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 $\widehat{=}$ €65 tCO_2
    $\Leftrightarrow$ EU ETS: $<$ €10 tCO_2
    $\Leftrightarrow$ social cost of carbon: €30 tCO_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

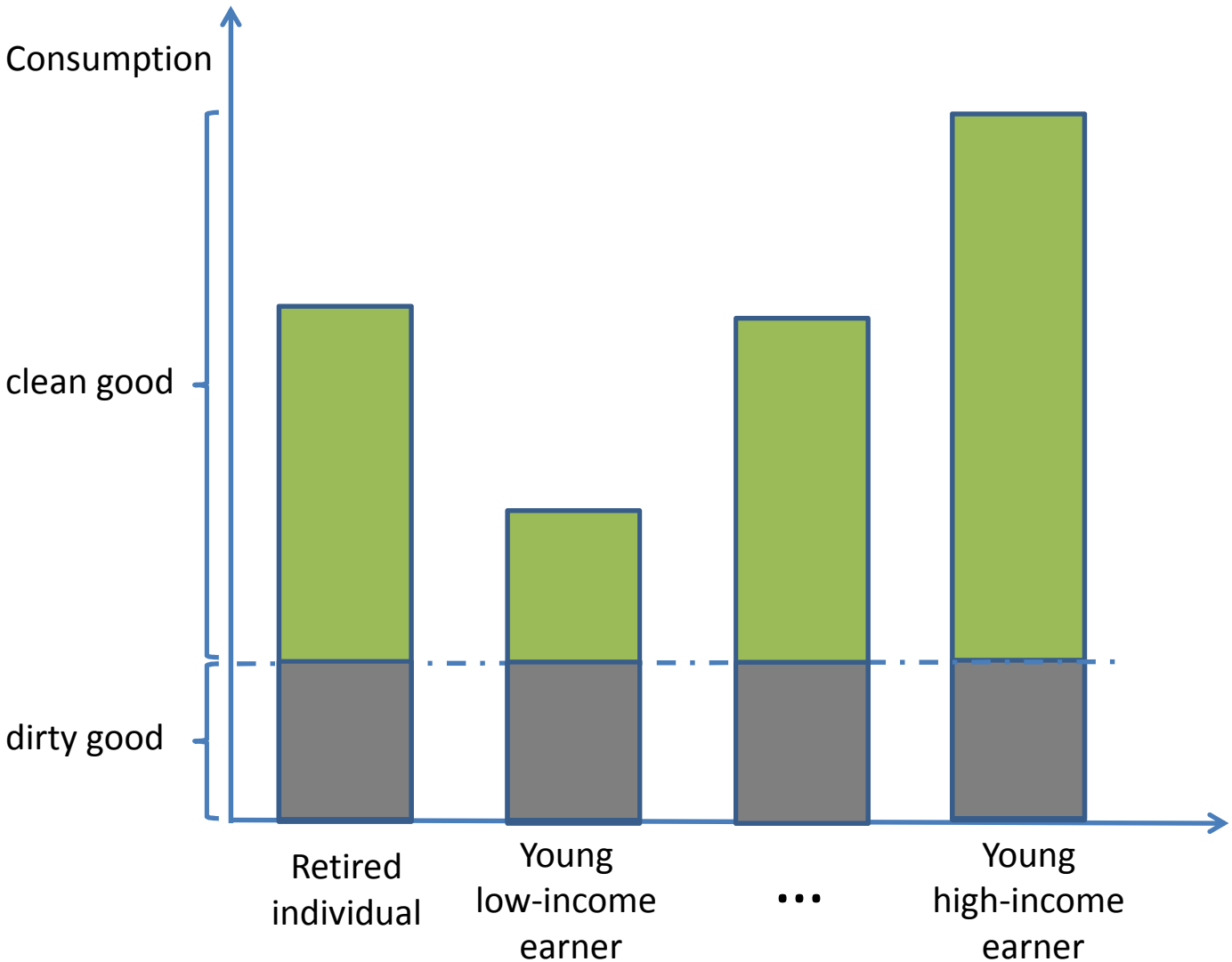
$\Rightarrow$ politico-economic reasons!

The Model

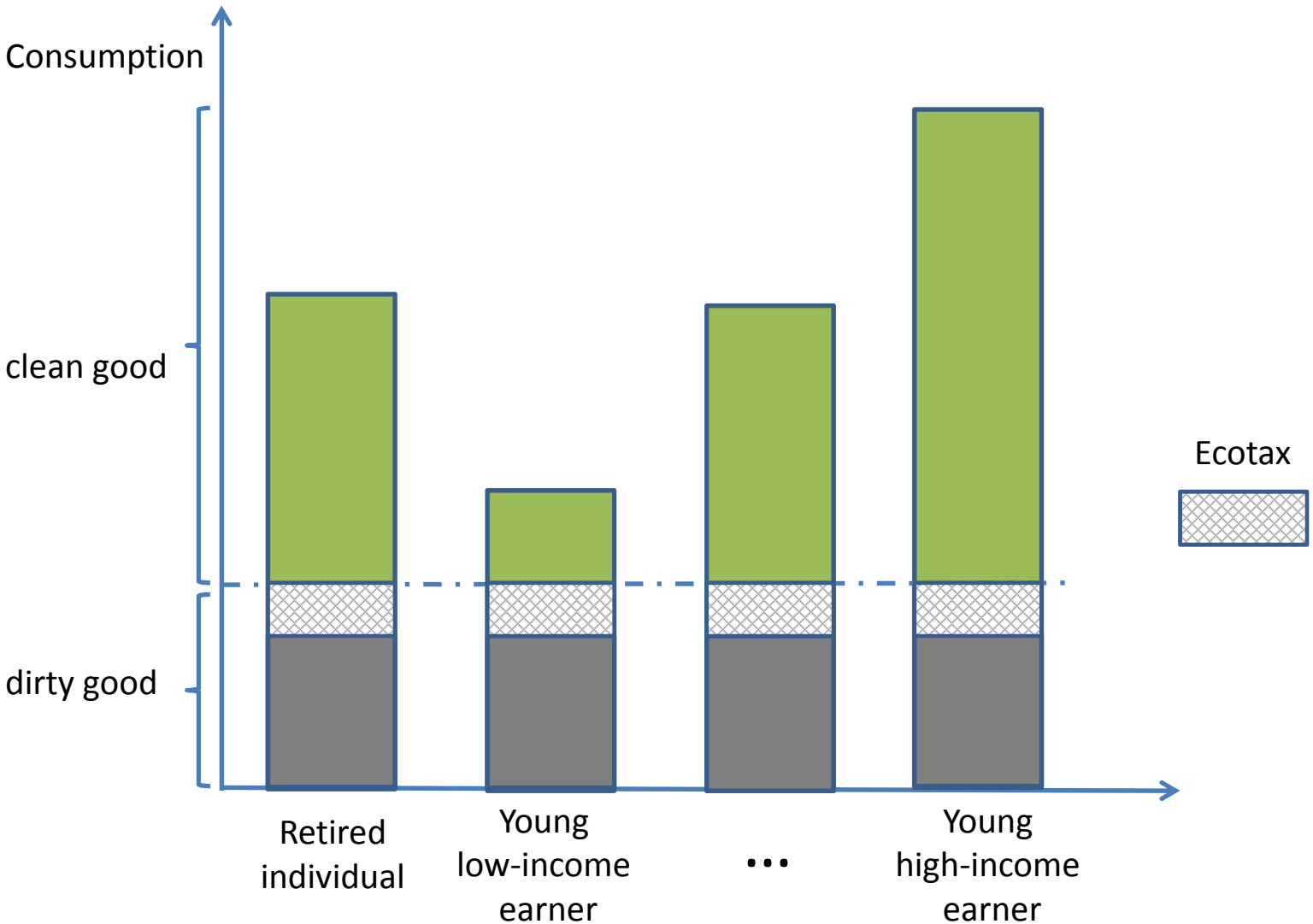
- Old (size=1) and young (size=$1+n$) vote in each period on
  - ✓ ecotax rate θ
  - ✓ refund rule α: lump-sum transfer $\rightarrow$ benefits all *or* reduction of pension contributions $\rightarrow$ benefits the young

  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. $\downarrow$

Clean & dirty good consumption



Ecotax is regressive!



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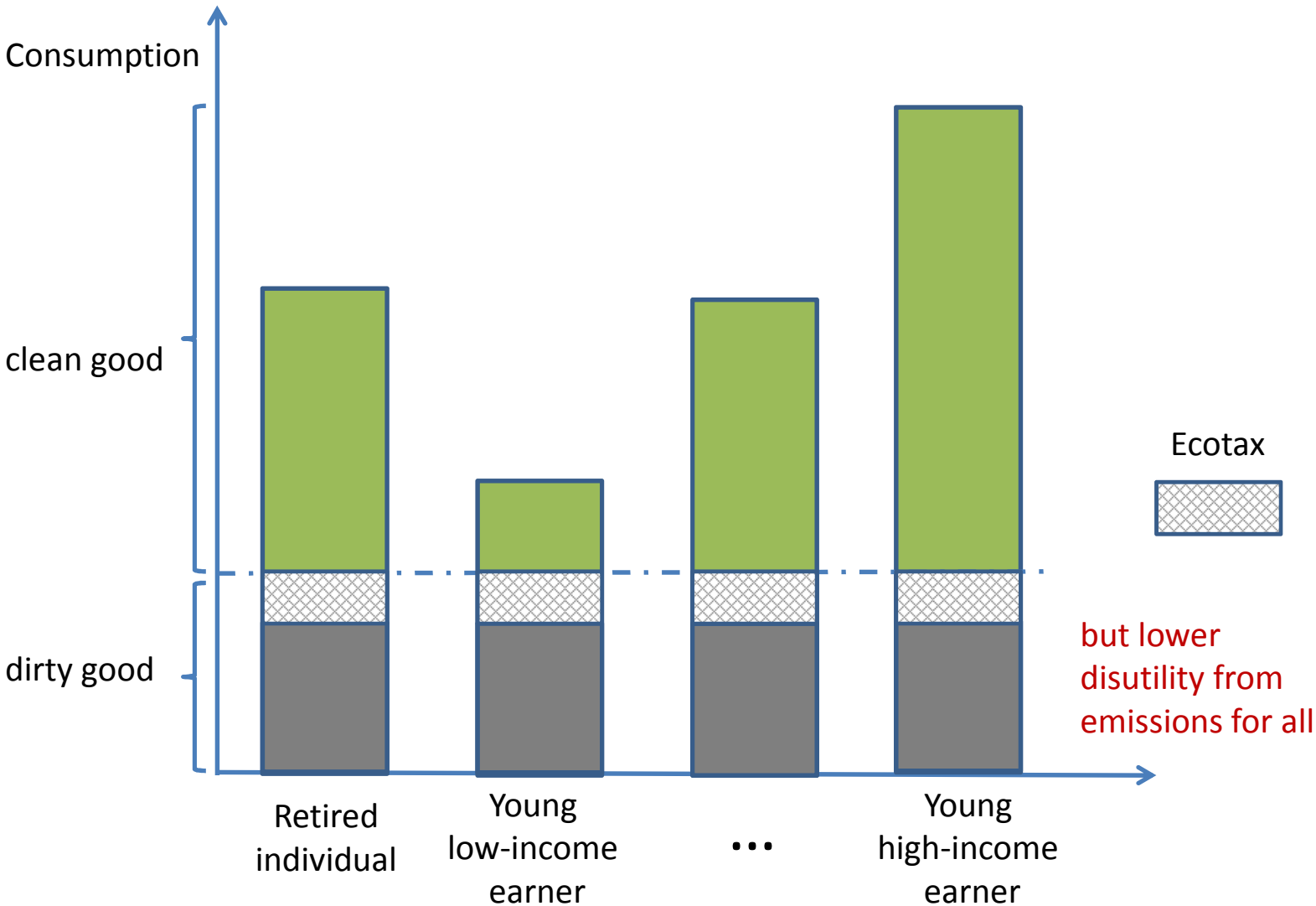
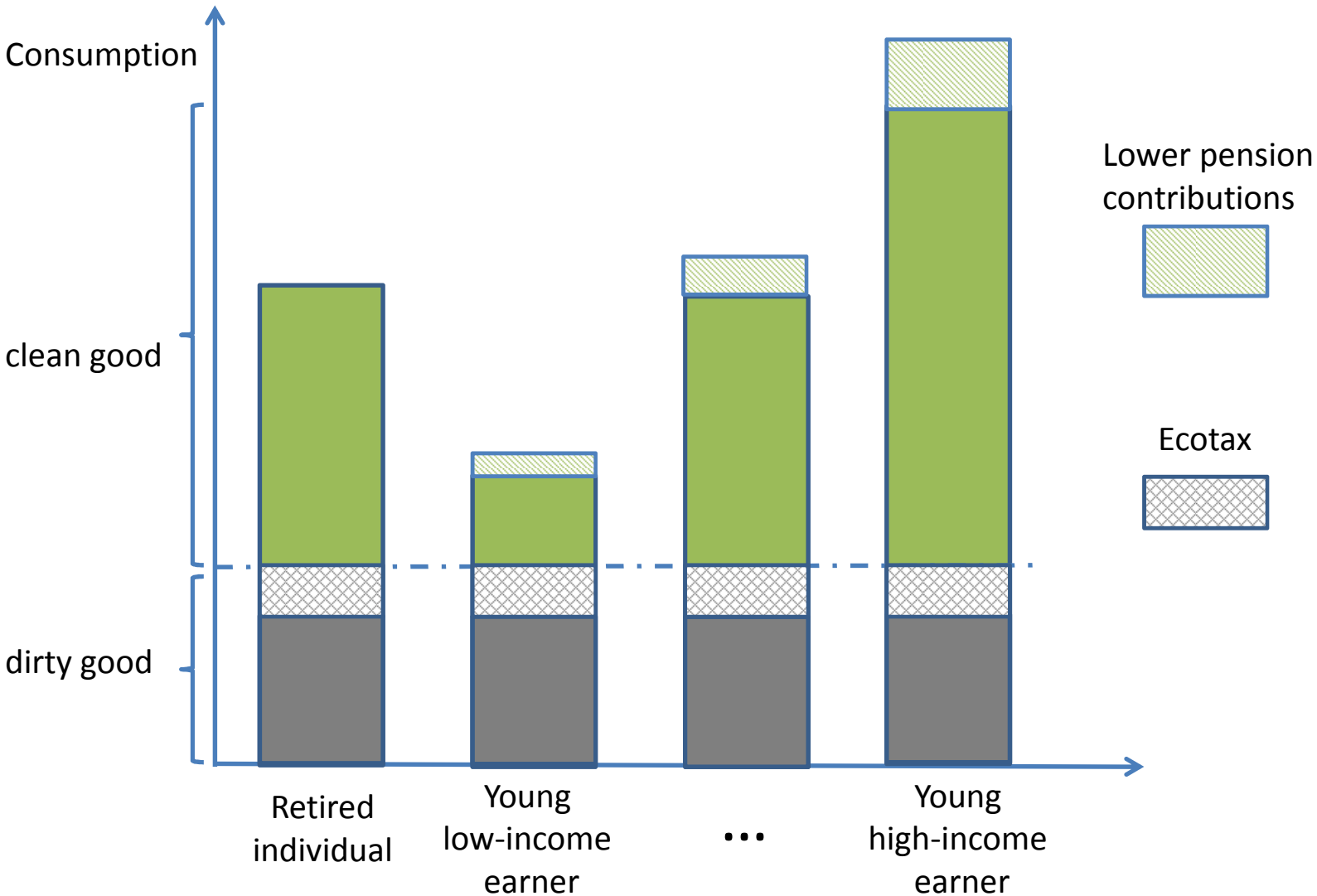
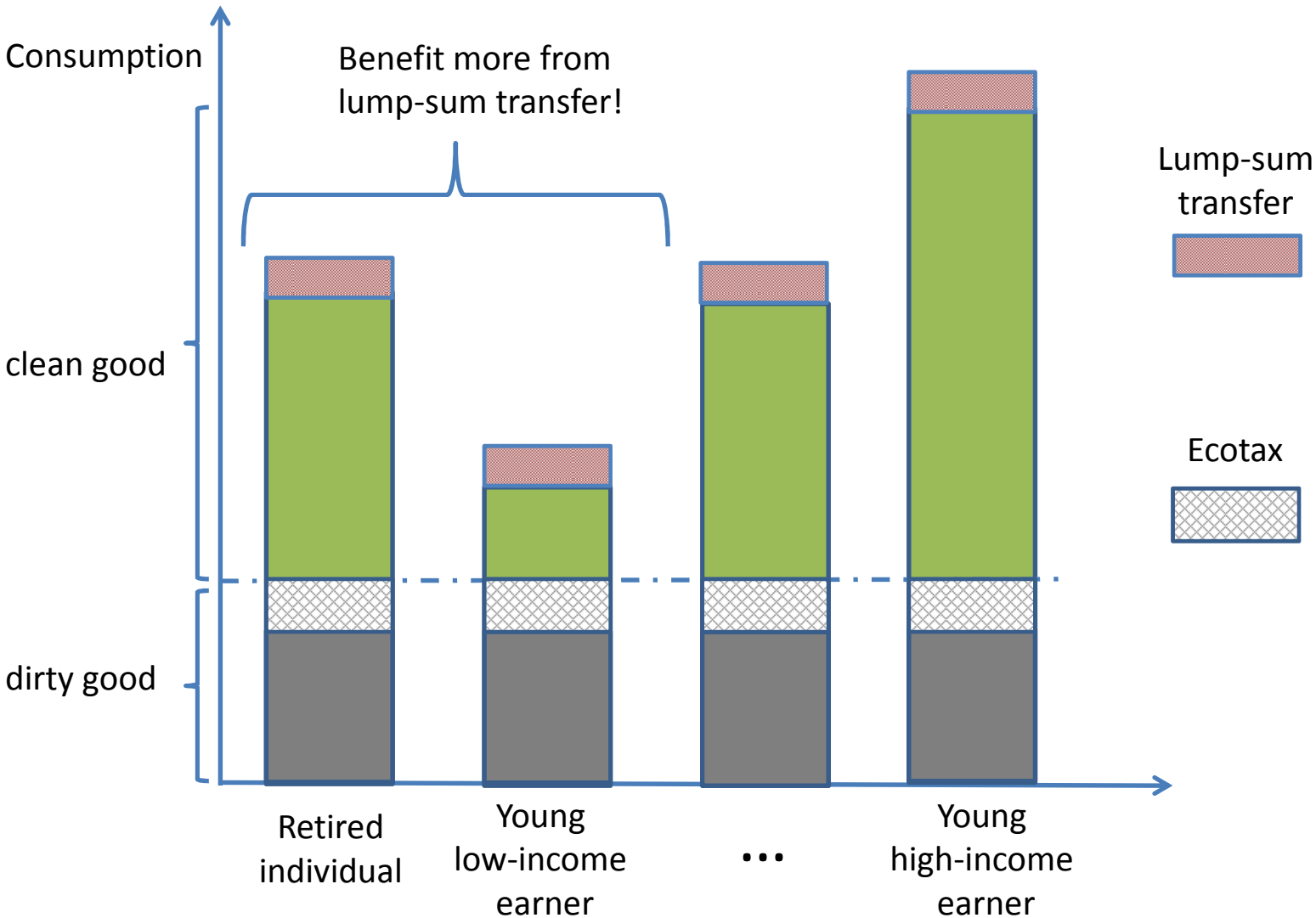


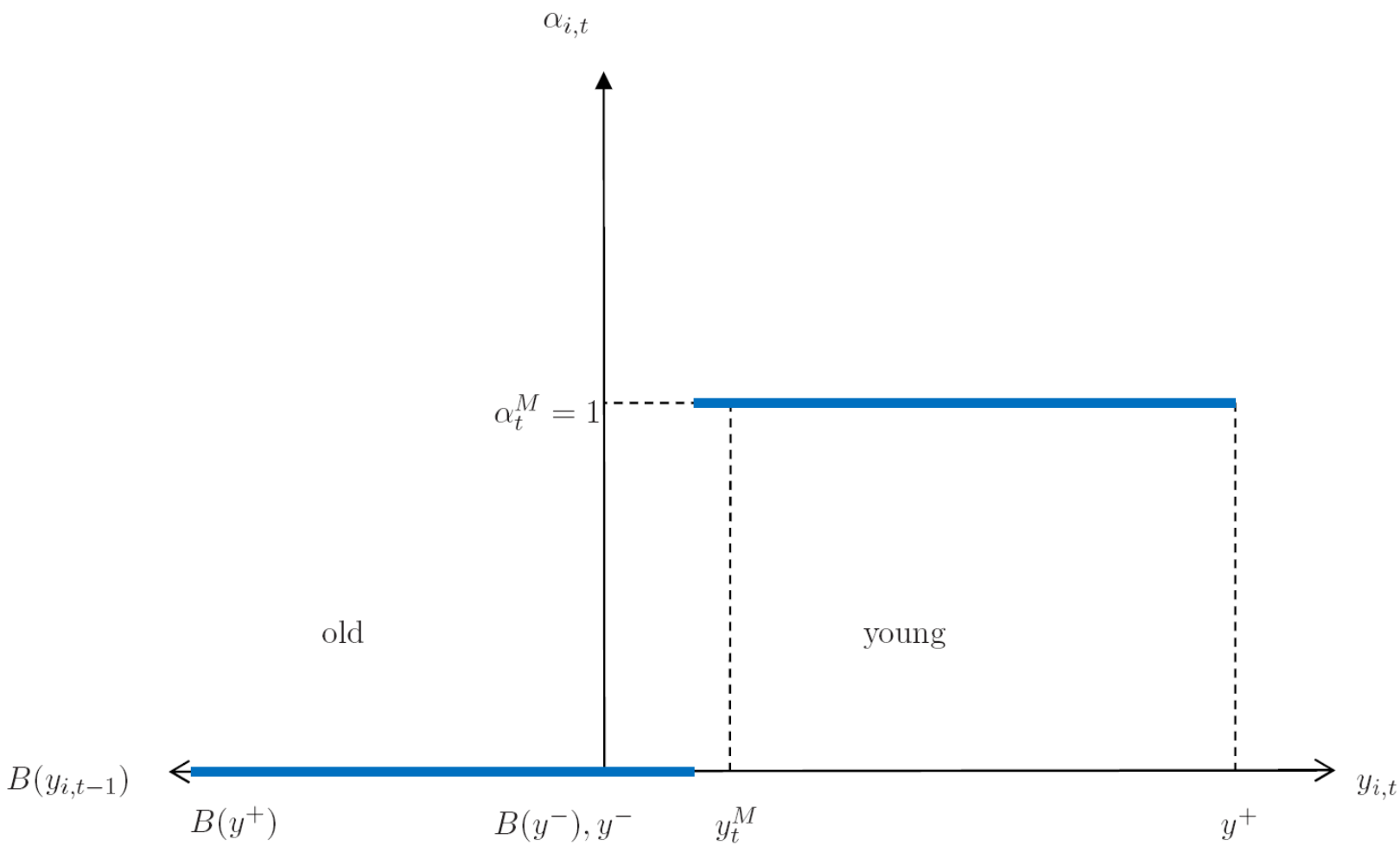
Ecotax with cuts in pension contr.



Ecotax with lump-sum transfer

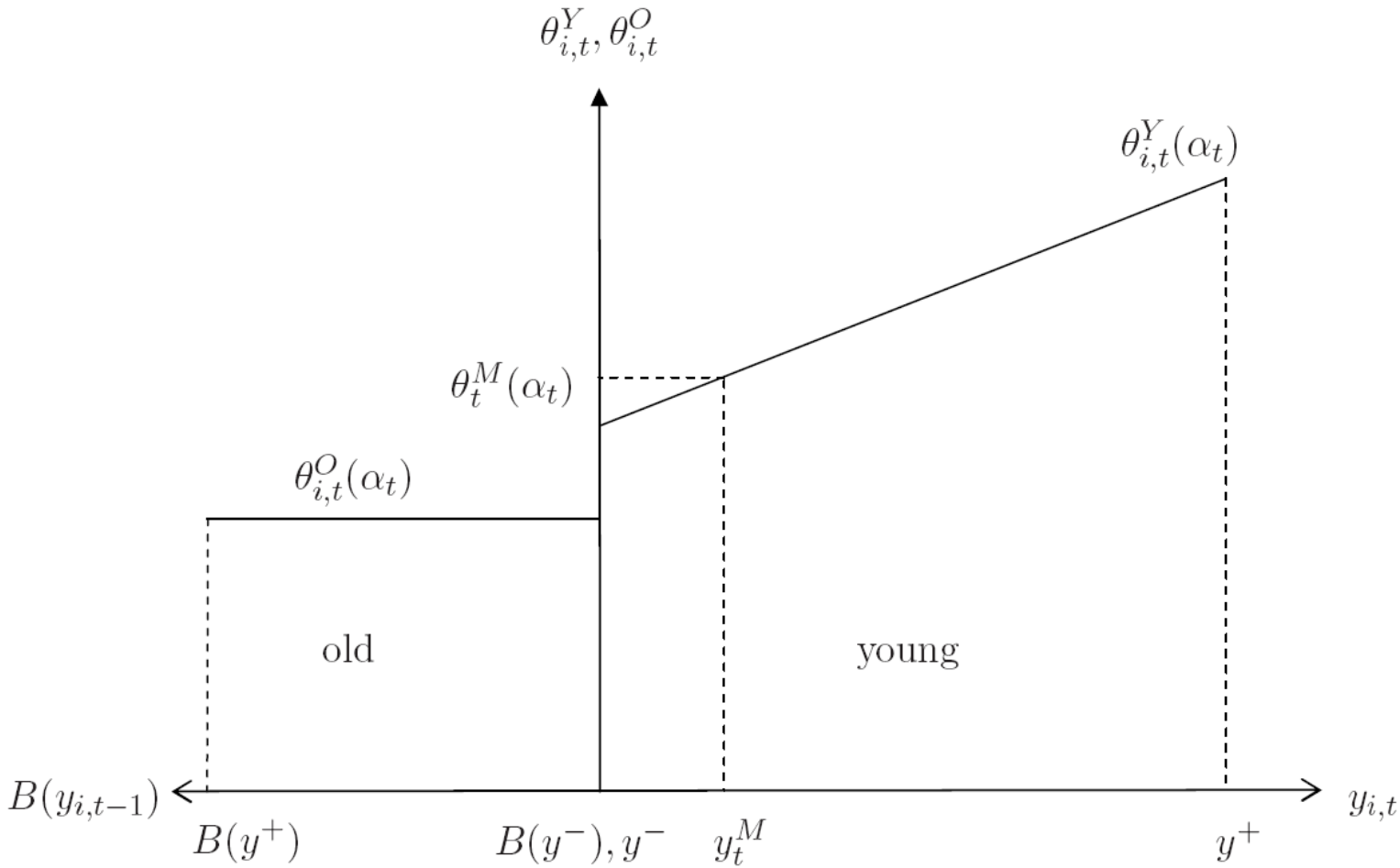


Voting on Refund Rule



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 (θ_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 $\theta_t^* \gtrless \theta_t^{eq}$

   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.
    $\Rightarrow$ 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.