Intergenerational Aspects of Ecotax Reforms — an Application to Germany

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Motivation

- since 1990s: environmental tax reforms in many European countries $\Rightarrow$ double dividend (?)

- introduction of ecotax in Germany 1999-2003:
  - ✓ tax on gasoline, e.g.: €0.15 per liter $\cong$ €65 t\(CO_2\)
  - $\Leftrightarrow$ EU ETS: $< $€10 t\(CO_2\)
  - $\Leftrightarrow$ social cost of carbon: €30 t\(CO_2\)? (IPCC, 1995)
  - ✓ 90% of revenue (€16 bn p.a.) used for cuts in pension contributions
  - ✓ pension benefits constant!

What explains high carbon price implied by German ecotax?
  - $\Rightarrow$ old and young generation hit differently
  - $\Rightarrow$ politico-economic reasons!
The Model

- Old (size=1) and young (size=1 + n) vote in each period on
  - ✓ ecotax rate $\theta$
  - ✓ refund rule $\alpha$: lump-sum transfer $\rightarrow$ benefits all or
    - reduction of pension contributions $\rightarrow$ benefits the young separately!
- The young go working and pay *distortionary* pension contr.
- The old are retired and receive *constant* pension benefits
- Pension system is Pay-as-you-go
- Young and old consume clean & dirty good which causes $CO_2$
  - $\Rightarrow$ disutility from emissions
- If tax revenue is devoted to pension scheme, pension contr. ↓
Clean & dirty good consumption

Consumption

clean good

dirty good

Retired individual
Young low-income earner

... Young high-income earner
Ecotax is regressive!

- Consumption: clean good
  - Ecotax: dirty good
  - Retired individual
  - Young low-income earner
  - Young high-income earner

- Ecotax: dirty good
  - Retired individual
  - Young low-income earner
  - Young high-income earner

Diagram showing the regression of Ecotax on consumption categories and income levels.
Ecotax is regressive!

Consumption

clean good

dirty good

Retired individual  Young low-income earner  ...  Young high-income earner

Ecotax

but lower disutility from emissions for all
Ecotax with cuts in pension contr.

Consumption

clean good

dirty good

Retired individual

Young low-income earner

... Young high-income earner

Lower pension contributions

Ecotax
Ecotax with lump-sum transfer

Consumption

Benefit more from lump-sum transfer!

clean good

dirty good

Retired individual
Young low-income earner
...
Young high-income earner

Lump-sum transfer
Ecotax
Individuals can be ordered according to labour income. For \( n > 0 \), the median voter is young and divides the electorate in halves.
Voting on Green Tax Rate (for $\alpha_t > 0$)

Individuals can be ordered according to labour income. The median voter is the same as before.
The Political Equilibrium

Social planner

- considers deadweight loss from pension contributions ($\alpha_t^* = 1$)
- takes into account damage on future generations ($\theta_t^*$)

The political equilibrium is described by:

1. $y_t^M < \tilde{y}_t$: $\alpha_t^{eq} = 0$ and $\theta_t^* > \theta_t^{eq}$
2. $y_t^M \geq \tilde{y}_t$: $\alpha_t^{eq} = 1$ and $\theta_t^* \geq \theta_t^{eq}$

A necessary (but not sufficient) condition for $\theta_t^* < \theta_t^{eq}$:

$$y_t^M > \frac{\tilde{y}_t}{1 - \eta}.$$
Conclusion

- Distributing rents created by env. regulation to young working agents may secure political support for higher ecotaxes.

- Without redistribution through pension system, ecotax substantially lower.

- Calibration of our model to German economy (2009):
  - Median voter wants redistribution through pension system instead of lump-sum transfer.
    - Germany’s green tax rate may be close to or even exceed the Pigouvian tax rate, depending on discount rates, $CO_2$ removal rates etc.
  - Demographic change as expected for Germany will lower the tax rate below its optimal level

- Similar effects of ecotax reforms in the UK, Sweden, Denmark, the Netherlands: cuts in income or social security taxes.