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Accounting for early action in the European Union Emission Trading Scheme

Iñaki Arto [a,b,*], Carmen Gallastegui [a], Alberto Ansuategi [b]

[a] IEP, Instituto de Economía Pública, University of the Basque Country, Avd. Lehendakari Agirre, 48015 Bilbao, Spain
[b] Departamento de Fundamentos del Análisis Económico I, University of the Basque Country, Avd. Lehendakari Agirre, 48015 Bilbao, Spain

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ABSTRACT

In the context of emission markets, failure to include early action (EA) as a criterion when sharing out the reduction effort may be unfair. This paper presents (1) a method based on index decomposition that seeks to quantify EA and (2) a method for determining effort sharing considering EA. It is shown that, in the case of European industry (EU-15) and for the period 1995–2005, EA accounted for a reduction of 21% in energy-related CO_2 emissions. Considering two alternative schemes for sharing out the reduction effort in European industry, equal shares (all industries in all countries reduce their emissions by the same percentage) and taking EA into account, we find that Spain, Austria, Italy, the United Kingdom and Sweden would be better off under an equal shares scheme as opposed to one that takes EA into account. The efforts of the remaining countries would be greater than if EA was taken into account. An equal shares scheme would also greatly benefit the textile, non-metallic mineral, paper and "other" industries, and would be particularly detrimental to the chemical, non-ferrous and other metal, and engineering industries.

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1. Introduction

One of the initiatives proposed by the European Union (EU) to encourage the reduction of greenhouse gas emissions and the resulting climate change is the creation of an Emission Trading Scheme (ETS) (Directive 2003/87/CE, hereafter called "Directive"). This consists of allocating a limited number of emission allowances to participating firms that can be traded between them subject to the restriction that none of them are permitted to exceed their CO_2 emission allowance.

These types of schemes seek to ensure that environmental targets set to limit emission levels are met in a cost-effective way, i.e. by minimizing the abatement costs arising from the need to reduce emissions (Montgomery, 1972; Tietenberg, 1980; Baumol and Oates, 1988).

The Directive provides a structure within which an ETS can be set up between certain sectors of industry across the EU. The initial allocation, which is always one of the most controversial points in these programs, is left in the hands of Member States. This is a matter of crucial importance as it has a great effect on the distribution of income derived from ETS. When there is a market but allowances are allocated free of charge,[1] allocation is merely a representation of the effort required of each agent. When deciding the initial allocation it is therefore important to recognize prior efforts made by the different agents to reduce emissions,[2] i.e. early action (EA). This is so because from the perspective of a fair distribution, equal effort should be required of all agents, given that asymmetries in this context might be translated into redistributions of income. Past efforts must therefore be taken into account when reduction efforts are shared among agents and allowances are allocated.

Despite the importance of considering EA, very few studies have attempted to solve the problem omission of EA when sharing out efforts to reduce emissions. The main aim of this paper is to develop a new methodological framework that allows the consideration of EA-related criteria when sharing out efforts to reduce CO_2 emissions.

We begin by analyzing the distributive aspects of the effort sharing mechanism proposed in the Directive. Section 3 presents a methodological framework based on decomposition analysis, aimed at including EA among the criteria for sharing out efforts to reduce emissions. Following this, in Section 4, we apply the method to the case of European industry. The paper closes with a discussion section (Section 5) and some conclusions and final considerations (Section 6).

* Correspondence to: Instituto de Economía Pública, Universidad del País Vasco, Fac. CC., Económicas y Empresariales Avd. Lehendakari Agirre, 83 – Edif. Zubiria, 48015 Bilbao, Spain. Tel.: +34 946017103.
E-mail address: i.arto@ehu.es (I. Arto).

[1] Article 10 of Directive 2003/87 establishes that at least 95% of the allowances for the period must be allocated free of charge; 90% for 2008–2012.

[2] It is likewise necessary to penalize actions that result in worse environmental behavior.

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2. Distributive aspects of effort sharing

Article 2 of the Directive that creates an EU ETS establishes that the Directive applies only to CO_2 emissions generated by the group of activities listed in its Annex I. According to this, the economy is split into two groups: those sectors that take part in the ETS ("Directive Sectors") and those that do not ("Non Directive Sectors").

In such a framework, before allowances can be allocated, the extent to which each group of agents has to contribute in order to meet the target set in the environmental policy must be determined. In this regard, and as will be shown later, the method chosen for sharing this effort has major implications in terms of income distribution.

Taking into account that the allowances will be distributed free of charge (see Article 10 of the Directive), the effort allocated to Directive Sectors translates into an endowment of allowances from which income from their trade can be obtained. On the other hand, meanwhile, Non Directive Sectors must support abatement costs whose distribution depends directly on the way effort is shared.

In terms of fairness, past efforts to reduce emissions – made voluntarily prior to the establishment of the market – should be taken into account when sharing the abatement efforts. This would guarantee equal effort from all the sectors.

The European Commission (EC) itself comments on recognizing EA in the sharing out of emission allowances as follows:

> The accommodation of early action is considered as desirable from a fairness point of view. Those installations that have already reduced greenhouse gas emissions in the absence of or beyond legal mandates should not be disadvantaged vis-à-vis other installations that have not undertaken such efforts. The application of this criterion necessarily implies fewer allowances available for installations that have not undertaken early action. (COM (2003) 830 final)

The EC recommends the use of benchmarking for this purpose. In order to include EA in the sharing out of allowances among installations in the same sector, the differences between certain emission ratios at each installation can be taken into account (e.g. emissions per unit of output), measured according to given benchmarks.

However, the EC makes no mention of taking EA into account when sharing out the burden of reduction among different sectors. It establishes that the first thing to be taken into account in determining the total allowances to be shared out,[3] which is equivalent to sharing the burden between the Directive and Non Directive Sectors, is as follows:

> …In deciding the total quantity, the proportion of overall emissions of covered installations in relation to total emissions is a first element to be taken into account. A Member State should use the most recent data available to determine the proportion. In case a Member State deviates substantially from this proportion, it should give reasons for such deviations. […] Quantities of allowances to be allocated shall be consistent with the potential, including the technological potential, of activities covered by this scheme to reduce emissions. (COM (2003) 830 final)

In other words, the main criterion for sharing the burden between the Directive and Non Directive Sectors is the proportion of total emissions accounted for by each group in the most recent year considered, bearing in mind the potential for reduction by the Directive Sectors. This means that EA is not included *a priori* as a criterion in effort sharing. Consequently the method defined in the Directive does not solve the problem of fair distribution mentioned earlier.

Before presenting our method for quantifying EA, the scope of the concept must be defined. As indicated above, the Directive makes no mention of EA regarding effort sharing, but does mention it in reference to allowance allocation. Under the Directive, EA is understood to mean:

> … actions undertaken in covered installations to reduce covered emissions before the national allocation plan is published and notified to the Commission.

The EC goes no further in defining EA; it merely indicates that only those actions that exceed the requirements of EC legislation can be considered as such (COM(2003) 830 final). In other words, the definition refers only to covered emission reductions greater than those imposed by the EC or national legislation, or to the adoption of actions not obliged by legislation.

In general, EA means the voluntary implementation by an agent of a number of actions that entail a reduction in its CO_2 emissions, prior to the establishment of an ETS. This usually comprises the introduction of technological improvements in processes or products that result in a more efficient use of resources and/or a shift towards cleaner energy sources. EA therefore involves a reduction in emissions per unit of output and, consequently, has a direct impact on trends in emissions in the economy as a whole.

In the EU-15,[4] 93% of CO_2 emissions come from the consumption of fossil fuels (European Environment Agency, 2007). Taking into account the limitations on the reduction of non-energy-related CO_2 emissions, it is clear that in order to identify EA the energy environment must be analyzed.

Energy-related CO_2 emissions from a sector i at a given time t (G_{it}) can be calculated according to the following formula:

$$G_{it} = \sum_{j=1}^{k} G_{ijt} = \sum_{j=1}^{k} f_{ijt} E_{ijt} \tag{1}$$

where sub-index $j = 1,\ldots,k$ denotes the different types of energy source. G_{ijt} is the CO_2 emission amount due to the consumption of energy source j in sector i. f_{ijt} is the CO_2 emission factor associated with energy source j in sector i. E_{ijt} is the amount of energy j consumed by sector i.

By multiplying and dividing Eq. (1) by the total amount of energy consumed by sector i (E_{it}) and by its gross value added (GVA) (Q_{it}), Eq. (2) is obtained:

$$G_{it} = \sum_{j=1}^{k} f_{ijt} \frac{E_{ijt}}{E_{it}} \frac{E_{it}}{Q_{it}} Q_{it} = \sum_{j=1}^{k} f_{ijt} s_{ijt} e_{it} Q_{it} \tag{2}$$

where s_{ijt} is the share of energy source j in the total energy consumption of sector i. e_{it} is the energy intensity of sector i.

Therefore, total energy-related CO_2 emissions from the n production sectors of a country as a whole (G_t) would be given

[3] Each Member State must demonstrate how that quantity of allowances enables the Kyoto target to be met or exceeded taking into account, on the one hand, the proportion of total emissions accounted for by these emissions in relation to those from sources not covered by the Directive and, on the other hand, national energy policies.

[4] EU-15 includes the 15 member states of the European Union before the enlargement of May 1, 2004 (Austria, Belgium, Denmark, Finland, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden and the United Kingdom).

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