



Handbook of Research on Environmental Taxation

Edited by **Janet E. Milne • Mikael Skou Andersen**



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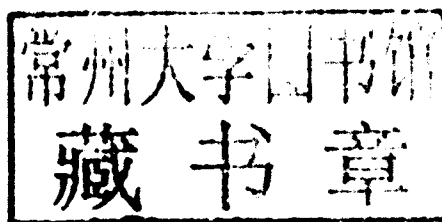
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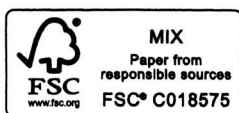
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HANDBOOK OF RESEARCH ON ENVIRONMENTAL TAXATION

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Mikael Skou Andersen dedicates his work on this book to the memory of Svend Auken, Minister of Environment and Energy in Denmark from 1993 to 2001, who gave us many environmental taxes to study.

Abbreviations

ASA	aviation service agreement
ATSDR	Agency for Toxic Substances and Disease Registry
BT	business tax
BTA	border tax adjustment
CAFE	Clean Air for Europe
CCA	climate change agreement
CCL	Climate Change Levy
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (US)
CGE	computable general equilibrium
CIT	country in transition
CRF	concentration-response function
CT	consumption tax
dB	decibels
ECA	enhanced capital allowance
ECJ	European Court of Justice
EEA	European Environment Agency
EFR	Environmental Fiscal Reform
EKC	Environmental Kuznets Curve
ETD	Energy Tax Directive
ETR	environmental tax reform
ETS	Emission Trading Scheme
EU	European Union
FYP	five-year plan (China)
GATT	General Agreement on Tariffs and Trade
GDP	gross domestic product
GHG	greenhouse gas
GTZ/GIZ	German Development Implementing Agency
HCFC	chlorinated and fluorinated hydrocarbons
ICAO	International Civil Aviation Organization
IEA	International Energy Agency
IMF	International Monetary Fund
IPA	impact pathway approach
LCA	life cycle assessment
LCIA	life cycle impact assessment
MAC	marginal abatement costs
MBI	market-based instruments
MEA	multilateral environmental agreement
MFN	most-favored nation
MLG	multilevel governance

MSD	marginal social damage
NEEDS	New Energy Externalities Developments for Sustainability
NICs	national insurance contributions
ODC	ozone-depleting chemical
OECD	Organization for Economic Cooperation and Development
OPEC	Organization of the Petroleum Exporting Countries
PM	particulate matter
PPM	Process and Production Methods
PRF	Permanent Reforestation Fund
R&D	research and development
SARA	Superfund Amendments and Reauthorization Act
TFEU	Treaty on the Functioning of the European Union
TI	tax interaction
UNFCCC	United Nations Framework Convention on Climate Change
VAT	value added tax
WTO	World Trade Organization
WTP	willingness to pay
YOLL	years of lost lifetime

MEMBER STATES OF THE EUROPEAN UNION—OFFICIAL ABBREVIATIONS

AT	Austria	SE	Sweden
BE	Belgium	SI	Slovenia
BG	Bulgaria	SK	Slovakia
CY	Cyprus	UK	United Kingdom
CZ	Czech Republic		
DE	Germany		
DK	Denmark		
EE	Estonia		
EL	Greece		
ES	Spain		
FI	Finland		
FR	France		
HU	Hungary		
IE	Ireland		
IT	Italy		
LT	Lithuania		
LU	Luxembourg		
LV	Latvia		
MT	Malta		
NL	Netherlands		
PL	Poland		
PT	Portugal		
RO	Romania		

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1 This book's approach to environmental taxation

Janet E. Milne

The field of environmental taxation is entering a stage of maturity as governments increasingly incorporate environmental tax instruments into their environmental portfolios and as a wide variety of stakeholders and scholars explore ways to address the ecological challenges that face their countries and the globe. This Handbook describes the state of the art of research on environmental taxation for a wide variety of readers, including researchers in academia and at think tanks, policymakers and analysts in government, representatives of the private sector, and people interested in the ways in which tax systems can affect behavior. This brief chapter describes the approach we have taken to the subject and an overview of the following chapters.

AN INTERDISCIPLINARY PERSPECTIVE

Because environmental taxation is inherently a topic that has warranted interest from many different sides, the Handbook takes an approach based on several areas of study. Economic theories generate the roots from which environmental taxation grows; the principles and practice of political economy and economics shape its acceptance and application; law and public finance mold the features of its design and execution. Consequently, the book is written both for and by people from a range of disciplines, including economics, law, political science, public finance and engineering. We have encouraged the contributing authors to present their topics in a way that delicately treads the line between providing sophisticated analysis and explaining research in a manner that a broad range of readers can understand. We hope that a deeper appreciation of the issues involved in environmental taxation will enhance the ability to effectively design and implement environmental tax measures and encourage research and interdisciplinary collaboration among different fields.

A LIFE CYCLE APPROACH TO ENVIRONMENTAL TAXATION

It is a statement of the obvious that environmental taxation exists to advance environmental goals. The range of these environmental goals is broad, and it grows each year as policymakers find new ways to harness tax systems for environmental protection. Science, of course, defines the environmental goals that environmental taxation serves. This book, however, does not try to start with any specific environmental goals or the science that underlies those goals. That starting point is the logical place for the development of any particular environmental tax instrument, but an issue-by-issue analysis would require a tome much larger than this one.

Instead, the following chapters focus on universal themes that affect environmental

2 *Handbook of research on environmental taxation*

taxation, organized around what we think of as the life cycle of environment tax instruments:

- The life cycle starts with an introduction to the *concepts* underlying environmental taxation, in effect the fundamental DNA that shapes its development. It explores the vocabulary and principles of environmental taxation and the legal authority to engage in environmental taxation.
- The book then turns to the *design* of environmental taxation—the fundamental elements of the design of environmental taxation instruments that shape the details of the way the instruments look when governments create them. Environmental taxation instruments share many universal design choices. They also raise interesting issues about how to determine the cost of environmental externalities that tax rates might reflect and whether to dedicate the revenue to the environmental purpose.
- The enactment of environmental taxation instruments requires their *acceptance* in the public and private sectors. The degree of acceptance is heavily influenced by assessments of their effect on competitiveness, the extent to which tax measures disadvantage people at lower income levels, the economic and equity impacts that flow from how government can use the revenue from environmental taxes, and other aspects of political economy.
- Acceptance is followed by the realities of *implementation*. Implementation involves issues such as how countries with multiple levels of government match environmental taxes with the appropriate level of government and the level of public and private transactional costs associated with environmental taxes. Case studies illustrate how environmental elements can be incorporated into tax systems in established economies and countries in transition.
- Once in place, the ultimate merit of environmental taxation depends on its *impact*. Therein lie the challenges of determining the actual impact of environmental taxes in decoupling economic growth and environmental degradation, and assessing environmental taxation's effect on environmentally positive technological innovation. There is also the question of how environmental taxes affect competitiveness.
- It is then useful to step back and consider the role of environmental taxation amid the broad *policy mix*, which includes traditional regulation and other market-based instruments, such as tradable emissions allowances. Environmental tax instruments rarely exist in isolation, and policymakers must continually determine the most appropriate combination of instruments, each with its own unique attributes.

We hope that readers can draw lessons from this life cycle analysis that will inform the development and analysis of a broad range of environmental taxation instruments. We also hope that it can serve readers around the world. Research on environmental taxation is often country- or region-specific, but many of the principles and lessons have broad applicability. In selecting topics, we have tried to identify issues that are quite universal and will have currency in the greatest number of countries. At the same time, we have included several case studies that illustrate how specific issues have been addressed in particular countries or regions, choosing examples that offer lessons that can have broad relevance or interest.

WHAT IS 'ENVIRONMENTAL TAXATION'?

A foundational issue for environmental taxation is the question of what 'environmental taxation' encompasses. Environmental taxation is often viewed as meaning environmental taxes, such as pollution or emissions taxes. This book adopts the OECD's definition of environmental taxes, provided in Chapter 2, which considers whether an environmental tax is 'environmentally related,' a definition that provides significant latitude.

However, this book also addresses environmental tax policy more broadly. It considers tax instruments that provide government support for environmentally positive choices—such as reduced tax rates, tax credits, exemptions or deductions. As explained in Chapter 2, these tax incentives are often referred to as environmental tax expenditures. We think it is important to consider both sides of the incentive coin: the tax increases for environmentally negative actions and the tax benefits for environmentally positive actions.

The repeal of subsidies for environmentally damaging activities, such as the production and use of fossil fuels, is also a significant component of environmental tax policy viewed broadly. Environmental tax policy consists not only of adjusting the tax code to include new measures designed to promote environmental protection but also considering ways to reform the tax code to withdraw or discourage measures that work at cross purposes. While certainly important and worthy of research, a detailed inquiry into environmentally damaging subsidies lies beyond the scope of this book. With limited pages, we have chosen to delve more deeply into the environmental taxation instruments that can yield positive environmental results.

A BRIEF OVERVIEW OF THE BOOK

This Handbook seeks to serve multiple goals. Its authors capture the key literature to help researchers in the field, and in doing so, they also provide their own analytical frameworks that may assist researchers and policymakers as they consider issues. After assessing the landscape, they highlight issues that warrant future research, and the final chapter presents the editors' views on an agenda for research. In short, the book is descriptive and analytical, retrospective and prospective. Given the multiplicity of environmental taxation instruments and their potential for broad application, it cannot be comprehensive, but we hope it can help establish a framework and can be a useful reference for current and future research and exploration.

Although the wealth of material in the pages ahead defies summarization, the following brief descriptions of the subsequent chapters highlight the key issues addressed in the book and how various issues relate to each other. They also note issues that lie beyond the scope of this book, given the inevitable realities of limits on coverage, but that readers nonetheless should bear in mind.

Part I: Fundamental Concepts of Environmental Taxation

Part I introduces readers to fundamental concepts that shape environmental taxation. Janet Milne and Mikael Skou Andersen (Chapter 2) review the development of the

concepts of environmental taxation and the vocabulary used to articulate those concepts. Starting with the intellectual father of environmental taxes, A.C. Pigou, they trace the evolution of environmental taxation concepts over the past century, and in so doing, they discuss semantic and conceptual issues that lurk beneath this evolution. Questions examined include: What is a ‘Pigouvian tax’? How has the international community distinguished an ‘environmental tax’ from other taxes, fees or charges? What are the terms used to describe tax reforms of which environmental taxes are one component, and what are the other components of such reforms? And what is the place of environmental tax expenditures in environmental tax policy? The chapter builds a common foundation for the chapters that follow.

Environmental taxation is the product of economics. As a market-based instrument, environmental taxation springs from economic principles of how to affect behavior in environmentally positive ways. Consequently, understanding the economic theories is critical to appreciating the conceptual basis for environmental taxation. Jean-Philippe Barde and Olivier Godard (Chapter 3) explore the economic rationales for environmental taxes and the static and dynamic efficiency of environmental taxes. They also place environmental taxes in the important context of environmental fiscal reform, which includes the restructuring of existing taxes and the removal of environmentally damaging tax subsidies—a significant topic not otherwise addressed at great length in this book, as noted above. Finally, they distinguish the economic principles of environmental taxation and tradable permit systems and identify key criteria for choosing between these two market-based approaches. Taken as a whole, the chapter offers a comprehensive but accessible framework for considering the role of taxation in environmental protection.

Although shaped by economics, environmental taxation instruments are also creatures of the law. This legal aspect generates often underappreciated but fundamental questions about which governmental units actually have the legal authority to use environmental taxes and how legal procedures affect their ability to do so.

Michael Rodi (Chapter 4) takes on the task of analyzing the legal authority to enact environmental taxes. Because the law varies from country to country, the chapter highlights key legal issues that are common to many countries, illustrated by examples from a variety of countries, including those from Australia provided by contributing author Hope Ashiabor. The chapter starts with the basic question of whether environmental taxation instruments fall within the rules governing tax instruments or environmental instruments, given their hybrid nature. It then focuses on how a country’s constitution and its more general legal principles, such as rules governing retroactivity or basic rights, can affect the use of environmental taxation. Because one governmental entity is usually part of a tiered set of governmental entities (local, state, national and possibly supranational, as in the case of the European Union), the chapter considers intergovernmental legal rules that can limit the authority to use environmental taxation. International law can also play a role in defining legal authority. It lays the groundwork for Chapter 14, which examines how environmental taxation has actually been implemented at different levels of government, and it links to the discussion in Chapter 11 about how trade agreements affect the use of environmental taxes.

Part II: Design

After adopting the concept of environmental taxation and ensuring its legal basis, a government or advocate must consider how to design the environmental taxation instrument. Economic and environmental principles motivate its use, but a variety of considerations affect the actual design details. Pedro Herrera Molina (Chapter 5) lays out the critical design decisions for environmental taxes and environmental tax expenditures. He dissects the instruments into their component parts and identifies factors that affect design decisions, which can arise from issues of law, environmental policy, economics, politics or technical administrative feasibility. As he notes, the influence of these factors will vary depending on the country and the particular circumstances, but the fundamental design choices and the need to consider each factor are universal. The chapter also addresses the important issue of who can and should administer environmental taxation instruments as a matter of law and policy—tax authorities or environmental authorities. As noted in Chapter 4, the hybrid nature of the environmental taxation instrument poses interesting challenges that traditional environmental protection instruments need not face.

A significant issue in environmental tax design is how to use the revenue from a new or increased environmental tax, a recurring element in the discussion about how to design policy packages that include environmental taxes. One design option is to dedicate the revenue to environmental purposes. Claudia Dias Soares (Chapter 6) examines the law and policy of earmarking environmental tax revenues to the environmental problem that the tax addresses. She distinguishes earmarked taxes from other arrangements, such as charges and revenue recycling, and explores the literature and range of considerations surrounding the question of whether to earmark revenues. Selected examples illustrate these distinctions and considerations. The option of using the revenue for revenue-neutral tax reform is also explored elsewhere in this Handbook, particularly with respect to the political acceptance of environmental taxes in Part III.

In a case study, Michael Rodi, Kai Schlegelmilch and Michael Mehling (Chapter 7) explore how a number of design issues played out in one specific context—when Vietnam adopted its recent environmental tax reform, which came into effect in 2012 and applies to a broad range of pollutants. Although they discuss the role of environmental tax reforms in countries in transition in general, many of the design issues are common to a broad range of countries considering enacting or reforming environmental taxes. The chapter describes and analyzes the steps that led to the enactment of Vietnam's environmental tax reform and the legal, political and policy factors that influenced its introduction and design, as well as its projected distributional impacts.

An inevitable issue for environmental tax design is how high to set the tax rate. As explained in Chapters 2 and 3, the tax rate could be set to execute the Pigouvian principle of internalizing externalities, or it might be set to achieve a given degree of environmental improvement under the Baumol-Oates approach. Alternatively, government could decide to send a softer price signal not strictly correlated with an economic theory. If government seeks to execute the Pigouvian principle, it will need to know the cost of the environmental externalities when it designs the tax, because that cost will determine the tax rate. Even if the tax rate does not achieve the Pigouvian level, it will partially internalize the externalities.