# Inter-generational conflict and the declining labor share

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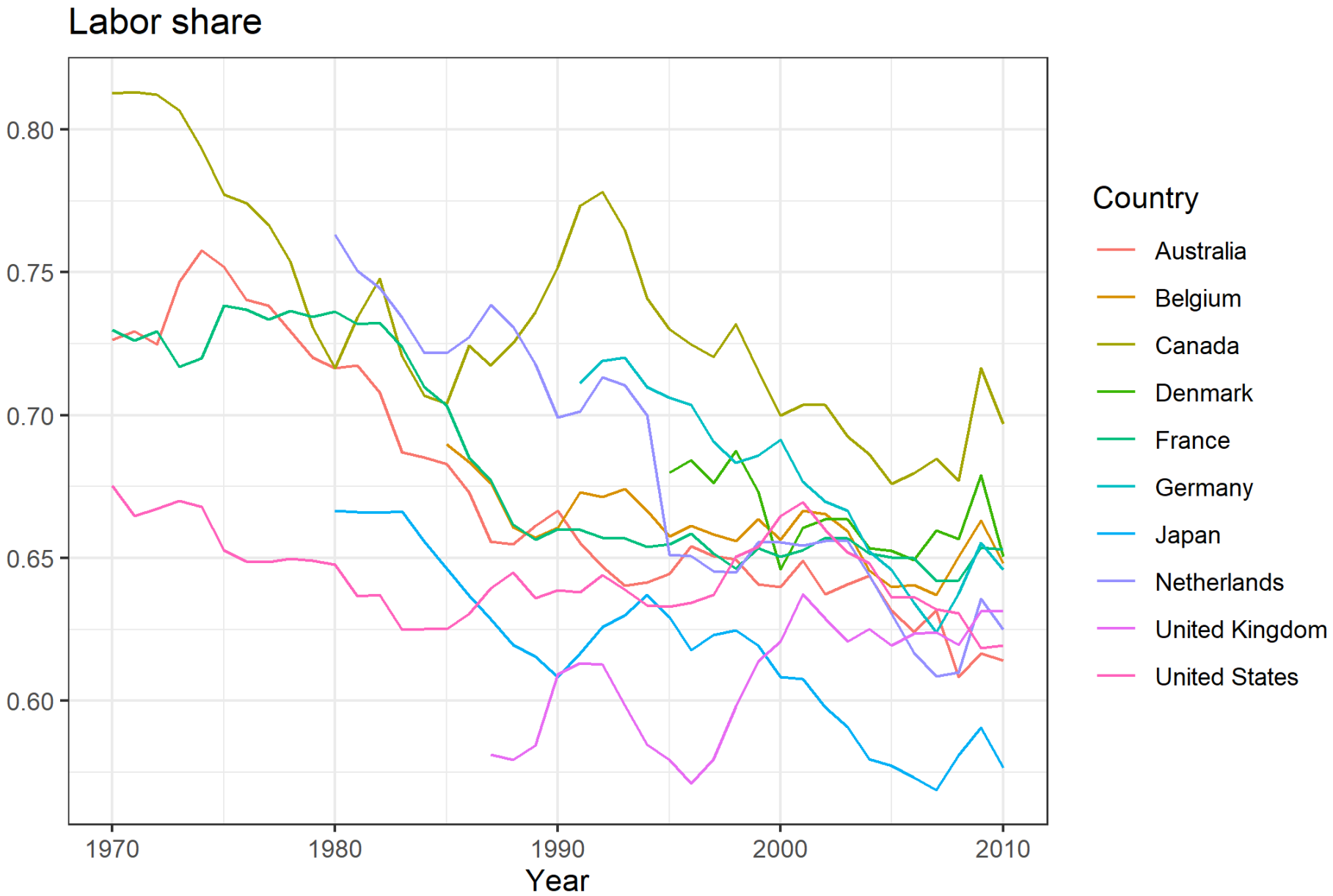
# Overview

# Declining labor share in high-income countries



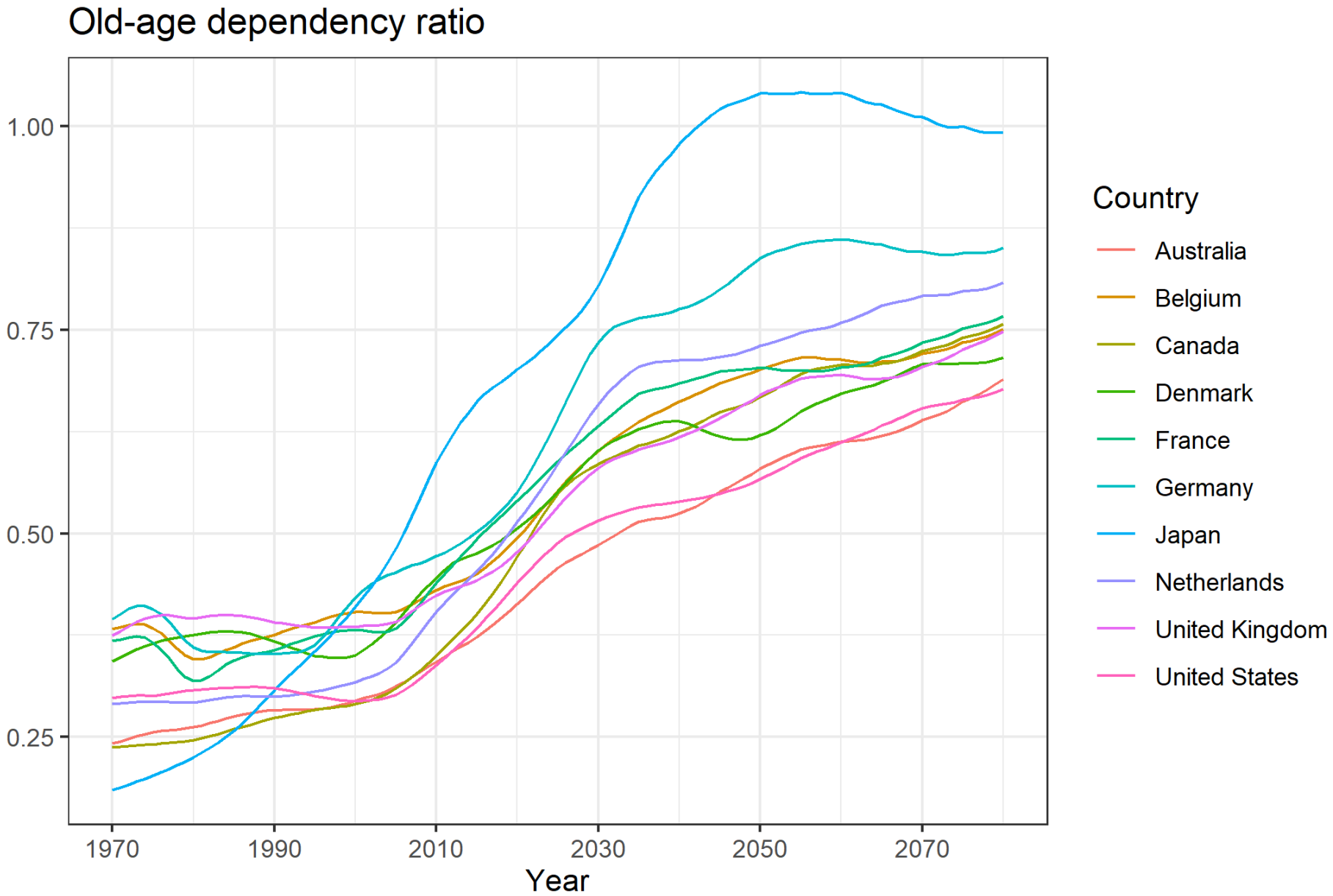
# Declining labor share in high-income countries

- Main determinants:
  - Globalization: Autor et al. (2020); Jayadev (2007); Pica (2010); Young and Tackett (2018)
  - Biased technical change: Acemoglu (2002); Acemoglu (2003); Karabarbounis and Neiman (2014)
  - Institutions: Bentolila and Saint-Paul (2003); Blanchard (1997); **Caballero and Hammour (1998)**

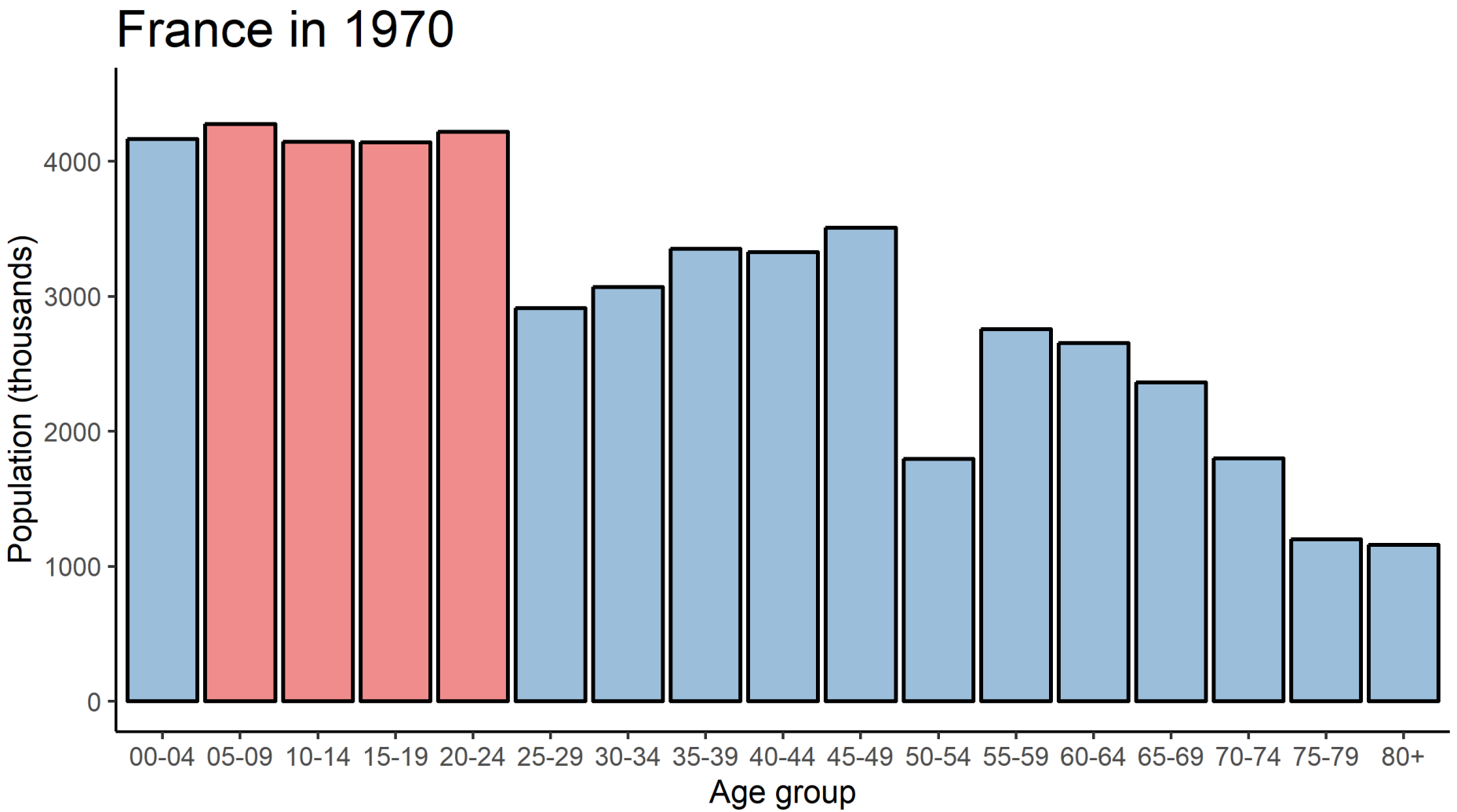
- Literature on the labor share has paid hardly any attention to demography !
  - only Schmidt and Vosen (2013) with a direct mechanism
    Aging population $\Longrightarrow$ more saving $\Longrightarrow$ more capital $\Longrightarrow$ labor share

$\Rightarrow$ Why would this matter ?

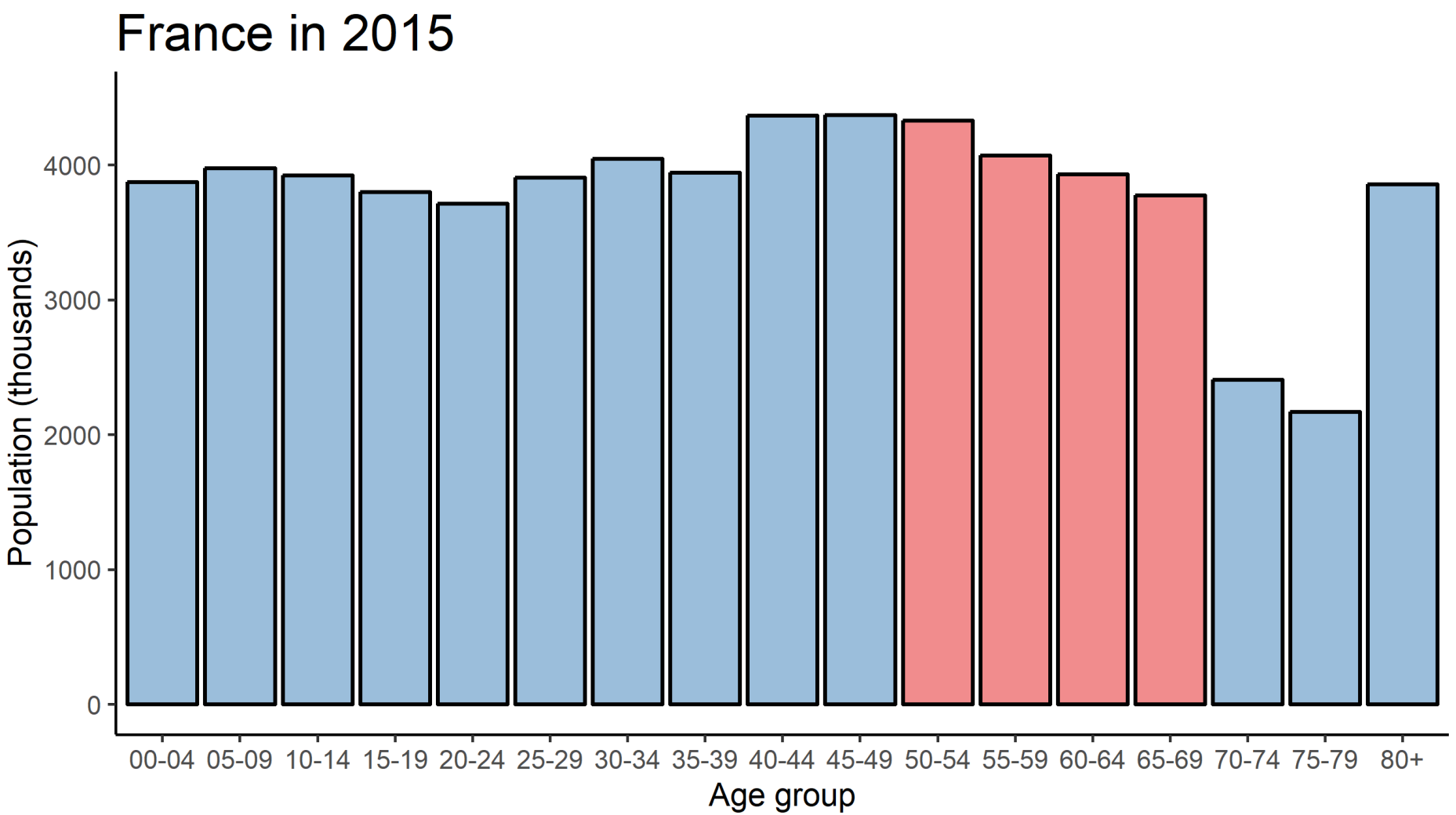
# Aging population in these countries



# From the *baby-boomers'* coming...



# ... to their retirement



# The impacts of an aging population

- Aging directly affects the economy: Dedry et al. (2017); Futagami and Nakajima (2001); Schmidt and Vosen (2013); Razin et al. (2002)


Figure: Chloe Swarbrick in New Zealand Parliament on October 5, 2019

- But also **indirectly through institutional changes**: Busemeyer et al. (2009); Gonzalez-Eiras and Niepelt (2012); Jäger and Schmidt (2016); Sørensen (2013)
  - Due to the existence of **age-related conflict within the public policy**

# Research question

*How does age structure affect the income allocation between capital and labor in high-income countries ?*

# What I do

- Focus on two mechanisms:
  - Direct cohort effect: factor accumulation
  - **Indirect policy mechanism**: age-structure affects policy and institutions
- **OLG model calibration** to analyze the co-movement between labor share and age structure
  - Focus on France and the United-States
  - Long-run predictions of the labor share
- **Counterfactual analysis** to quantify the role of the aging population
  - **Sources**: population growth *vs* survival rate
  - **Transmission channels**: direct *vs* indirect

# Contributions

1. Build a theoretical framework in which the firms shift away from labor towards capital
   - due to changes in labor market institutions endogenously determined by the age structure of the population

2. Quantify the role of population growth and survival rate on the labor share; and the mechanisms through which they operate

3. Identify the **boomers' cohort** as
   - the **winner** of the inter-generational conflict;
   - and the **driver** of the labor share decline

# Overview

# Overlapping generations model

- Standard 2-period OLG model with logarithmic utility function and CES production function
  - Key parameter: **capital-labor elasticity of substitution** ($\sigma$)
- Closed economy and capital fully depreciates between two periods: $R_t = r_t$ and $K_t = S_{t-1}$
- Each cohort is a continuum of **homogeneous agents**
  - Young HH: supply labor inelastically, earn income, pay taxes, consume and save for retirement
  - Old HH: consume the return of their savings, pay taxes and derive utility from the government health spending

# Demography and labor share

- Demographic dynamics: $\begin{cases} N_t^y = n_t N_{t-1}^y & \text{with} \quad n_t > 0 \\ N_t^o = p_t N_{t-1}^y & \text{with} \quad p_t \in (0,1] \end{cases}$

$\Rightarrow$ Old-age dependency ratio:

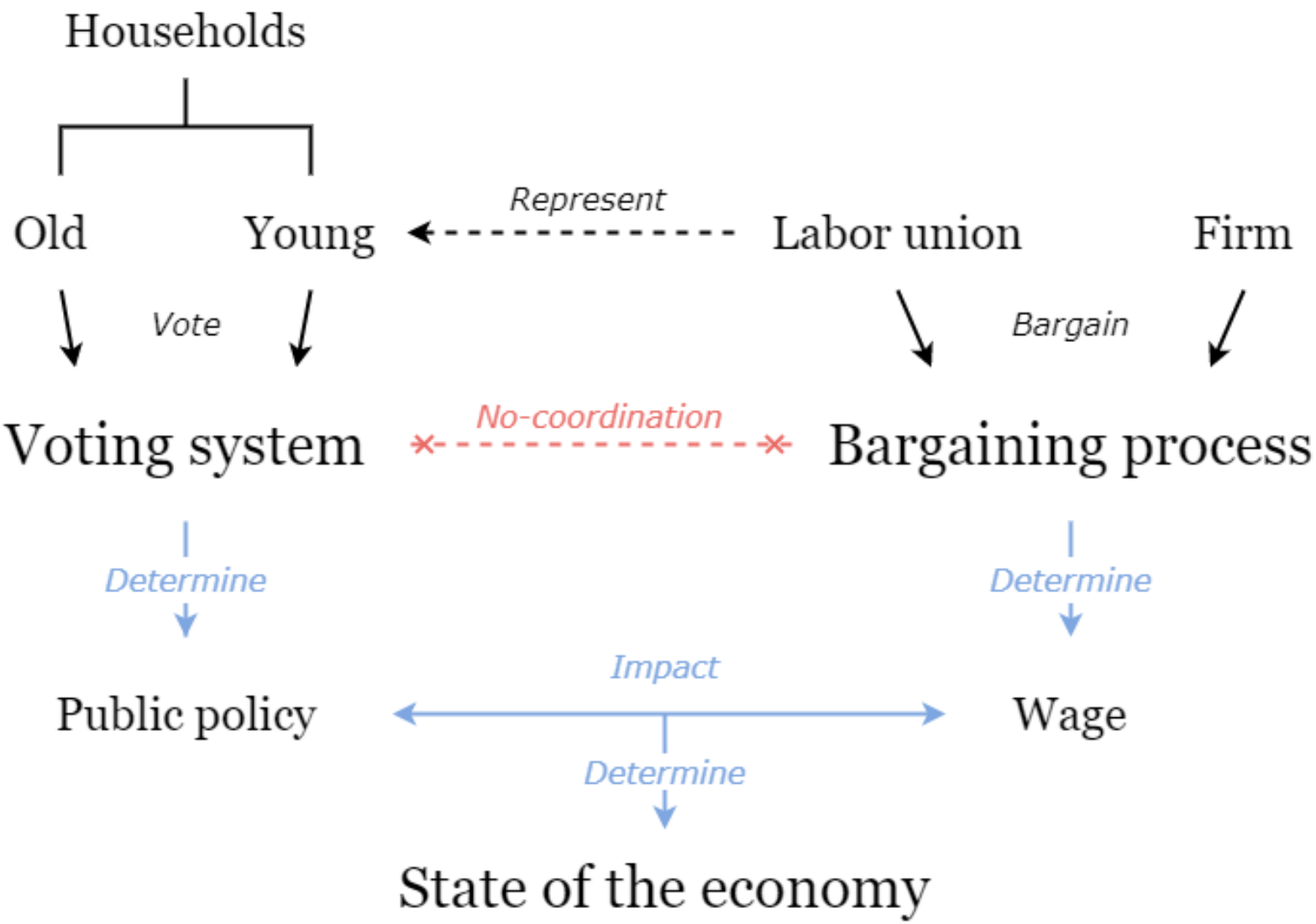
$$\frac{N_t^o}{N_t^y} = \frac{p_t}{n_t}$$

- Labor share:

$$\theta_t = \frac{w_t L_t}{Y_t} = \left(1 + \frac{\phi}{1-\phi} k_t^{\frac{\sigma-1}{\sigma}}\right)^{-1}$$

with $\sigma \in \mathbb{R}_+^\star \backslash \{1\}$ the capital-labor elasticity of substitution

# Diagram of the model



# Public policy preferences

- Age-related conflict within the public policy
  - Young HH desire more **unemployment benefit** ($b$)
  - Old HH desire more **health spending** ($h$)
  - Both desire less **taxes** ($\tau$)

- Maximization program characterizing the equilibrium policy choices in period $t$:

$$\max_{\tau_t, b_t, h_t} W(\tau_t, b_t, h_t; \eta_t, u_t, w_t, Y_t, N_t^y, N_t^o)$$

$$\text{s.t.} \quad \tau_t Y_t = b_t u_t N_t^y + h_t N_t^o$$

where $\eta_t$ is the **political weight of the youth**

# Political weight of the youth ($\eta$)

- Political weight of the youth:

$$\eta_t = \frac{n_t}{p_t} \frac{1 + \alpha p_{t+1}}{\omega}$$

  - $\omega \geq 0$ the *relative ideological spread-out* of the elderly w.r.t. the youth
  - $\alpha \in (0, 1)$ the discount rate

- The political weight of the youth depends on
  - the old-age dependency ratio $p_t/n_t$; $-$
  - their life expectancy $p_{t+1}$ and the discount rate $\alpha$; $+$
  - the tenacity of their ideology $\omega$ $-$

# Wage bargaining

- **Right-to-manage model** *à la* Nickell and Andrews (1983)
  - Single union that represents workers and bargains with the representative firm over wages
  - Employer retains the prerogative to hire and fire

- Maximization program characterizing the equilibrium wage:

$$\max_{w_t} \left( L_t \left[ U_t^{y,e} - U_t^{y,u} \right] \right)^{\gamma} \left( Y_t - w_t L_t \right)^{1-\gamma}$$

$$\text{s.t.} \quad U_t^{y,e} - U_t^{y,u} = \log \left[ \frac{(1-\tau_t) w_t}{b_t} \right]$$

  - $\gamma \in (0,1)$ the relative bargaining power of the union
  - $\frac{b_t}{(1-\tau_t) w_t} \in (0,1)$ the net replacement rate in unemployment

# Equilibrium

- *At the equilibrium* **on the labor market**, the wage and labor are a function of the net replacement rate in unemployment
- *At the equilibrium* **public policy**, the net replacement rate in unemployment is a function of the labor income, the unemployment rate and the **youth political power** $\eta_t$
- Comparative statics depends on the **capital-labor elasticity** $(\sigma)$

$\Rightarrow$ Turn to quantitative analysis

# Overview

# OLG model calibration

- Objectives:
  1. **Match the dynamics** of the labor share over the period 1970-2010
  2. **Model predictions** of the labor share over the period 2010-2080

- Following the methodology of Gonzalez-Eiras and Niepelt (2012) with **four sequences of model predictions**
  - 1st sequence: 1970, 2010, 2050, ...
  - 2nd sequence: 1980, 2020, 2060, ...
  - 3rd sequence: 1990, 2030, 2070, ...
  - 4th sequence: 2000, 2040, 2080, ...

$\Rightarrow$ List the four sequences in a single time series

# Data

| | Variable | Source |
|---|---|---|
| $K$ | Capital stock at constant 2011 national prices | PWT 9.1 |
| $Y$ | Real GDP at constant 2011 national prices | PWT 9.1 |
| $emp$ | Number of persons engaged | PWT 9.1 |
| $\theta$ | Share of labor compensation in GDP | PWT 9.1 |
| $\tau$ | Government revenue as a share of GDP | OECD |
| $N^y, N^o$ | Demographic data | UN WPP 2017 |

*Notes*: Adjustment method of the labor share: self-employed income as a compensation. The demographic data correspond to the "medium variant" estimates from the United Nations.

# Parameters

| | Parameter | France | United States |
|---|---|---|---|
| $\phi$ | Capital share in 1970 | 0.270 | 0.325 |
| $\gamma$ | Relative bargaining power of the union | 0.500 | 0.500 |
| $\alpha$ | Discount rate | 0.669 | 0.669 |
| $\sigma$ | Capital-labor elasticity of substitution | 1.321 | 1.234 |
| $\omega$ | Relative ideological spread-out | 0.983 | 1.533 |
| $\beta$ | Preference for government health expenditure | 0.739 | 0.138 |
| $A$ | Scale parameter of the production function | 23.891 | 22.840 |

*Notes*: Single-equation estimation of $\sigma$ from the two first-order conditions of the profit maximization with normalized CES production function. $\sigma$ estimates are significant at $p < 0.1$ for France and $p < 0.05$ for the United-States.

# Model predictions of the labor share

# Determinant variables over the period 1970-2010

# The young baby-boomers (1970-2010)

1. Massive entry of the young boomers on the labor market ($\uparrow n$) with increasing political power ($\uparrow \eta$)

2. **Shape the institutions** by increasing taxes ($\uparrow \tau$) and the unemployment benefits ($\uparrow b$)

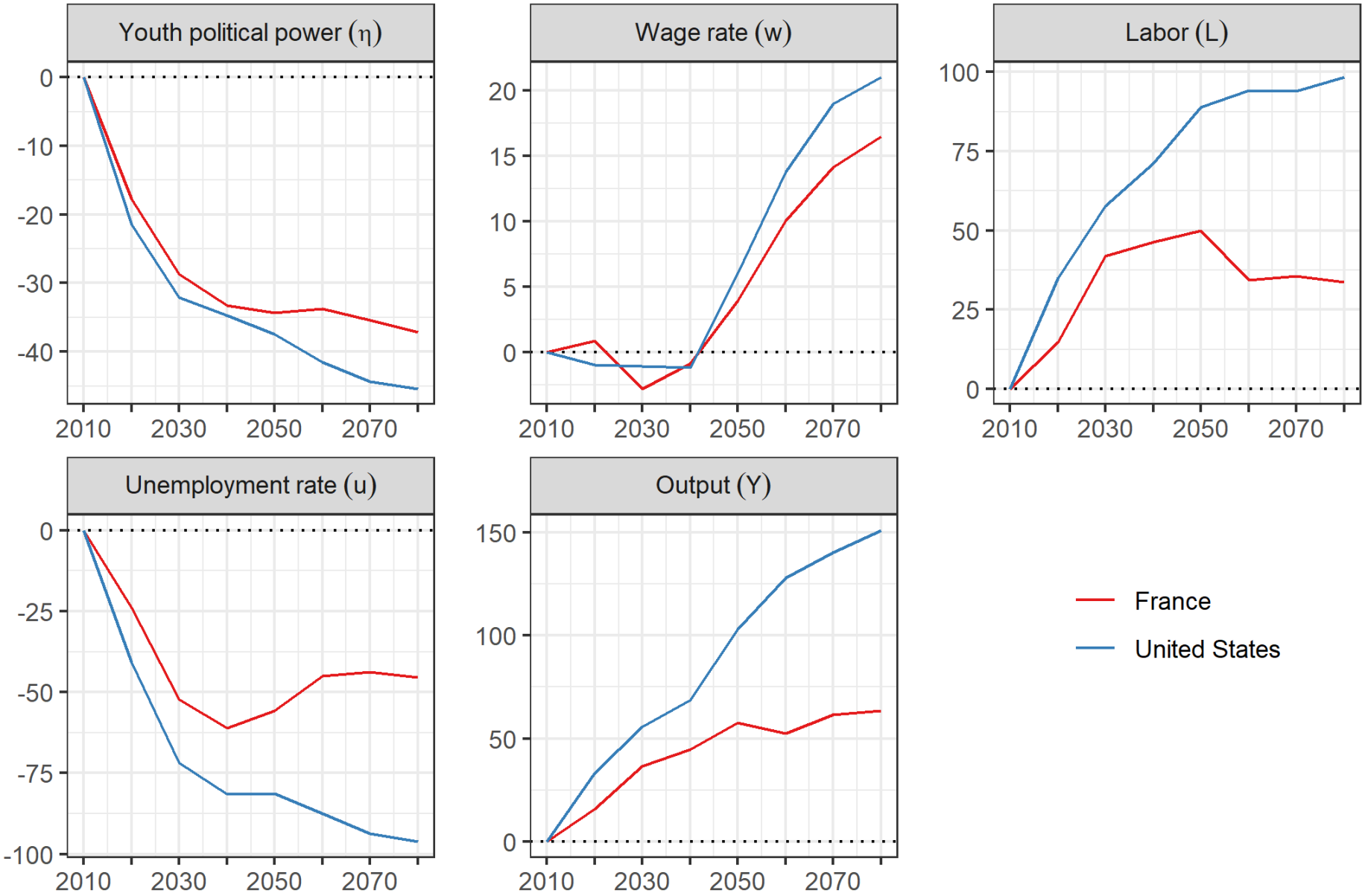
3. Greater bargaining power leads to greater wages ($\uparrow w$)

4. **Firms substitute labor with capital** ($\downarrow L \implies \uparrow k$) to thwart workers' empowerment

5. The rising output-per-worker ($Y/L$) overtakes the wage gains ($w$)

$\Rightarrow$ Decline of the labor share ($\downarrow \theta$)

# Determinant variables over the period 2010-2080



# The retired boomers (2020-2050)

1. Important savings of the boomers when young ($\uparrow S_{t-1}$) have leaded to considerable available capital once old ($\uparrow K_t$)

2. **Population ages** because boomers retire and population growth flattens

3. Pro-elderly public policy ($\uparrow h, \downarrow b$) fosters employment ($\uparrow L, \downarrow u$)

4. But the increase in labor barely compensate for the rise in capital

$\Rightarrow$ **The expected resurgence of the labor share is dampen by the capital over-accumulation due to boomers' savings**

# Counterfactual and aging effect decomposition

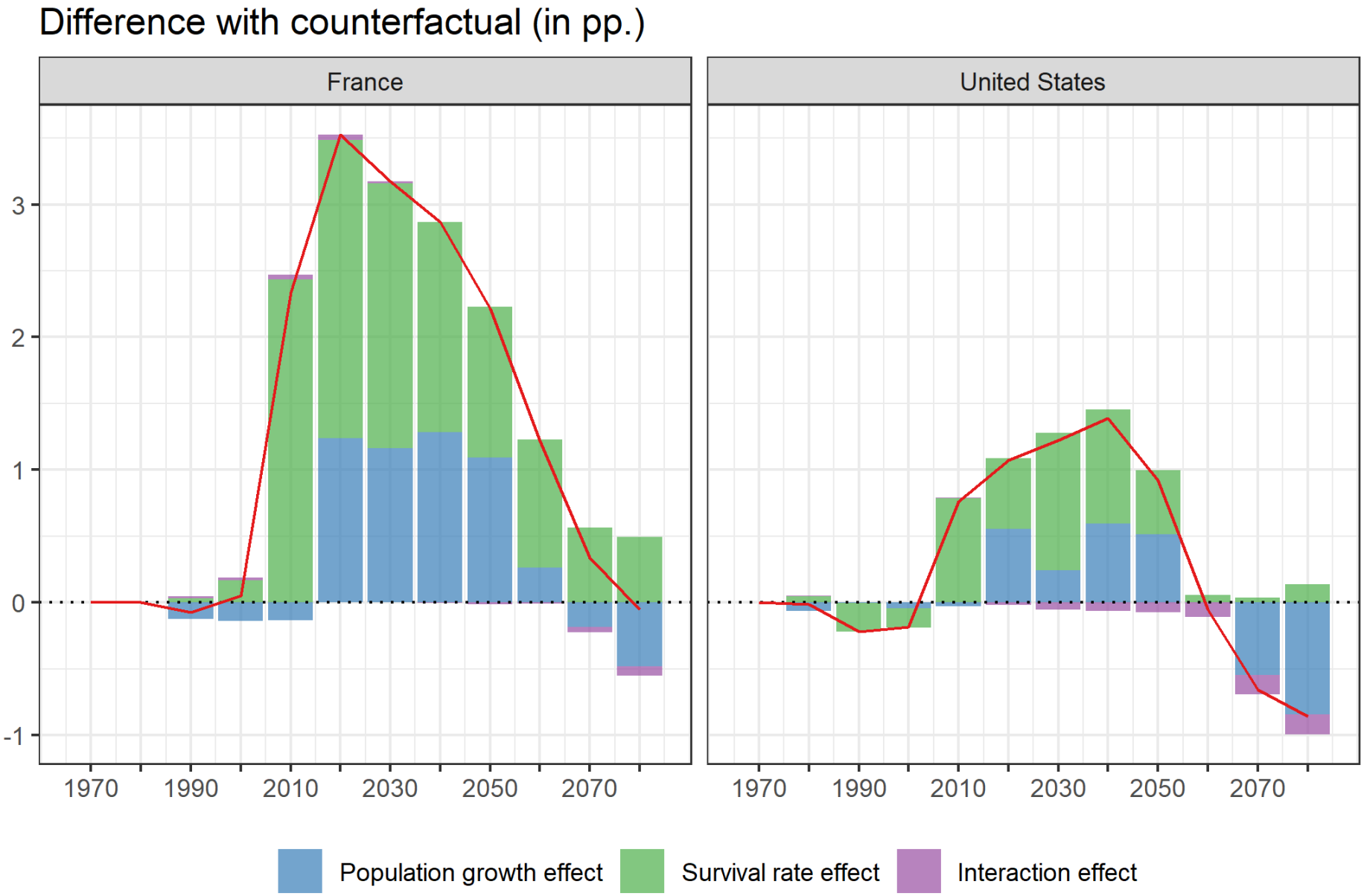
- Objectives: quantify the role of the aging population
  - **Sources**: population growth ($n$) *vs* survival rate ($p$)
  - **Transmission channels**: direct ($n, p, N^y, N^o$) *vs* indirect ($\eta$)

- **Intuition**: *what would have happened in terms of model predictions if this effect/channel was neutralized ?*
  - Suppose that the concerned variables remain at their 1970's level

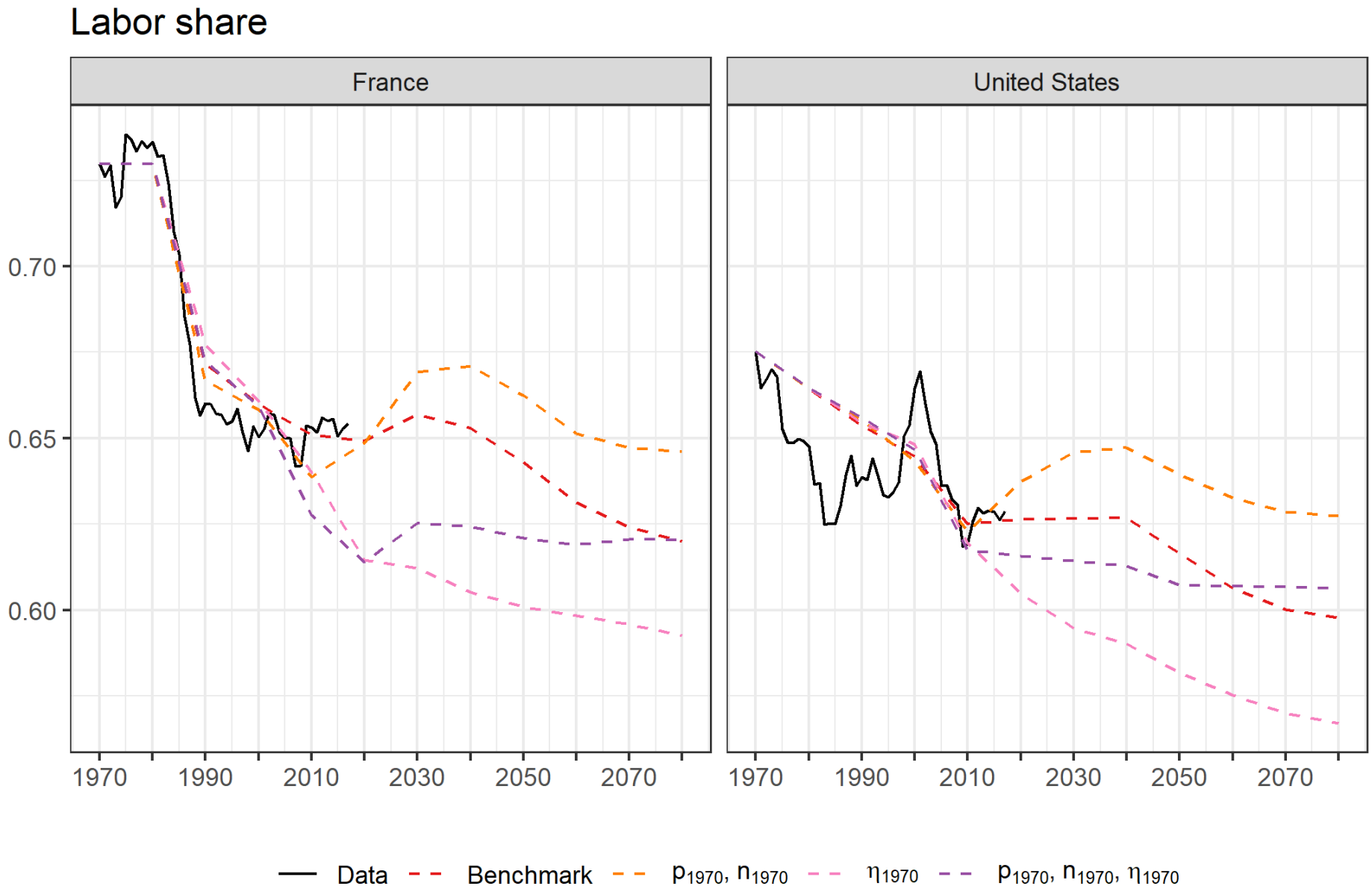
| | **Variable** | **France** | **United-States** |
|---|---|---|---|
| $p_{1970}$ | Survival rate in 1970 | 0.417 | 0.476 |
| $n_{1970}$ | Population growth in 1970 | 1.134 | 1.597 |
| $p_{2010}$ | Expected survival rate in 2010 | 0.583 | 0.561 |
| $\frac{p_{1970}}{n_{1970}}$ | Old-age-dependency ratio in 1970 | 0.368 | 0.298 |
| $\eta_{1970}$ | Youth political power in 1970 | 3.846 | 3.008 |

# Counterfactual predictions: pop. growth *vs* survival rate

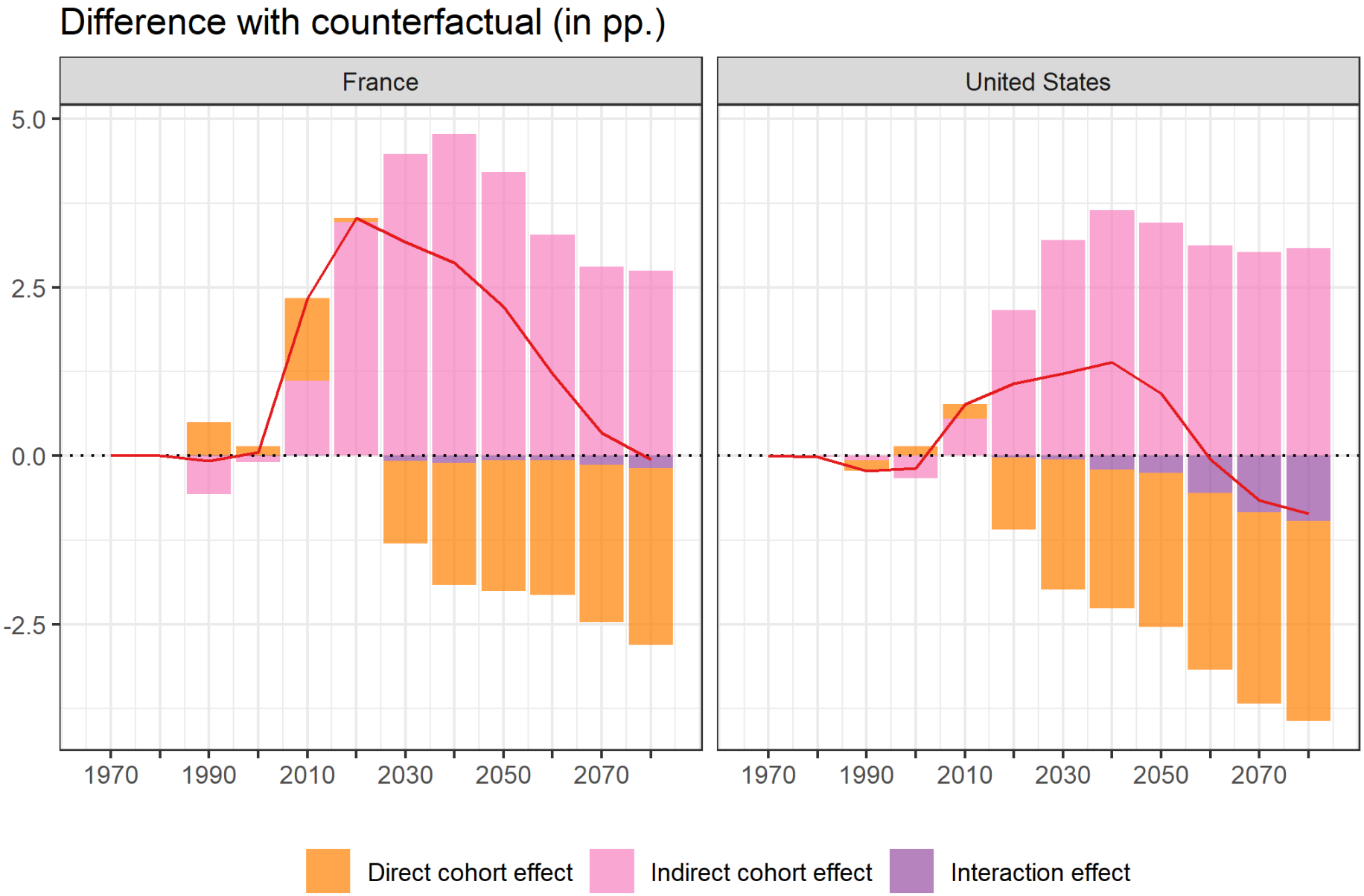
# Decomposition: population growth *vs* survival rate



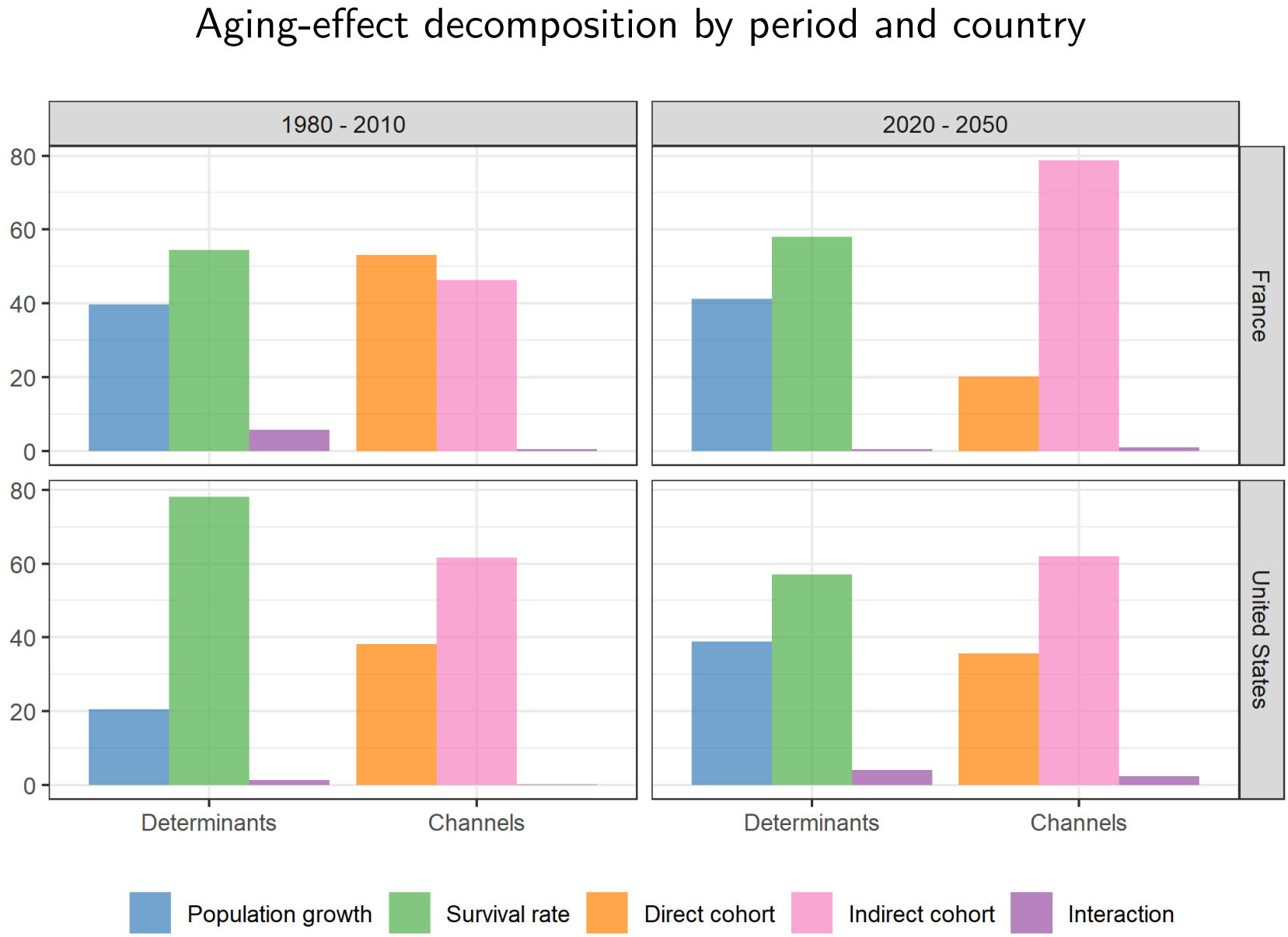
# Counterfactual predictions: direct *vs* indirect channel



# Decomposition: direct *vs* indirect channel

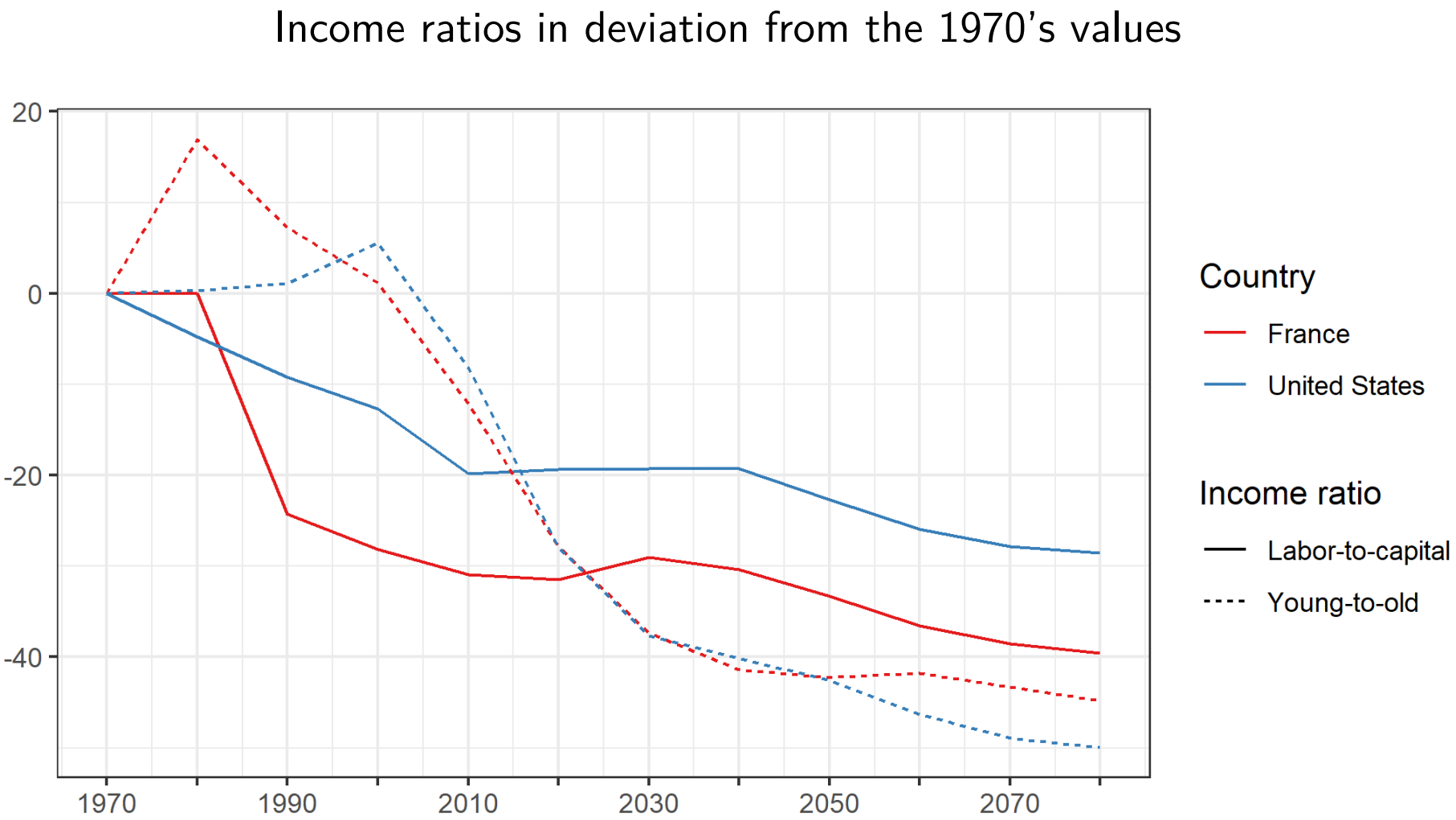


# Decomposition: summary



# Overview

# Who are the winners of the inter-generational conflict ?

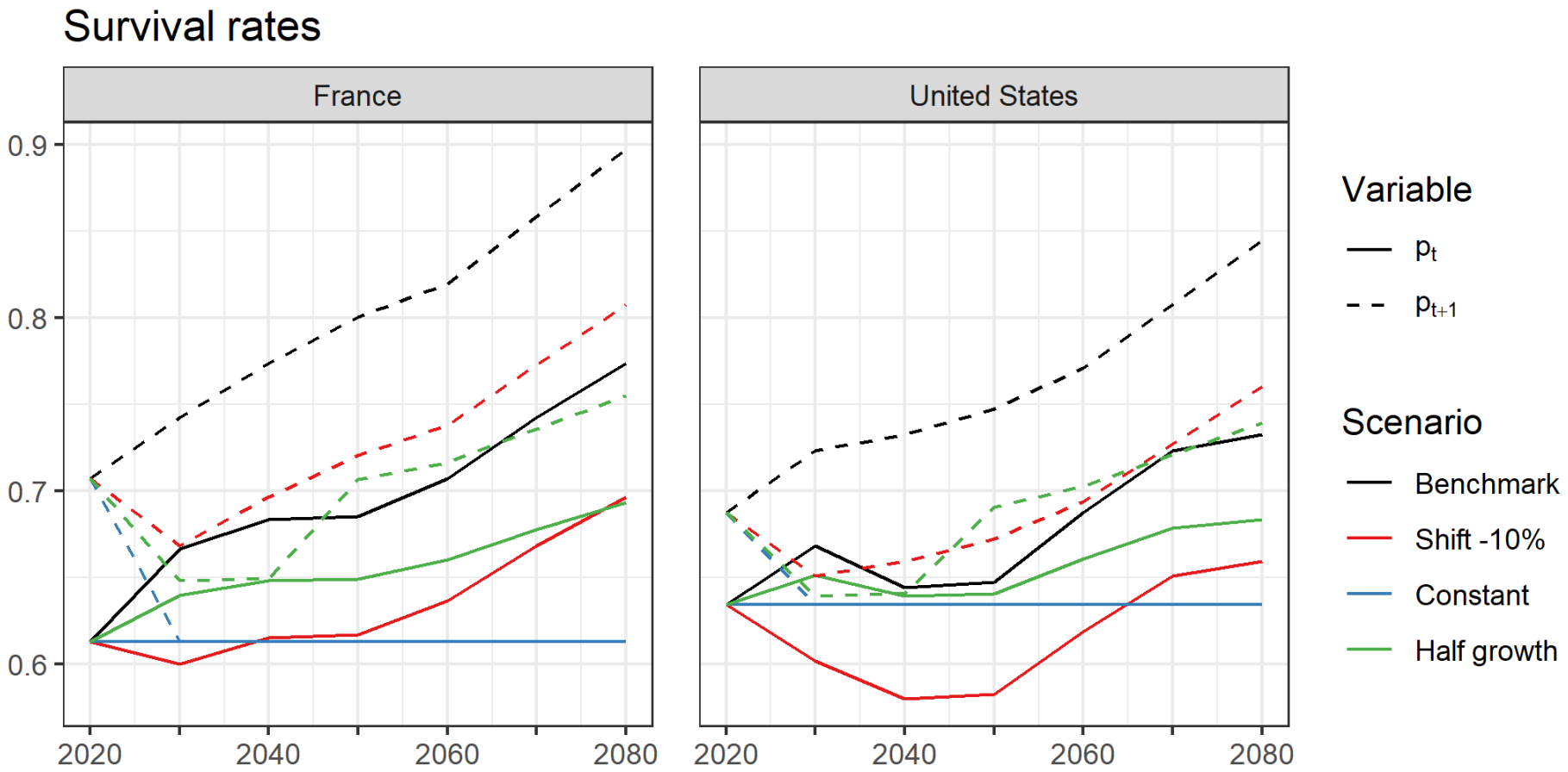


# Are the results robust to a change in the retirement age ?

- In public debate, it is often argued that the legal retirement age should change (upward) in the future
- Increasing retirement age equivalent to a decline of the survival rate (in terms of the model)

$\Rightarrow$ Counterfactual analysis after 2020, with three *scenarii* compared to the benchmark one

# Are the results robust to a change in the retirement age ?



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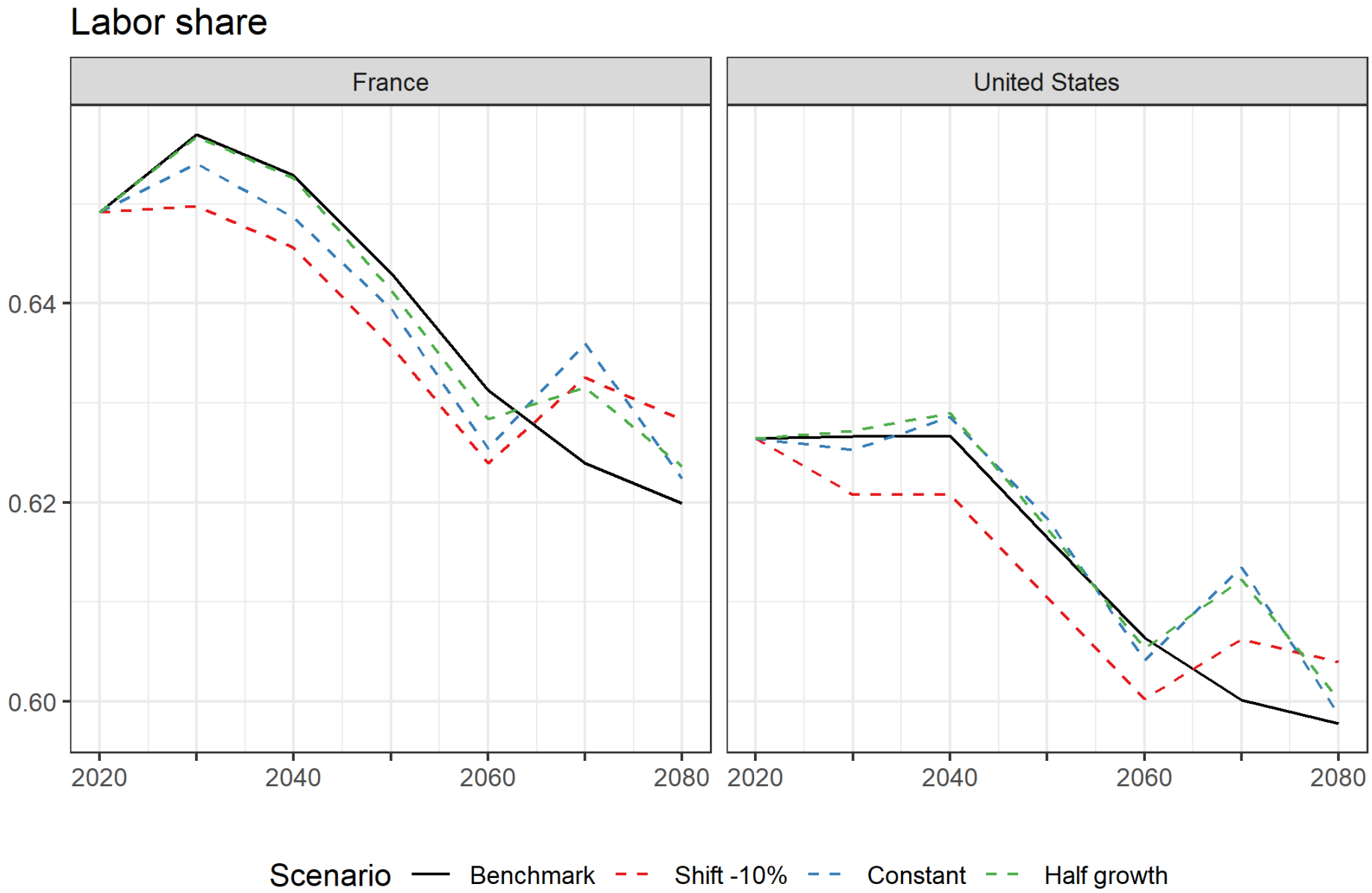

# Discussion: summary

1. The boomers are the winner of the inter-generational conflict
   - Always have a relatively **greater political weight** w.r.t. to the previous and next generations
   - Extract income through redistribution

2. Increase of the retirement age may increase the labor share in the very long run
   - But not in the medium/long run due to **capital over-accumulation**

# Overview

# Conclusion

- Age structure affects the income allocation in aging countries
  - The predominant cohort is able to shapes the institutions in its favor
- Biased technical change is a response of firms to income share *grability* of workers (Caballero and Hammour 1998)

$\Rightarrow$ Demographic dynamics may be a determinant of this *grability* and thus be the source of the bias

# References I


Acemoglu, D. (2002). Directed technical change. *Review of Economic Studies*, 69(4):781–809.

Acemoglu, D. (2003). Cross-country inequality trends. *Economic Journal*, 113(485):F121–F149.

Autor, D., Dorn, D., Katz, L. F., Patterson, C., and Van Reenen, J. (2020). The Fall of the Labor Share and the Rise of Superstar Firms*. *The Quarterly Journal of Economics*, 135(2):645–709.

Bentolila, S. and Saint-Paul, G. (2003). Explaining movements in the labor share. *Contributions in Macroeconomics*, 3(1).

Blanchard, O. (1997). The medium run. *Brookings Papers on Economic Activity*, 1997(2):89–158.

Busemeyer, M. R., Goerres, A., and Weschle, S. (2009). Attitudes towards redistributive spending in an era of demographic ageing: The rival pressures from age and income in 14 OECD countries. *Journal of European Social Policy*, 19(3):195–212.

Caballero, R. J. and Hammour, M. L. (1998). Jobless growth: Appropriability, factor substitution, and unemployment. *Carnegie-Rochester Conference Series on Public Policy*, 48:51–94.

# References II


Dedry, A., Onder, H., and Pestieau, P. (2017). Aging, social security design, and capital accumulation. *Journal of the Economics of Ageing*, 9:145–155.

Futagami, K. and Nakajima, T. (2001). Population aging and economic growth. *Journal of Macroeconomics*, 23(1):31–44.

Gonzalez-Eiras, M. and Niepelt, D. (2012). Ageing, government budgets, retirement, and growth. *European Economic Review*, 56(1):97–115.

Jäger, P. and Schmidt, T. (2016). The political economy of public investment when population is aging: A panel cointegration analysis. *European Journal of Political Economy*, 43:145–158.

Jayadev, A. (2007). Capital account openness and the labour share of income. *Cambridge Journal of Economics*, 31(3):423–443.

Karabarbounis, L. and Neiman, B. (2014). The global decline of the labor share. *Quarterly Journal of Economics*, 129(1):61–103.

Nickell, S. J. and Andrews, M. (1983). Unions, real wages and employment in Britain 1951-79. *Oxford Economic Papers*, 35:183–206.

Pica, G. (2010). Capital markets integration and labor market institutions. *The BE Journal of Macroeconomics*, 10(1).

# References III


Razin, A., Sadka, E., and Swagel, P. (2002). The aging population and the size of the welfare state. *Journal of Political Economy*, 110(4):900–918.

Schmidt, T. and Vosen, S. (2013). Demographic change and the labour share of income. *Journal of Population Economics*, 26(1):357–378.

Sørensen, R. J. (2013). Does aging affect preferences for welfare spending? A study of peoples' spending preferences in 22 countries, 1985-2006. *European Journal of Political Economy*, 29:259–271.

Young, A. T. and Tackett, M. Y. (2018). Globalization and the decline in labor shares: Exploring the relationship beyond trade and financial flows. *European Journal of Political Economy*, 52:18–35.