

# The "Second Dividend" and the Demographic Structure

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# Introduction (1/2)

- The demographic structure influences macroeconomic activity.
- The "second dividend" modifies growth.

Environmental taxes may lessen the distortive effects of the tax system if they are substituted to income taxes. Recycling them through lower taxes could trigger higher effect on activity than through higher spending (for a survey: see Bovenberg and Goulder, 2002).

- -> in general equilibrium, the second dividend and the demographic structure are interrelated.
- Available empirical literature about GE-effects of a carbon tax: mainly static models. Dynamics models involving demographic data rely on OLG (overlapping generations) framework. (John et al, 1995; Bovenberg and Heijdra, 1998). However, mostly theoretical approach with limited number of generations.

# Introduction (2/2)

- This paper = empirical assessment of the second dividend of a fully recycled carbon tax, in a dynamic, empirical and intertemporal setting that allows for measuring its relation with the demographic structure.

GE-OLG setting (see Auerbach and Kotlikoff, 1987).

Related literature: Carbone et al., 2012 / Rausch, 2013. Our model: distinguishes between non-ageing related public spendings (=public services) and ageing-related public expenditures (PAYG system, healthcare) -> public spending directly influenced by ageing whereas in other models it remains exogenous.

Annual data, 60 cohorts = very detailed, more realistic.

- Policy relevance: the second dividend, (in % of GDP) can be significant in comparison with the size of the recycled tax, especially if the recycling concentrates on the working population. + for a given rate, the size of the effect varies significantly from one country to another, depending on its demographic structure<sup>3</sup>.

# The model

- Computable General Equilibrium model with an energy module...
  - Models the impact of numerous variables in the energy sector on growth, savings, L supply, K per unit of efficient labor, aggregate substitution between K and energy...
  - Production function with K, L and Energy (nested CES function)
  - Long-run macroeconomic equilibrium. 1 good.
- ... an overlapping generations framework (OLG)...
  - Intergenerational redistribution
  - (Public choice)
  - Dynamic equilibrium
- ... and public finances :
  - Public spending (pensions; non ageing-related public expenditures...)
  - Social contributions, income tax, carbon tax

# The policy scenarios

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	Carbon tax redistributed through...	
	... higher lump-sum public expenditures	... lower proportional, direct income taxes
Germany	Scenario DEU EXP	Scenario DEU TAX
France	Scenario FRA EXP	Scenario FRA TAX

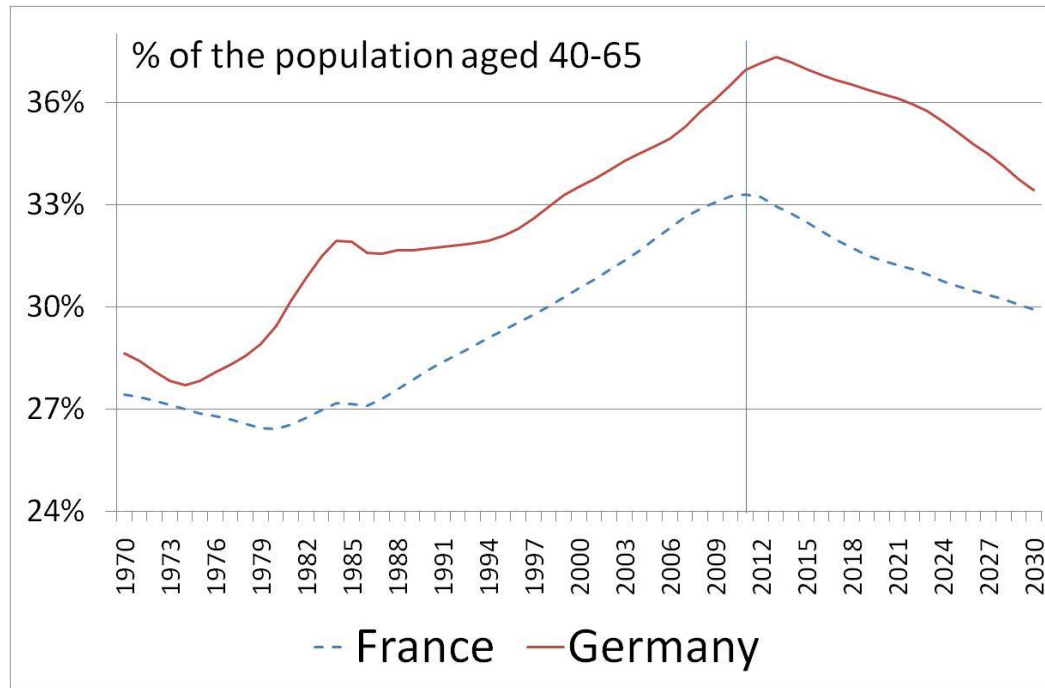
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For scenarios DEU TAX and FRA TAX, we distinguish 3 different recycling mechanisms:

- (a) recycling with lower proportional social contributions on labour income and pensions rather than higher, lump-sum transfer for all individuals ;
- (b) recycling with lower proportional social contributions on labour income financing the PAYG regime rather than higher, lump-sum transfer for all individuals. This involves a direct redistributive mechanism.
- (c) recycling through lower proportional social contributions on labour income financing the PAYG rather than higher, lump-sum transfer for individuals of working age (i.e., below 60) only. Here, the recycling always focuses on individuals of working age.

# The policy scenarios

We select two different demographic structures existing in two countries with relatively comparable economic structures, namely, France and Germany.



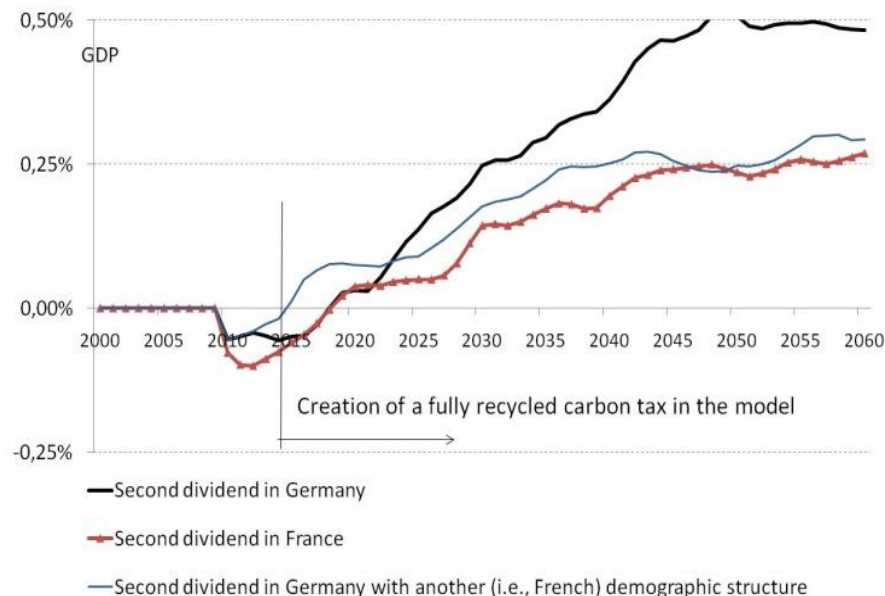
In line with life-cycle theory, this group of cohorts (aged 40-65) saves more than other demographic groups in the model, in absolute as well as in relative terms.

# Results (1/4)

- The dynamic aggregate second dividend is higher in the model for relatively older countries than for relatively younger ones, and the difference mirrors mainly the influence of demographic factors.
- Intuition:  
the more concentrated the demographic structure on cohorts with a high saving rate, the higher the effect on capital supply of recycling a carbon tax through lower proportional taxes on income, the higher the positive influence on long-run GDP of the second dividend.

## Results (2/4)

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  - Intuition: the more concentrated the demographic structure on cohorts with a high saving rate, the higher the effect on capital supply of recycling a carbon tax through lower proportional taxes on income, the higher the positive influence on long-run GDP of the second dividend.
- For a carbon tax of around 1% of GDP that is fully recycled, positive effect between +0,1% and +0,5% of GDP in the long run, depending on whether the recycling concentrates on working population or not.

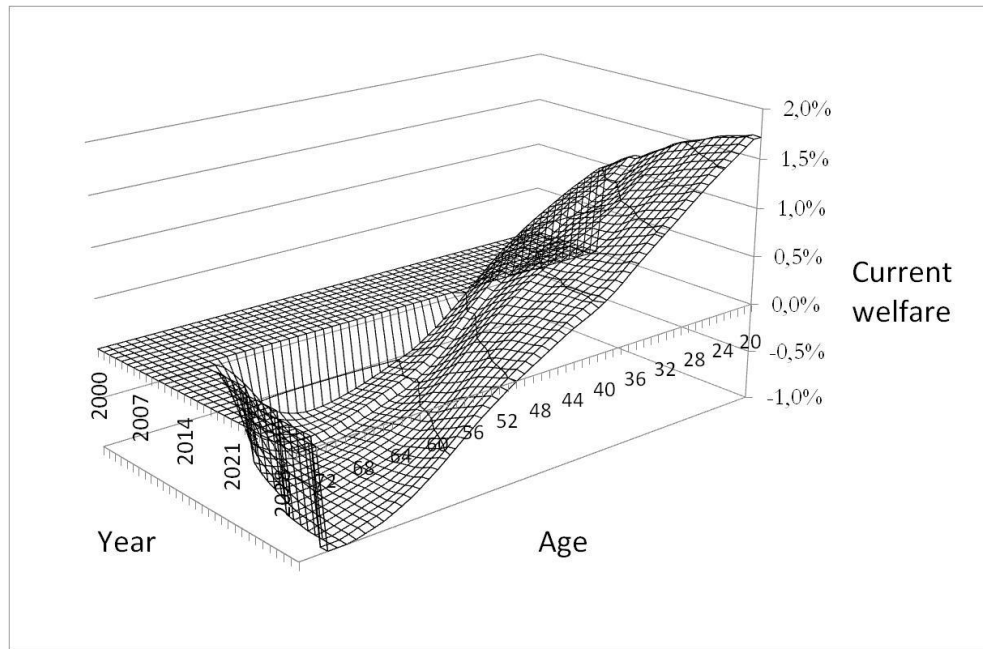




## Results (3/4)

The 2<sup>nd</sup> dividend has pro-youth intergenerational redistributive properties. Joint influence of a distortive effect and a capital deepening effect:

The former *bolsters* relatively more the wellbeing of the young cohorts. The latter *weighs* relatively more on the wellbeing of the aged working cohorts (through a lower yield for savings).



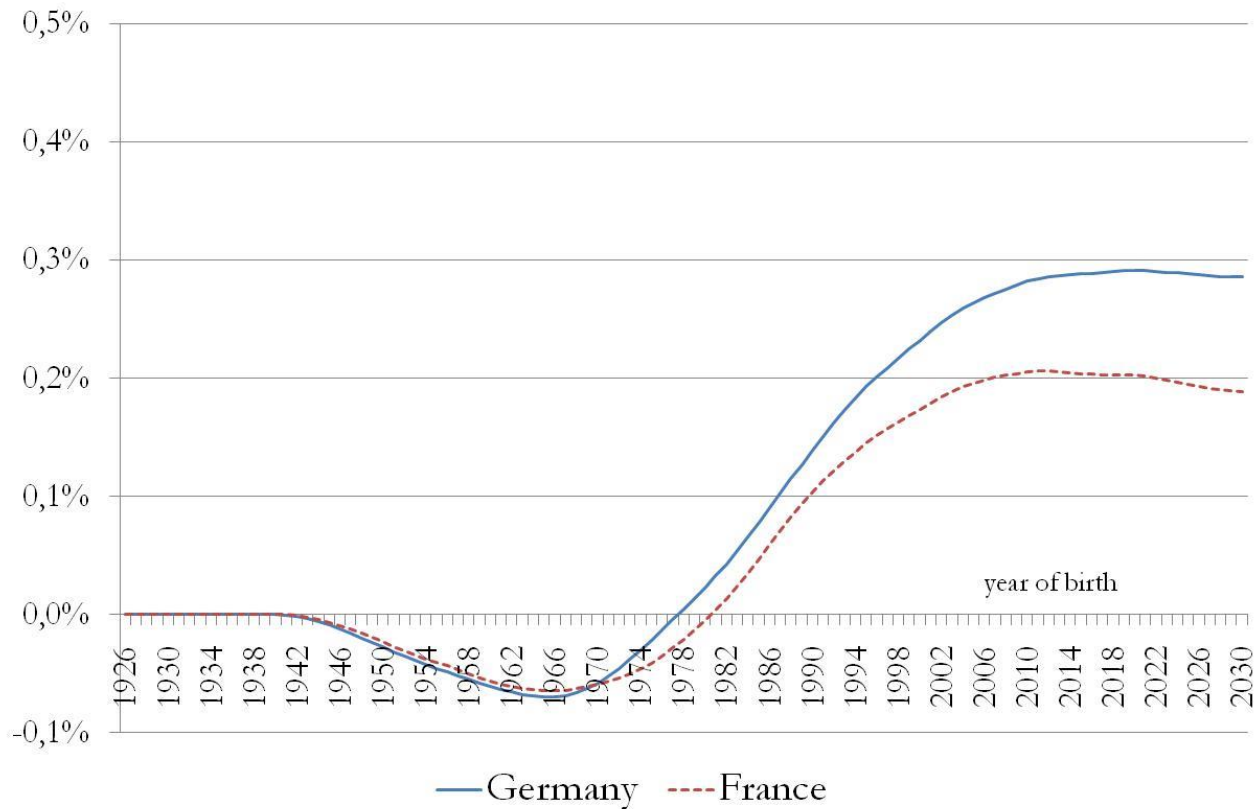
This holds qualitatively whether the recycling of the carbon tax concentrates on the working population or not (i.e., recycled for the whole population).

## Results (4/4)

The magnitude of the intergenerational pro-youth property of the second dividend is influenced by demographics.

It is higher in a relatively older country than in a younger one.

*(graph shows intertemporal welfare for each cohort depending on its birth year)*



# Conclusion

- **The main result is that the older the working population, the higher the second dividend.**
- In absolute terms, our estimations of the size of the second dividend are coherent with orders of magnitude commonly assumed by macroeconomic literature about fiscal multipliers (Blanchard et al., 2013). Though contained in absolute terms, the relative size of the second dividend is significant, especially if its recycling focuses on the working population.
- **Policy implications:** if a gvt feels concerned with the magnitude of the second dividend of a carbon tax and/or its pro-youth redistributive properties, then the rate of the tax should be set higher in countries with relatively younger working populations.

Thank you