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Federal Department of Finance FDD
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Tax and the environment: Basic concepts and policy issues

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Introduction

- **Rising interest in environmental taxation (OECD, EU)**
- **Growing awareness of environmental challenges**
- **Optimism from experience of early movers:**

  → Green taxes as effective and efficient instruments for environmental policy: Environmental tax reform can be growth friendly
- **Administrative issues**
- **Green taxes may help fiscal consolidation**

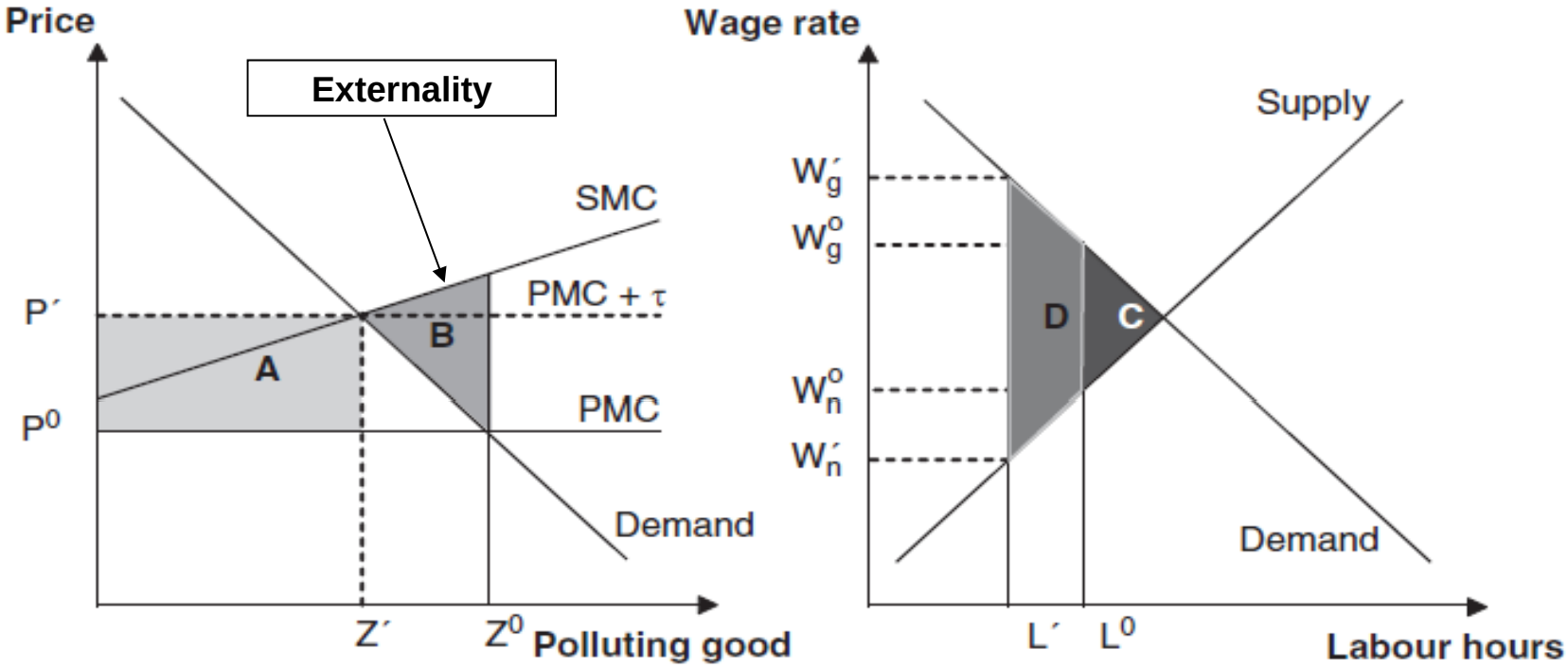
Basic concepts of green taxes – Welfare implications I

- Externalities: Consumers of environmental goods do not bear all costs of their actions → Part of the cost of consumption are borne by society as a whole → Over-consumption and pollution
- "Polluter pays" principle: Polluters should be charged the marginal cost of the negative environmental externalities associated with their pollution → Business and consumers would take into account the costs of pollution in their choices about what and how to produce and what to buy

  → Market-friendly environmental policy: Set correct price signals for optimal allocation of scarce resources

  → Internalize the externality with a tax which is equal to marginal external cost (Pigou tax)

Basic concepts of green taxes – Welfare implications II



Original equilibrium without policy: Demand = PMC (p^0, Z^0), welfare loss B, since SMC>PMC

New equilibrium with Pigou tax τ: Demand = PMC + τ = SMC (p‘, Z‘), welfare gain B, revenue A

Source: Fullerton/Leicester/Smith (2010): Environmental taxes, chapter 5 of Mirrlees Review, p. 444.

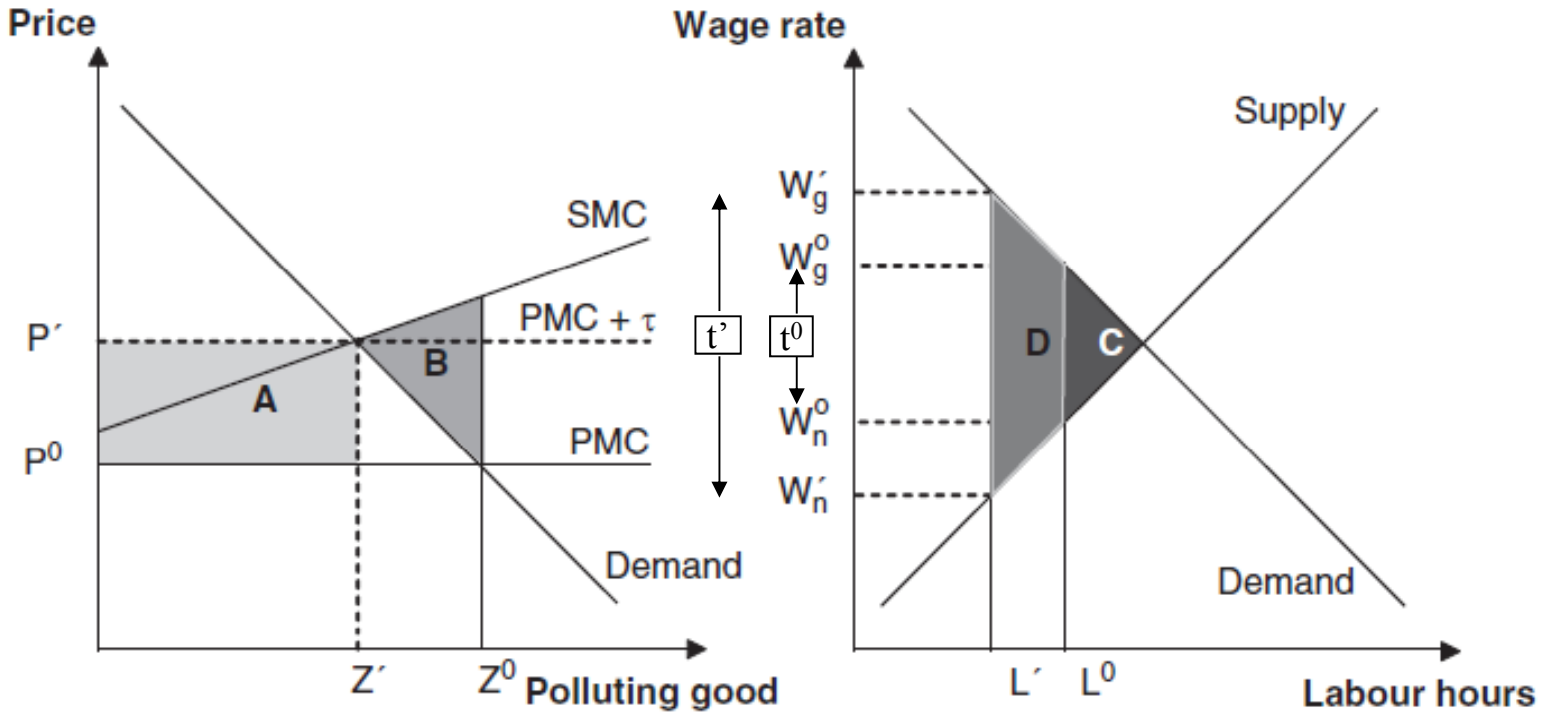
Basic concepts of green taxes – Welfare implications III

- Problem with Pigou tax: In most cases external costs are unknown
- Alternative: Define environmental goals (e.g. a certain emission level) and set tax rates accordingly → Information about price elasticities necessary
- Change of relative prices of polluting and non-polluting goods: Effectiveness depends on reactions of consumers and producers, i.e. price elasticity and substitution elasticity
- Empirical results: Long-term price elasticities of energy and fuel demand are higher than short-term elasticities and can be substantial

Basic concepts of green taxes – Double dividend hypothesis I

- **Double dividend (DD): Revenue-neutral shift from taxation of labour and capital to taxation of environmental goods has 2 benefits:**
  - 1. Increase in environmental quality (reduction of energy use, reduction of CO_2 emissions and secondary benefits (health, buildings, biodiversity))
  - 2. Efficiency gains from reducing other distorting taxes with the revenue from green taxes
- **Weak form of DD: Positive welfare gain from using the green tax revenues to reduce distortionary taxes instead of returning tax revenues to taxpayers through lump-sum payments → Empirically uncontested**
- **Strong form of DD: Raising a green tax and reducing a distorting tax has not only an environmental gain (first dividend) but also reduces the overall distortionary costs of taxation (second dividend). Overall welfare gain achieved even without environmental gain! → Empirically contested!**

Basic concepts of green taxes – Double dividend hypothesis II



2 benefits of green tax τ: 1. Welfare gain B (environmental gain) and 2. With revenue A cut wage tax from t‘ to t^0, raise labour supply from L‘ to L^0 and reduce welfare cost on the labour market (C+D) by D

Source: Fullerton/Leicester/Smith (2010): Environmental taxes, chapter 5 of Mirrlees Review, p. 444.

Basic concepts of green taxes – Double dividend hypothesis III

- **A green tax has its own distorting effects on labour supply and therefore can have more of less excess burden than the labour tax itself**
  - Price increase reduces real net wage which might reduce labour supply, adding to excess burden (however, price increase also reduces real net unemployment benefits which might offset effect of real net wage reduction on labour supply)
  - On the other hand, green tax revenue used to cut labour tax rate increases real net wage rate and raises labour supply, reducing excess burden → Which effect dominates?

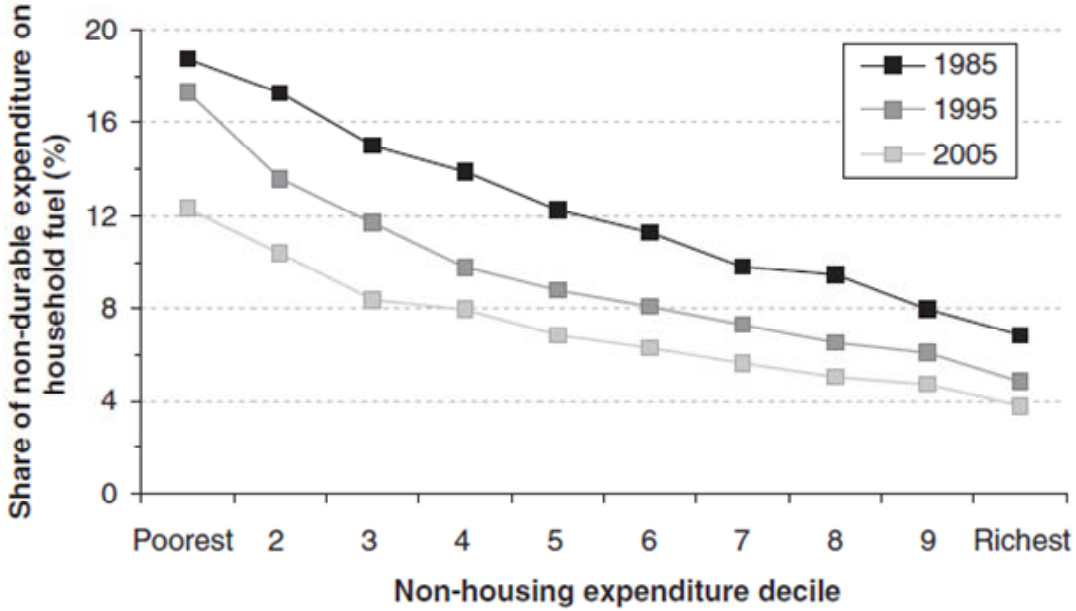
  → Empirical results: Effect depends on efficiency of current tax system and situation on labour market
- **Countries with efficient tax systems and well-functioning labour markets (how many of these exist?): Strong form of double dividend unlikely**
- **All other countries (majority?): Strong form of double dividend very likely!**

Basic concepts of green taxes – Conclusion I

- Compared to other instruments, by using green taxes a given level of environmental protection is achieved at lower cost by
  - Providing incentives for polluters to choose the most cost-effective abatement mechanisms
  - Encouraging the greatest abatement effort from those polluters for whom it is least expensive
  - Providing ongoing incentives for innovation in pollution control
- The revenue of green taxes can be used to cut other distortionary taxes, thereby increasing the efficiency of the tax system (double dividend)
- However, there are two major drawbacks of green taxes
  - Significant distributional consequences
  - Concerns about international competitiveness of firms

Basic concepts of green taxes – Conclusion II

- Distributional impact of green taxes
  - Fuel and electricity taxes tend to be regressive
  - UK example: How green taxes fall on different income groups



Source: Fullerton/Leicester/Smith (2010): Environmental taxes, chapter 5 of Mirrlees Review, p. 467

→ Revenue recycling to compensate losers, e.g. balance income distribution via other tax cuts

Basic concepts of green taxes – Conclusion III

- Concerns about international competitiveness

  - Caused by rising input prices (energy products, fuel etc.)
  - Not all sectors are similarly affected:
    - Energy-intensive firms vs. labour-intensive firms
    - Winners: Services, construction, agriculture
    - Losers: Basic industry, metal industry, chemicals
  - The smaller the economy the stronger the negative effects of rising energy prices

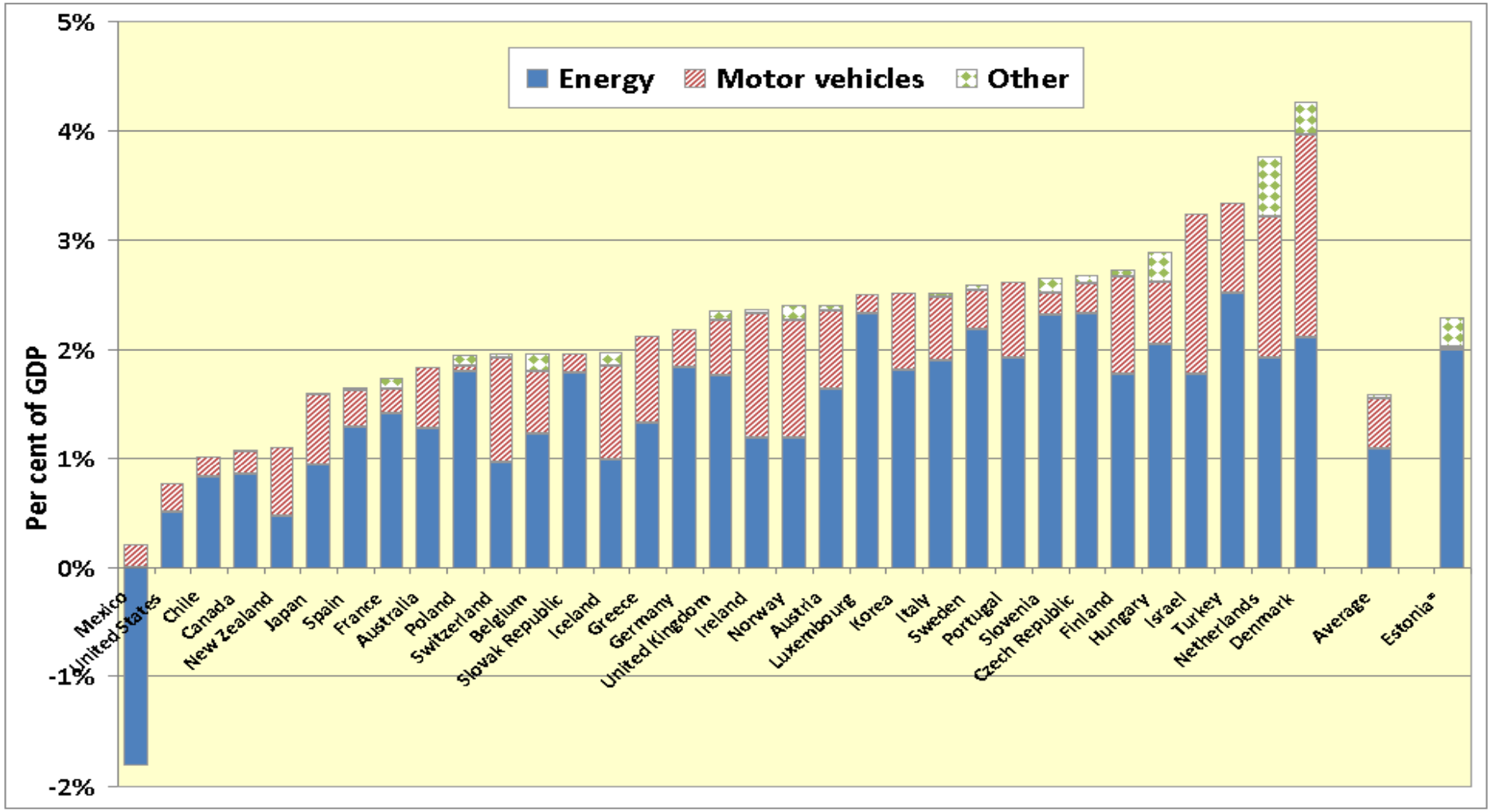
  → Revenue recycling to compensate losers, e.g. increase international competitiveness of affected firms by cutting CIT

Experiences - I

- Early movers (SWE, DNK, NOR, FIN, GER, NLD)
  - Introduction of green taxes during 1990ies
  - Green taxes are an effective instrument to improve environmental quality (first dividend)
  - Positive effects of green taxes on growth and employment (second dividend)
  - Positive effects of green taxes on innovation and competitiveness (third dividend?)
  - Negative effects on income distribution can be mitigated by tax cuts (reduction of PIT rates, tax credits, reduction of SSC)
  - No negative impact on international competitiveness of firms

Experiences - II

Green taxes in OECD countries: Taxes on energy, CO_2, vehicles, pollutants (excluding royalties and taxes on natural resource rents)



Green taxes: The way forward I

- **Revenue potential**
  - Revenues from green taxes: 2 - 2.5% of GDP
  - 90% of this revenue from taxes on motor vehicle fuels and motor vehicles
  - Table: Potential fiscal revenue from a CO_2 tax or emission trading (Revenue as % of GDP in 2020 following a gradual introduction covering all GHG emissions)

Price on emissions per tonne of CO_2-equiv.	Australia and New Zealand	Canada	EU27 and EFTA	Japan and Korea	United States
USD 10	0.8	0.5		0.2	0.4
USD 25	1.9	1.2	0.7	0.5	1.0
USD 50	3.3	2.1	1.1	1.0	1.7
USD 100	5.7	3.6	2.3	1.7	2.9

Green taxes: The way forward II

- **Efficiency and growth potential**

	Japan	Korea
Revenue from energy taxes	0.9% of GDP	1.8% of GDP
Other environmental taxes and trading	SOx, Waste	NOx, SOX, VOC, Waste, Batteries
Combined corporate income tax rate	39.5%	24.2%

- Which country's tax system gives better conditions for investment and green growth?
- Expanding the use of green taxes as important part of growth-oriented tax reform → Shift (part of) the burden away from corporate and personal income taxes and social security contributions
- However, the case for environmental tax reform should appeal first and foremost to the potential environmental gains!

Green taxes: The way forward III

- **Administrative issues**
  - Design green taxes with low administrative costs: E.g. taxes on petroleum products levied on limited number of taxpayers (refineries, depots, importers) → Relatively simple to administer and enforce
  - Income taxation can be more prone to evasion than fuel taxes
  - Falling prices of technology make it cheaper to measure and to tax resource use and pollution
  - Taxes are more transparent than negotiated regulations
  - Compensation of revenue from green taxes via PIT/CIT cuts may reduce administrative costs

Conclusion

- **Green taxes are effective instrument for achieving environmental goals**
- **Revenue of green taxes can be used to cut other distortionary taxes → increase the efficiency of the tax system (double dividend)**
- **Double dividend depends on distortions caused by actual tax system**
- **Revenue recycling for correcting distributional consequences and concerns about international competitiveness of firms**
- **Environmental tax reform → Kill two birds with one stone!**