

1. Introduction

1. PURPOSE OF THE BOOK

The last two decades have experienced an increasing awareness about global warming. Its causes have been extensively explained and the study of its potential effects on the ecosystem and on humankind has been growing enormously. In spite of the lack of scientific consensus on its potential consequences, it is well recognized that global warming involves a risk that governments cannot neglect anymore. In an attempt to safeguard against the risk of massive damage caused by a change in climate, international and European institutions have committed to clear environmental goals aimed at stabilizing the global temperature at a non-dangerous level. In 2005, with the entry into force of the Kyoto Protocol, the ratifying parties committed to reduce by 2012 their emissions to 5.2 per cent below the level of 1990.

The European Union (hereinafter EU) has been playing an important role in this political process; in the last two decades the mitigation of climate change has become one of the most important issues in the European political agenda. After having ratified the Kyoto Protocol, the European Commission (hereinafter EC) expressed its firm intention to enforce emissions reduction climate policies even beyond the terms of the Kyoto Protocol. At the end of 2008, the European Climate Package, which imposes a unilateral 20 per cent emissions cut below the 1990 emissions level to be met by 2020, was finally approved. These emissions reduction targets are ambitious and costly as they require the public and private sectors to make substantial long-term investments in a relatively short period in order to move to a low-carbon economy. In fact, not just reducing emissions, but achieving these ambitious goals without preventing the economy from growing is the main challenge the EU is facing nowadays. For this purpose, credible and efficient economic instruments need to be designed to induce a reduction of greenhouse gas (hereinafter GHG) emissions in a cost-effective way.

In Europe, the political will to move toward a low-carbon economy has favoured the institution of a cap and trade system: the European Emissions Trading Scheme (hereinafter ETS). The EU ETS is the biggest

cap and trade scheme in the world as it covers almost 12 000 European energy and manufacturing installations that are overall responsible for almost half of the EU carbon emissions. The ETS was established in 2003 by the Directive 2003/87 and it became operational in 2005, when a first three years' pilot trading period was launched. In 2008 a second five years' trading phase started and in 2009 a new Directive 2009/29, which amended the first one, reforming the ETS institutional framework and extending the ETS to a post-Kyoto trading period (2013–2020), was approved.

The establishment of the ETS constitutes a milestone within European and international climate policy. Thanks to this scheme, for the first time CO₂ emissions have been priced in Europe, creating the most important attempt to promote a substantial reduction of emissions and mitigate climate change in a cost-effective way. Indeed, from its very beginning the ETS was expected to facilitate the achievement of the EU emissions reduction targets at the minimum compliance cost. The EC estimated 'the scheme should allow the EU to achieve its Kyoto target at a cost of between €2.9 and €3.7 billion annually. This is less than 0.1% of the EU's GDP. Without the scheme, compliance costs could reach up to €6.8 billion a year' (EC 2004, p. 6). Indeed, according to the Coase theorem, a cap and trade system, where a limited number of freely tradable polluting allowances is generated and assigned to economic agents, is supposed to give optimal incentives to induce efficient emissions reduction. In fact, as long as the costs of entering into a contractual transaction are low enough, free bargaining among private agents should ensure that tradable allowances are allocated to those who value them most, while emissions are reduced where marginal abatement costs (MACs) are lowest. (See e.g. Coase 1960; Dales 1968.)

In spite of EC declarations, the partial results achieved so far seem to suggest that the ETS is far from being the effective and market-oriented mechanism described in the economic literature. Without denying the importance of the result achieved with the launching of the ETS and the pricing of CO₂ emissions, this book intends to analyse the legal framework of the ETS and its economic performance in order to verify how effective this mechanism is in promoting a cost-effective abatement of emissions and to determine how much the European Member States (hereafter MS) effectively rely on this instrument to comply with their emissions reduction targets. After having identified the inefficiencies affecting the ETS we analyse whether the ETS performance can be improved by correcting the relevant legislation.

So far, we have clarified the general purpose of this book. The next section presents the structure of the book, the topics that will be discussed and the methodology that has been adopted to assess the ETS's

effectiveness. The third section describes the scope and boundaries of this research, contextualizing European climate policy within the more extended scientific, political, economic and legal debate concerning climate change and international efforts, the Kyoto Protocol in particular, aimed at inducing global and collective action to reduce the world GHG emissions to a safe level. The final section describes the synopsis of this book.

2. METHODOLOGY AND CONTENT

By adopting a law and economics approach, the effectiveness of the ETS is going to be assessed through an economic analysis of its legal framework and institutional design. First, a positive analysis is going to be performed to assess whether the ETS has been affected by some inefficiencies or fallacies. In the case these are identified, we are going to investigate to what extent they can be considered a consequence of the underlying European institutional design and legal framework. Then, if the ETS institutional design has been found ineffective or distorted, we will proceed to assess whether and how the ETS inefficiencies can be reduced by improving the European legislation. This second part of the analysis is mainly policy oriented.

This positive-normative approach is going to be applied at two parallel levels. First, we are going to focus on the ETS cap in order to assess its stringency. The level of the ETS cap indicates the amount of emissions by which the sectors regulated by the ETS have to reduce and, thus, how the emissions reduction burden deriving from the Kyoto target has been shared among trading and non-trading sectors. Therefore, assessing the stringency of the ETS cap will allow us to understand if and how much MS are relying on this economic flexible mechanism to comply with their Kyoto targets. Second, we are going to focus on the allocation rule adopted to assign the initial number of allowances among the ETS sectors. The choice between grandfathering and auctioning impacts the ETS sectors' costs as well as their competitiveness on the secondary markets, and these allocation rules will be compared according to both an efficiency and an equity approach. The main purpose of this analysis is to assess whether grandfathering can be considered an efficient and fair allocation rule. This will be done by clarifying the conditions under which this allocation rule is consistent with an efficiency and equity interpretation of the polluter-pays principle.

The book will follow a chronological order to clarify the ETS normative evolution and its consequential impact on the tradable permits market. First, the stringency of the ETS cap and the ETS allocation rule, as they

have been designed by the first ETS Directive 2003/87, will be analysed. Afterwards, some policy recommendations will be proposed to reduce and correct the ETS inefficiencies by improving the European legislation. In the light of these normative considerations, the content of the new ETS Directive 2009/29 will be finally discussed to assess whether, and to what extent, the way the ETS has been reformed will improve its effectiveness during the third ETS trading period 2013–2020.

3. SCOPE AND BOUNDARIES

As previously mentioned, this book focuses mainly on the EU ETS and on the European legislation that has established it. This implies that we do not intend to bring any new insight to the debate about climate change, its potential evolution and consequences on the ecosystem; that would be mainly a scientific task. Moreover, it is important to stress from the very beginning that I consider the Kyoto emissions reduction target as a given, and by questioning the effectiveness of the EU ETS to reach this political target I make no attempt to infer any conclusion concerning the efficiency of the Kyoto Protocol itself. Indeed, this research has been developed on the preposition that an economic instrument, such as the emissions cap and trade scheme, can be more or less effective in reaching a goal even if the goal has not been properly chosen.

Despite the fact that we have limited ourselves to considering the ETS and the European legislation, it is important to clarify to the reader that both the European climate policy and the ETS have been developed within a more general scientific, economic and political context. Scientists have been analysing the causes of global warming, its evolution and potential consequences; economists have been trying to assess the costs and benefits of climate change and its mitigation; while politicians have been working to promote cooperation at an international level aimed at mitigating climate change. As previously mentioned, these scientific, economic and political topics will not be deeply analysed or questioned. Nevertheless, these topics are going to be shortly introduced as it is important to be aware that the ETS and the European climate policy have been developed within this general framework.

4. SYNOPSIS OF THE BOOK

After this first introductory chapter, Chapter 2 contextualizes the ETS within the broader scientific and economic debate about both climate

change and its mitigation costs and policies. We initially clarify what is meant by the term ‘global warming’, its causes and its main anthropogenic sources, as well as the possible natural consequences linked to different climate scenarios. Next, the chapter focuses both on the economics of climate change and on the economic debate concerning the costs and benefits of global warming as opposed to the costs and benefits of its mitigation. Then we shortly review the different economic models developed to assess the optimal levels of emissions and emission reductions, highlighting the different assumptions, methodologies and contrasting results of these analyses without pretending to assess which is the most reliable one. Afterwards, we introduce the economic concept of negative externality and briefly summarize the problems that have to be addressed when dealing with the provision of global public goods. The chapter finally describes the political and juridical pathway that has brought about the entry into force of the Kyoto Protocol, the first international treaty aimed at stabilizing the emissions of GHG at a safety level. It will do so by focusing on the Protocol content, namely the emissions reduction targets and the flexible mechanisms established to reach them. Moreover, given that the Kyoto Protocol *de facto* does not impose any emissions reduction commitment on the US or on the developing countries (Carraro et al. 2009), introducing the Kyoto Protocol is crucial to highlight from the very beginning the unilateral nature of the European climate policy, which is aimed at achieving a stringent emissions reduction target in an asymmetric geopolitical scenario.

Chapter 3 presents a taxonomy of the legal rules and economic instruments that can potentially address the problem of environmental externality, and in particular climate change. From a law and economics perspective, it is possible to separate the legal and economic instruments that intervene *ex post*, such as the liability regime, from others intervening *ex ante*. Moreover these ‘competing’ legal instruments can be classified according to their degree of flexibility: ranging from the more interventionist command and control regulation to the market-oriented economic instruments, such as pollution taxes and the cap and trade system. We do not intend to develop an exhaustive comparative analysis of these different competing legal solutions. Nevertheless, Chapter 3 intends to review the properties and the related advantages and disadvantages of the most important legal and economic instruments adopted so far in the field of environmental law. It will do so in order to explain why, among them, the cap and trade system has been chosen first in the Kyoto Protocol and then within the European legislation as the principal legal and economic instrument to address the problem of climate change. The emergence of the cap and trade scheme is also explained from the perspective of political

economy, which takes into consideration how the private interests of the regulated parties tend to influence the type of adopted regulation.

Chapter 4 focuses on Directive 2003/87/EC, which establishes the ETS. This chapter intends both to introduce the economic and legal background of the ETS and to describe its functioning. Starting with a brief reminder of the importance of the previous experience of the American SO₂ emissions trading programme, Chapter 4 describes both the origin of the EU ETS within the legal framework of the Kyoto Protocol and the role it covers within European climate policy. The legal nature of the allowances within the field of property law is briefly recalled. The ETS is contextualized in a temporal and spatial framework. The length of the ETS regulation and its subdivision into different trading periods is specified together with its scope, which is the amount of emissions and number of emissions sources that fall within the ETS. This specification is important to underline from the very beginning: the ETS regulates only a subset of the GHGs and emissions sources covered by the Kyoto Protocol and, thus, complying with the ETS legislation does not necessarily mean complying with the terms of the Kyoto Protocol. Moreover, this chapter describes the responsibilities that the MS have in implementing the ETS at a national level. The functioning of the National Allocation Plans (NAPs) is explained in order to highlight which parts of the ETS decision-making process have been decentralized at a national level according to the principle of subsidiarity. Finally, Chapter 4 illustrates how the ETS can impact the secondary market, in this case the electricity generation market, by inducing a reduction of emissions through a switch to less carbon-intensive fuels. As such, the indicator of the CO₂ theoretical coal-to-gas switch price is introduced.

Chapter 5, which along with Chapters 6 and 7 constitutes the core of the book, focuses on the level of the ETS cap.¹ The purpose of Chapter 5 is to assess the extent to which MS are effectively relying on the ETS to comply with their Kyoto commitments. In order to do this, we assess the ETS cap stringency, where the ETS cap indicates the proportion of emissions that the ETS sectors are legally required to abate and, consequently, the amount of emissions by which the non-trading sectors have to reduce to comply with Kyoto commitments. A theoretical benchmark is established to evaluate if emissions permits have been over-allocated during the first and second ETS trading periods. Over-allocation is defined here as occurring when the ETS cap exceeds a theoretical ETS cap that would

¹ Part of Chapter 5 has been originally published as a research article in the review *Climate Policy*. For details see S. Clò (2009), 'An analysis of the EU Emissions Trading Effectiveness', *Climate Policy*, 9, 227–41.

impose an emissions reduction burden on the ETS sectors proportional to the share of European emissions they produce. The analysis clarifies how the emissions reduction effort has been divided between ETS and non-ETS sectors. Finally, the inefficiencies concerning permits over-allocation are analysed, namely cross-subsidization from non-ETS to ETS sectors, national subsidy to the ETS sectors, lack of harmonization within the ETS and consequential distortion of competition in the secondary markets.

Chapter 6 focuses on the allocation rule adopted during the first and second ETS trading periods, which is grandfathering: the initial allocation of allowances free of charge proportionally to historical emissions. The main purpose of Chapter 6 is to assess whether grandfathering can be considered, in theory and in practice, an efficient and fair allocation rule. This will be done by clarifying the conditions under which this allocation rule is consistent with the polluter-pays principle. The basic question is the following: do polluters pay under grandfathering?² Taking into account the complexities inherent in the interpretation of principles, Chapter 6 distinguishes between an efficiency and an equity interpretation of the polluter-pays principle. In light of these different interpretations, Chapter 6 develops a comparative analysis between grandfathering and auctioning in order to assess to what extent the different allocation criteria can be considered efficient and fair. Finally, we analyse whether the theoretical findings concerning the efficiency and fairness of grandfathering are still valid within the ETS. By highlighting the inefficiencies that have emerged at the time of applying this allocation rule in the ETS, Chapter 6 determines some conditions that have to be satisfied in order to ensure the consistency of grandfathering with the efficiency interpretation of the polluter-pays principle.

Chapter 7 focuses on the reform of the ETS, as designed by new ETS Directive 2009/29/EC, which amends the first ETS Directive, and it is aimed at assessing if and how the ETS functioning will be effectively improved during its third post-Kyoto trading period (2013–2020).³ Chapter 7 focuses on the major provisions of the new ETS Directive to

² Part of Chapter 6 has been originally published as a research article written jointly with E. Woerdman and A. Arcuri in the *Review of Law and Economics*. For details see E. Woerdman, A. Arcuri and S. Clò (2008), 'Emissions trading and the polluter-pays principle: Do polluters pay under grandfathering?', *Review of Law and Economics*, 4(2).

³ Part of Chapter 7 has been originally published as a research article in *Energy Policy*. For details see S. Clò (2010), 'Grandfathering, auctioning and carbon leakage: Assessing the inconsistencies of the new ETS Directive', *Energy Policy*, 38(5), 2420–30.

modify the variables previously analysed in Chapters 5 and 6, namely the ETS cap and allocation rule. After recalling the inefficiencies that emerged in the past trading periods, Chapter 7 analyses how these variables have been reformed by the new ETS Directive in order to assess if and to what extent the new ETS Directive will improve the ETS functioning by increasing its effectiveness, avoiding undesirable distributive effects and granting higher harmonization within the internal market. The chapter focuses mainly on the phenomenon of carbon leakage (hereinafter CL) that could emerge by strengthening the ETS cap and by passing from grandfathering to auctioning as the main allocation rule. The methodology to assess the ETS sectors' exposure to CL is described and the results of the EC quantitative assessment are presented and discussed. Particular attention is devoted to the discussion of both the criteria adopted to assess the risk of CL in order to determine if and when the defined procedures can be considered as having a solid economic background and when they can be regarded as mainly political or extra-economic.

Finally, Chapter 8 concludes this book, summarizing the main results that have been reached.