments.

5. Conclusions

In this paper we have discussed three alternative pathways to understanding and introducing trading in GHG permits in an EU wide context. These three pathways have at the same time dominated the three phases in the history of the European emissions trading debate subsequently to the adoption of the Kyoto Protocol in 1997. The first was based on a UN based international emissions trading. Soon the discussion evolved to different national

economies) share such characteristics.

trading schemes, based partly on the developments in Denmark and the UK. While the "national" approach was unfolding, the discussion of the need for an EU-wide trading scheme intensified. We noted that it may take a long time before an UN-based scheme would be put in place, at least at entity level. Furthermore, the linking of very different national trading schemes may be difficult, if not impossible (e.g. the existing Danish scheme appears to be incompatible with the UK one). The final pathway via the EU level route has gained major impetus when the European Commission tabled a proposal for a Directive on an EU-wide scheme in October 2001.

We discussed also a number of misconceptions that we have come across over the years in discussions about EU emissions trading. It should be noted that in much of the debate we have witnessed in the EU, we have missed one important factor: the role of emissions trading as creating dynamic technology incentives within the entities that participate (because it "pays off" to innovate and reduce emissions beyond the initial allocation) or in other companies supplying abatement technology to participants.

One interesting conclusion emerging from the discussion of the powerful misconceptions is that in fact many of them are rooted in an insufficient understanding or even outright ignorance of the economic issues underlying the instrument and climate change policy at large. This implies that in the search for the origins of such misconceptions the way economists inform policy debates in Europe and economic analysis is taken up by policymakers seems to be the key.

The brief but lively history of the debate on emissions trading in Europe confirmed also the long-standing phenomenon that in a political process it is very difficult to find a constituency for an efficient solution. On the one hand what we would call "green lobbyists" have a preference for "policies and measures" (e.g. direct promotion of renewable energy) which give an illusion that something directly recognisable "green" is occurring. Emissions trading does not produce such "visible" results and thus the attitude is either (from a negative point of view) "emissions trading is an American invention which should not be taken seriously" or (a bit more positively, but still unfortunately) "I am not against emissions trading, but you should consider it only among other policies and measures".

On the other hand industry and their lobbyists hate caps, and like "voluntary approaches", and do not see that an emissions trading scheme contains many of the elements of a "voluntary agreement", but would offer more. For instance, while both need some kind

of a sanction for non-compliance, the main difference is that an emissions trading scheme contains a safeguard in the form of the possibility of buying allowances, if a company is in non-compliance. However, there is no obligation for buying because non-market transactions are allowed, as long as they are registered in the emissions trading scheme.

Finally, as regulators work in public institutions it is not surprising to find many among them who do not trust markets, but rather view them either as “foes” or at least as “potentially dangerous”. Those regulators would find it hard to believe that a market-based instrument, like emissions trading, could actually work for the improvement of environmental quality. And it would be even more surprising to find among such regulators those who would recognise that emissions trading could work better than existing instruments for the environment.

The “unholy alliance” of green and industrial lobbyists and skeptical regulators makes the prevailing view to be at best “we are not against trading”. In other words, there is hardly a natural constituency “for emissions trading”. And it is only if there is a large enough constituency seeing the virtues of a policy instrument that amasses enough support and actually makes a difference.

References

- Capros Pantelis, Leonidas Mantzos, Matti Vainio and Peter Zapfel (2002), Economic Efficiency of Cross-Sectoral Emission Trading in CO₂ in the European Union, in: Johan Albrecht (ed.), *Instruments for Climate Policy - Limited versus Unlimited Flexibility*, p. 25-64, Edward Elgar, Cheltenham.
- Confederation of Norwegian Business and Industry – NHO (2001), Meeting the Kyoto Protocol Commitments – Summary of Domestic Emission Trading Schemes, January.
- Department for Environment, Food & Rural Affairs (2000), A Greenhouse Gas Emissions Trading Scheme for the United Kingdom, Consultation Paper, November.
- European Commission (2000), Green Paper on greenhouse gas emissions trading within the European Union, COM(2000)87, March.
- European Commission (2001a), Final Report: ECCP Working Group I “Flexible Mechanisms”, available at http://europa.eu.int/comm/environment/climat/final_report.pdf, May.
- European Commission (2001b), Proposal for a framework Directive for greenhouse gas emissions trading within the European Community - COM(2001)581, October.
- Hahn Robert W. and Robert N. Stavins (1991), Incentive-Based Environmental Regulation: A New Era from an Old Idea?, *Ecology Law Quarterly* 18:1-42.
- Kelman Steven (1981), What Price Incentives? Economists and the Environment, Greenwood Publishing Group, Westport, Connecticut.
- Kornai János (1999), Legal Obligation, Non-Compliance and Soft Budget Constraint. *Economic and Business Review* 1:53-66.
- Kornai János (2001), Hardening the budget constraint: the experience of the post-socialist countries. *European Economic Review* 45:9. 1573-99.
- Ministry of Industry, Employment and Communication (2000), Emissions Trading: A way of Achieving the Climate Goal, A Summary of the Final Proposal found in SOU 2000:45, Stockholm.
- Ministry of Trade and Industry (2001), Application of the Kyoto Mechanisms in Finland’s Climate Policy, Report of the Finnish Committee on the Kyoto Mechanisms, Ad Hoc Committee Report 11/2001.
- OECD (1999), Implementing Domestic Tradable Permits for Environmental Protection – OECD Proceedings Paris.

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- (lvii) This paper was presented at the First Workshop of “CFEWE – Carbon Flows between Eastern and Western Europe”, organised by the Fondazione Eni Enrico Mattei and Zentrum fur Europaische Integrationsforschung (ZEI), Milan, July 5-6, 2001

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