The Costs of Building Walls

Immigration and the Fiscal Burden of Aging in Europe

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Introduction

Aging, Immigration and Public Finances

Population aging is a major concern for public finances in Europe

- Active (20-64) / older (65+) ratio in the EU: 2.9 in 2023 $\rightarrow$ 2.0 in 2060
- Fiscal burden of aging:
  - $\uparrow$ dependency ratios $\Rightarrow \downarrow$ taxes and $\uparrow$ social security and healthcare costs

Immigration (in this paper from developing countries) is a possible solution

- Yet, policies to **restrict or eliminate immigration** are on the agenda

This paper:

- How does changing immigration flows affect demographic dynamics?
- And how does that affect public finances in the Euro Area

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Why can Immigration be a Solution?

Two key observations:

1. Native fertility below the replacement rate of 2.1 children per woman
   - $\Rightarrow$ Without immigration, our societies would be on the path to **extinction**
   - $\Rightarrow$ Population share of immigrants (and their descendants) is increasing
2. Migrants into the EU are **younger** than the current resident population
   - $\Rightarrow$ Immigrants decrease the dependency ratio

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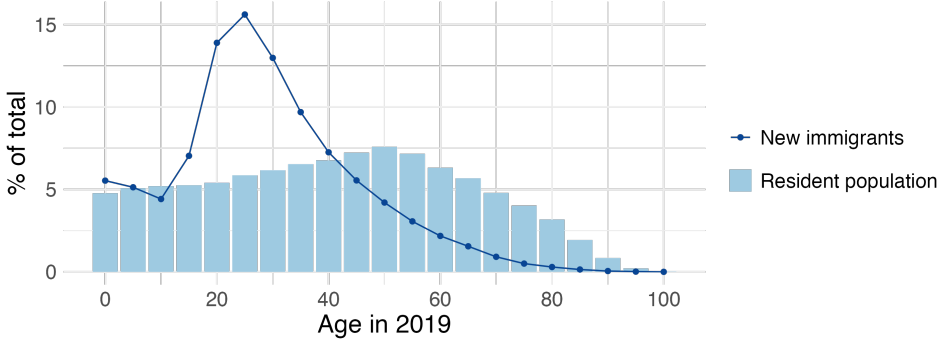

Introduction

Overview of the Paper

1. Population projections with immigration flows of varying intensity
   - In base case (2019 flow every year), immigrants and descendants will represent 50% of the population by 2100
   - Restricting immigration has **negative** effects on the dependency ratio
2. Assess implications of projections for public finances in Europe
   - **Static:** Use micro data from multiple surveys to estimate demographic profile of spending and revenue – by age, gender, region of birth, and education
     - Immigrants have a positive net contribution to the Gov. budget
   - **Dynamics:** Use the population projections and demographic profile of the budget and what is the implications of immigration for the fiscal burden of aging
     - Current migration flows alleviate the fiscal burden of aging by 1% of GDP/year
     - **Convex costs** of decreasing immigration flows
     - **Mechanism** Direct effect: Immigrants arrive as working-age adults, immediately lowering DR, Aging effect: These immigrants eventually retire, increasing DR later.
3. Boosting the **fertility** of the native population is not an alternative solution
4. Large country **heterogeneity** on the immigration effects

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Related Literature & Contribution

Dynamic fiscal impact of immigration (Auerbach & Oreopoulos, 1999; Lee & Miller, 2000; Bonin et al., 2000; Storesletten, 2000, 2003; Rowthorn, 2008; Hansen et al., 2017)

- Show general positive effects of migrants on public finances, due to their demographic characteristics and effects on population dynamics, but with qualifications (Hansen et al., 2017)

Cross-section fiscal contributions of immigration (Dustmann & Frattini, 2014; Preston, 2014; Christl et al., 2022; Fiorio et al., 2023)

- The last 2 papers show using Euromod that migrants are net fiscal contributors (end simulation in 2035)

Further contributions

- *Indirect effects of immigration* (Colas & Sachs, 2024; D'Albis et al., 2019; Furlanetto & Robstad, 2019). Size of demographic effects comparable to labor market spillovers (complementarity skilled-unskilled)
- *Political economy* (Hanson et al., 2007; Alesina et al., 2018, 2023). Heterogeneous effects on euro area countries may complicate policymaking - misperceptions and their political consequences.
- *Fertility vs. immigration* (Weil, 2023; Weil, 1999; Hock & Weil, 2012; Bloom et al., 2009). Distant, small gains from higher fertility cannot substitute for immigration.

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2. Measuring the Fiscal Burden of Aging
3. Immigration and the Fiscal Burden of Aging in Europe
4. Rebalancing Tax Increase at the Country Level
5. Conclusion

1 Population Projection Model

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Population Projection Model

Classic cohort-component model

- For each gender and country of birth group, the **population** evolves according to

$$P_{t+1,a+1} = (1 - m_{t,a})P_{t,a} + \bar{M}_a$$

- **Newborns** are given by

$$P_{t,0} = \sum_a P_{t,a} f_{t,a} + \bar{M}_a$$

- **Immigration flow** as in the base year:
  - Fixed in size ($\approx 0.4\%$ of population)
  - Distribution by age, gender, and education
- Population is further split by **education** level
  - the overall education level of the projected population is assumed to increase
- Other standard hypotheses (Eurostat):
  - life expectancy increase: 80 in 2019 $\rightarrow$ 89 in 2100 (no differences by CoB)
  - fertility: below replacement for natives and 2nd-gen; high for 1st-gen migrants

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Population Projection Model

A snapshot of the base year 2019

- Current immigrants are mostly working age, like new inflows

Age	EU-born	Non-EU-born
0–25	27.7%	17.5%
26–65	52.0%	71.1%
> 65	20.3%	11.5%

- Adult immigrant population is less educated than natives

Education Level	EU-born	Non-EU-born
Primary (ISCED 0–2)	28.8%	41.1%
Secondary (ISCED 3–4)	42.3%	33.8%
Tertiary (ISCED 5–8)	28.9%	25.1%

$\rightarrow$ New immigrants assumed to have the same education levels in baseline

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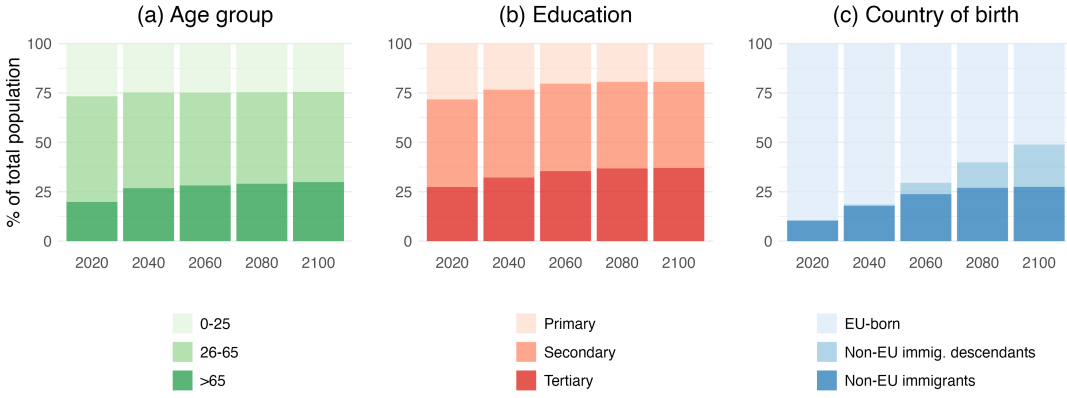
Population Projection Model

Demographic Distribution Projection



- Non-EU immigrants + descendants $\rightarrow \approx 50\%$ of pop. in 2100
  - similar figures to today's US or Canada.

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Measuring the Fiscal Burden of Aging

The Rebalancing Tax Increase Metric

Intertemporal Government Budget Constraint (Auerbach et al. 1991):

$$\underbrace{B_{\bar{t}-1}}_{\text{Public debt}} + \underbrace{\sum_{s=0}^{\infty} \sum_{i} \sum_{x \in X} D^s g^i_{\bar{t},x} P_{\bar{t}+s,x}}_{\text{Gov. Expenditure}} = \underbrace{\sum_{s=0}^{\infty} \sum_{i} \sum_{x \in X} D^s \tau^i_{\bar{t},x} P_{\bar{t}+s,x}}_{\text{Gov. Revenues}} + \lim_{s \to \infty} D^s B_{\bar{t}+s}$$

where: ▸ Full derivation

- $g_{\bar{t},x}$ and $\tau_{\bar{t},x}$ per capita fixed for each $x : a, g, c$ group
  - Micro data w/ adjustments: cyclical + capital utilization
- $P_{t,x}$: projected population of group x in year t
- D: discount/growth factor (constant)
- θ_τ is the permanent tax increase necessary to ensure government solvency
  - $\equiv$ **rebalancing tax increase** summarizes the **fiscal burden of aging**
  - Proportional tax increase targeting everyone
  - Key feature: robust to D assumptions, reflects only demographics

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Measuring the Fiscal Burden of Aging

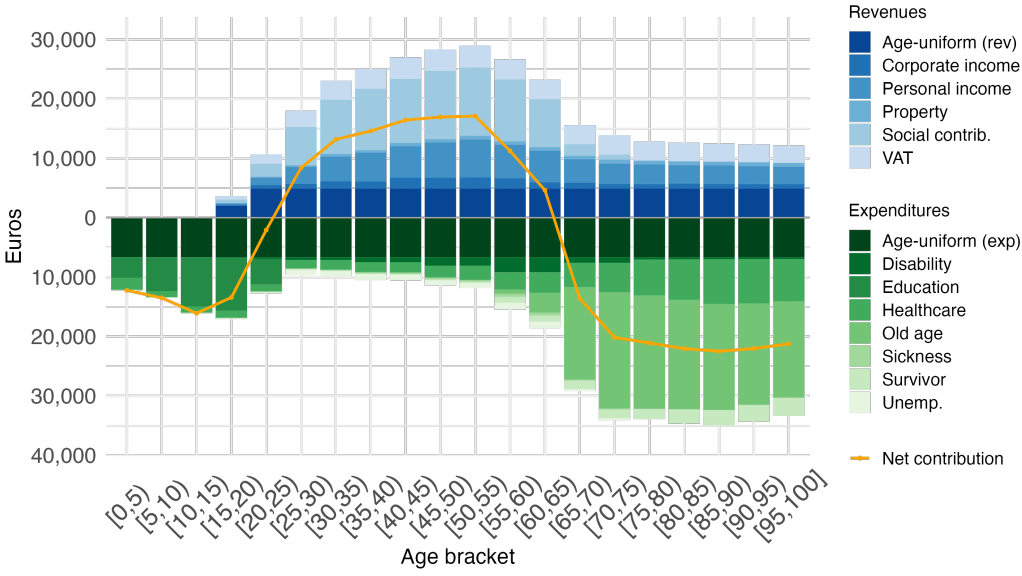
Data Sources

- Micro data
  - EU Survey on Income Living Conditions (EU-SILC): PIT, SS, and social benefits
  - Household Budget Survey (HBS): VAT
  - Household Finance and Consumption Survey (HFCS): Corporate Income tax
  - European Aging Working group (AWG): Health expenditure
  - Eurostat: Education expenditure by level of education
  - Labour Force Survey (LFS): Population breakdowns by CoB/Age/Educ/Gender

- Macro series
  - Eurostat
  - European Commission (AMECO)
  - OECD

Measuring the Fiscal Burden of Aging

Demographic Profiles in 2019, average across countries weighted by GDP



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Immigration and the Fiscal Burden of Aging in Europe

Expected Lifetime Yearly Net Contributions of Natives and Migrants

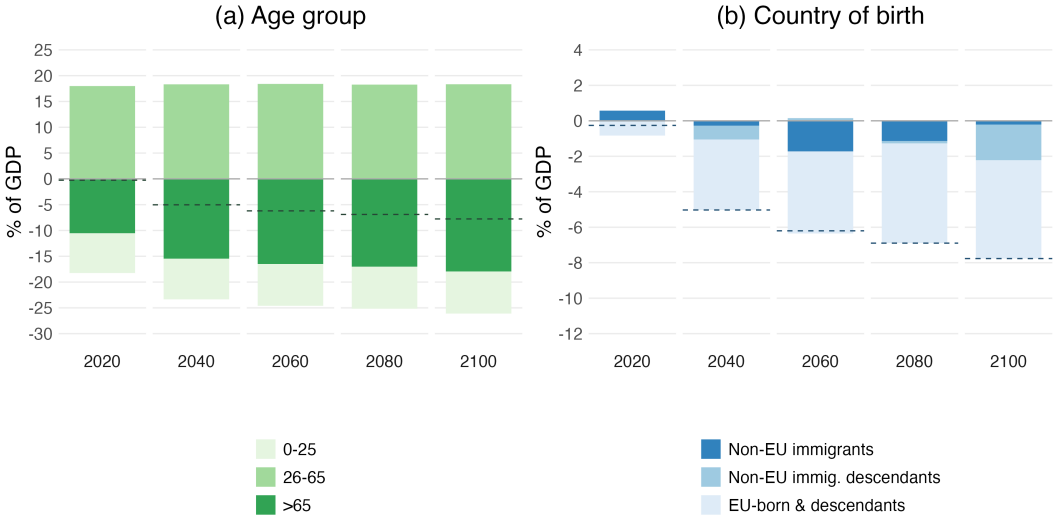
	Net Contribution		Tax payments	
Country of Birth	From age 0	From age 30	From age 0	From age 30
EU-born	-5,051	2,160	37,117	37,123
Non-EU-born	-9,757	-2,697	29,837	29,369

- Expected average yearly contributions, Euros per year

▸ Age profile of immigration flow

Immigration and the Fiscal Burden of Aging in Europe

Primary Balance Evolution and Decomposition by Age and Country of Birth



Immigration and the Fiscal Burden of Aging in Europe

The Effects of Migration on the Rebalancing Tax Increase θ_τ

- **Baseline**: $\theta_\tau = 14.0\%$
  - Immigration is 0.4% of total population
- **Zero mig.** $\Rightarrow \uparrow \theta_\tau$ by 2.3 p.p.
  - Corresponds to $\approx +$ 1% of GDP per year
  - Equivalent to tax payments of $\approx$ 845 Euros/year for an average native 30-year-old
- Migration has a **negative, convex** effect on θ_τ ▸ rob: macro ▸ rob: fert nat ▸ rob: fert 2nd gen

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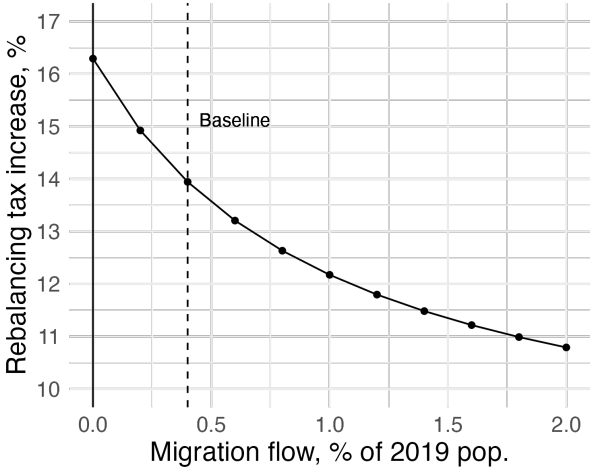

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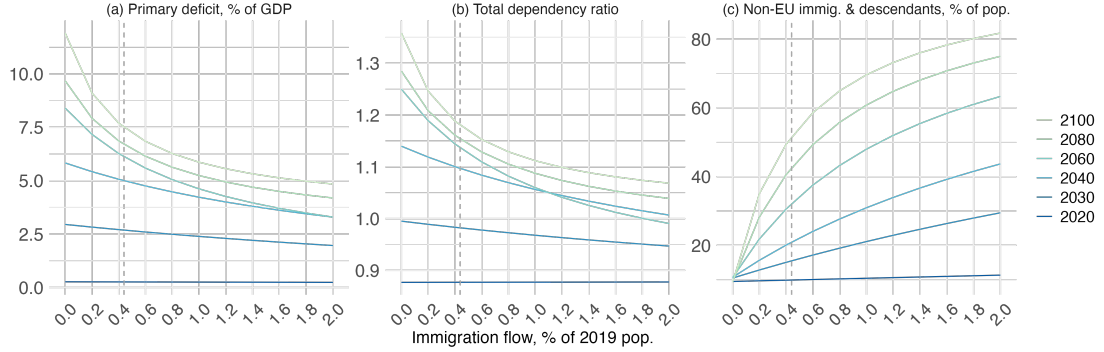
The Decreasing Returns of Immigration for the Dependency Ratio and the Budget Balance



- Population combines 2 groups: "natives", in fast decline, and young "immigrants"
- Larger inflow $\Rightarrow$ dynamics of total population closer to "immigrant" group

Fertility: an Alternative to Immigration?

- Start from zero migration, with baseline native fertility (1.6 children per woman)
- Compare two alternatives:
  1. Increase fertility: zero migration + high fertility rate (2.1 children per woman)
  2. Increase migration: baseline migration + baseline fertility

Scenario	θ_τ
No migration, low fertility	16.3%
1. No migration, high fertility	15.6%
2. Baseline mig., low fertility	14.0%

- Increasing fertility in the short-run only increases children $\Rightarrow$ + education spending
- In the long run, improves dependency ratio, but "too late"

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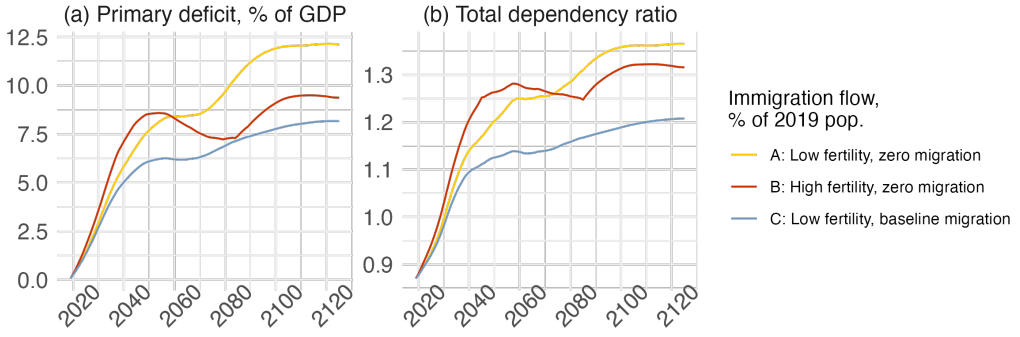
Projected Fiscal Balances under Different Assumptions for Native Fertility Rates



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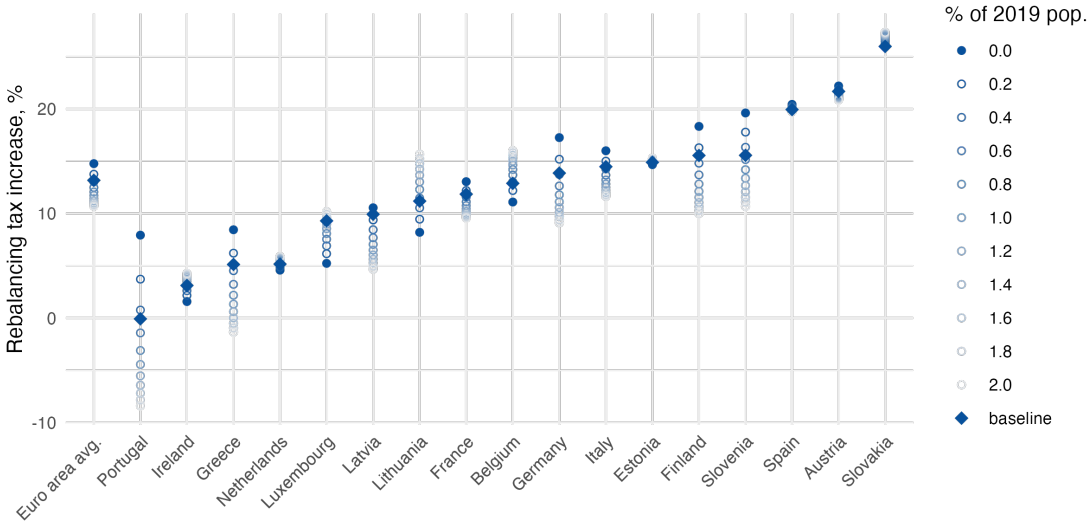
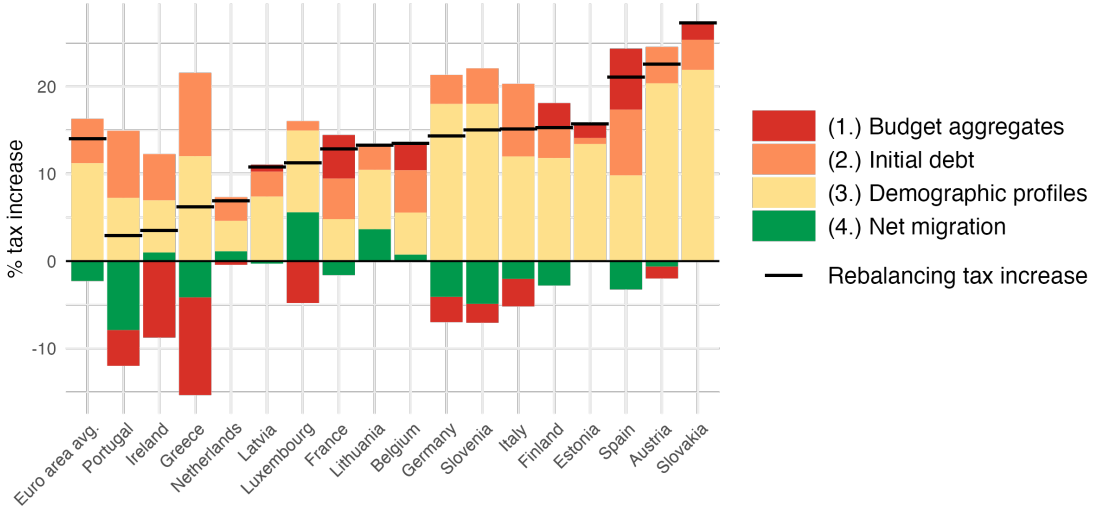
Rebalancing Tax Increase by EA country



Rebalancing Tax Increase by EA Country

Decompose the Rebalancing Tax Increase



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- **This paper**: how migration flows mitigate the fiscal burden of aging

- For the Euro Area:
  - Immigration alleviates the fiscal costs of aging by 2.3% GDP/year
  - Reducing immigration has **convex costs** for public finances' sustainability
    - building walls has high costs
    - limited benefits of increasing immigration (+ politically unfeasible)

- Policies that promote **fertility** are not a solution

- The fiscal burden of aging and the migration effects are heterog. across countries
  - Political economy implications for a common EU-wide migration policy

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Appendix

Demographic profiles

- We consider that individuals are heterogeneous with respect to 4 characteristics: **age**, $a \in A$, **gender**, $g \in G$, **skill-level**, $k \in K$, and **country of birth**, $c \in C$. Let $x \in X$ summarize the characteristics, with $X = A \times G \times K \times C$.
- The nominal government budget constraint is given by:

$$B_t = G_t - T_t + (1 + i_t)B_{t-1}$$

- We can write revenues (and expenditures) as

$$T_t = \sum_i T_t^i = \sum_i \sum_{x \in X} \tau_{t,x}^i P_{t,x}$$

  - $\tau_{t,x}^i$ is the average budget item i attributed to an individual x, in year t.
  - $P_{t,x}$ is the number of persons x alive in year t.

Estimation and Projection of the demographic profiles

- $\tau^i_{t,x}$ is not available for the whole population. To obtain them ($\tilde{\tau}^i_{t,x}$):
  - Using survey micro-data, get the profile for category i;
  - Distribute T^i_t according to this profile: coherence with the national accounts.
  - And similarly for spending.
- Per capita revenues (and spending) on item i, for each individual x, $\tau^i_{t,x}$, grow based on assumptions for nominal growth rate, γ_t:

$$\tilde{\tau}^i_{t,x} = \tilde{\tau}^i_{\bar{t},x} \prod_{j=\bar{t}+1}^{t} (1+\gamma_t) \text{ for } t > \bar{t}.$$

Fiscal Sustainability

- We define public finances to be sustainable if the government IBC holds:

$$\sum_{s=0}^{\infty}\prod_{j=1}^{s}\frac{G_{t+s}}{1+i_{t+j}}-\sum_{s=0}^{\infty}\prod_{j=1}^{s}\frac{T_{t+s}}{1+i_{t+j}}+B_{t-1}=\lim_{s\to\infty}\prod_{j=1}^{s}\frac{B_{t+s}}{1+i_{t+j}}.$$

- Using the demographic profiles of revenues and expenditures, the IBC becomes:

$$\sum_{s=0}^{\infty}\sum_{i}\sum_{x\in X}\prod_{j=1}^{s}\frac{1+\gamma_{t+j}}{1+i_{t+j}}\tilde{g}^{i}_{\tilde{t},x}P_{\tilde{t}+s,x}-\sum_{s=0}^{\infty}\sum_{i}\sum_{x\in X}\prod_{j=1}^{s}\frac{1+\gamma_{t+j}}{1+i_{t+j}}\tilde{\tau}^{i}_{\tilde{t},x}P_{\tilde{t}+s,x}+B_{\tilde{t}-1}=$$

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- Defining $D_t=\frac{1+\gamma_t}{1+i_t}$, the IBC simplifies to:

$$\sum_{s=0}^{\infty}\sum_{i}\sum_{x\in X}\prod_{j=1}^{s}D_{t+j}\tilde{g}^{i}_{\bar{t},x}P_{\bar{t}+s,x}-\sum_{s=0}^{\infty}\sum_{i}\sum_{x\in X}\prod_{j=1}^{s}D_{t+j}\tilde{\tau}^{i}_{\bar{t},x}P_{\bar{t}+s,x}+B_{\bar{t}-1}=$$

$$=\lim_{s\to\infty}\prod_{j=1}^{s}\frac{B_{t+s}}{1+i_{t+j}}.$$

Rebalancing Tax Increase

Back

- Fiscal sustainability is achieved when the **IBC holds** and the **RHS limit is 0**. Furthermore, for simplicity, we assume $D_t = D$. Then,

$$\implies \sum_{s=0}^{\infty} \sum_{i} \sum_{x \in X} D^s (\tilde{g}^i_{\bar{t},x} - (1+\theta_\tau)\tilde{\tau}^i_{\bar{t},x}) P_{\bar{t}+s,x} + B_{\bar{t}-1} = 0.$$

  - θ_τ: adjustment factor - it represents the permanent change in revenue such that the IBC holds.

- Solving for θ_τ:

$$1 + \theta_\tau = \frac{\sum_{s=0}^{\infty} \sum_i \sum_{x \in X} D^s \tilde{g}^i_{\bar{t},x} P_{\bar{t}+s,x} + B_{\bar{t}-1}}{\sum_{s=0}^{\infty} \sum_i \sum_{x \in X} D^s \tilde{\tau}^i_{\bar{t},x} P_{\bar{t}+s,x}}$$

Details on Cyclical Neutrality aggregates

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- Based on the work of Girouard and André (2006) we compute cyclical-neutral budget items
  - For a revenue item:

$$\frac{\left(T_{\bar{t}}^{i}\right)^{*}}{T_{\bar{t}}^{i}} = \left(\frac{Y_{\bar{t}}^{*}}{Y_{\bar{t}}}\right)^{\varepsilon_{i,Y}},$$

    where $T_{\bar{t}}^{i}$ is the observed value of the revenue item i in the base year, $Y_{\bar{t}}^{*}$ is the potential GDP of year $\bar{t}$, $Y_{\bar{t}}$ is the observed value of GDP in year $\bar{t}$ and $\varepsilon_{i,Y}$ is the elasticity of revenue category i with respect to output gap
  - For a spending item:

$$\frac{\left(G_{\bar{t}}^{i}\right)^{*}}{G_{\bar{t}}^{i}} = \left(\frac{U_{\bar{t}}^{*}}{U_{\bar{t}}}\right)^{\varepsilon_{i,U}},$$

    where $G_{\bar{t}}^{i}$ is the observed value of the spending item i in the base year, $U_{\bar{t}}^{*}$ is the natural unemployment rate of year $\bar{t}$, $Y_{\bar{t}}$ is the observed value of unemployment in year $\bar{t}$ and $\varepsilon_{i,U}$ is the elasticity of spending category i with respect to unemployment
- We compute the cyclical adjusted values of PIT, CIT, SS contributions, VAT and Unemployment, using the elasticities computed in Price, Dang and Botev (2015), potential GDP and natural unemployment from AMECO and the other aggregates from Eurostat.

Robustness Exercise: Macro assumptions

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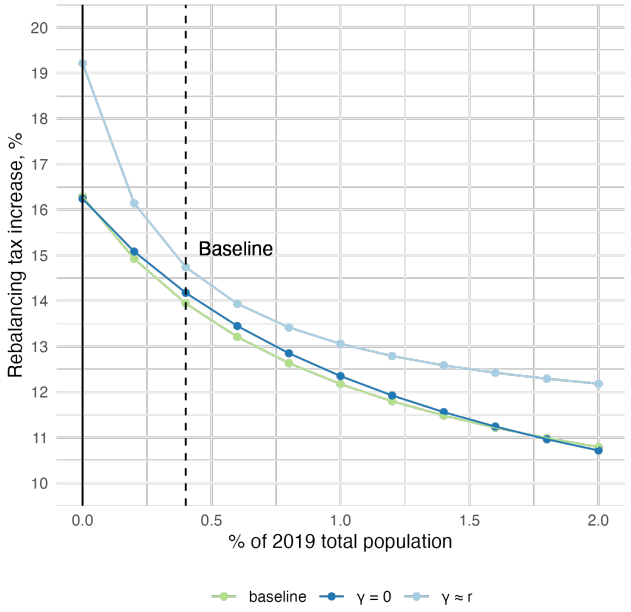

Robustness Exercise: Immigrants fertility assumptions

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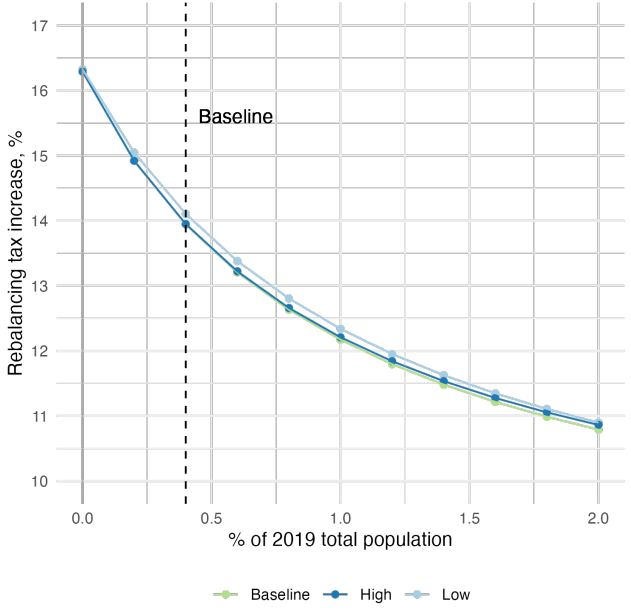

Robustness Exercise: Immigrants' offspring fertility assumptions

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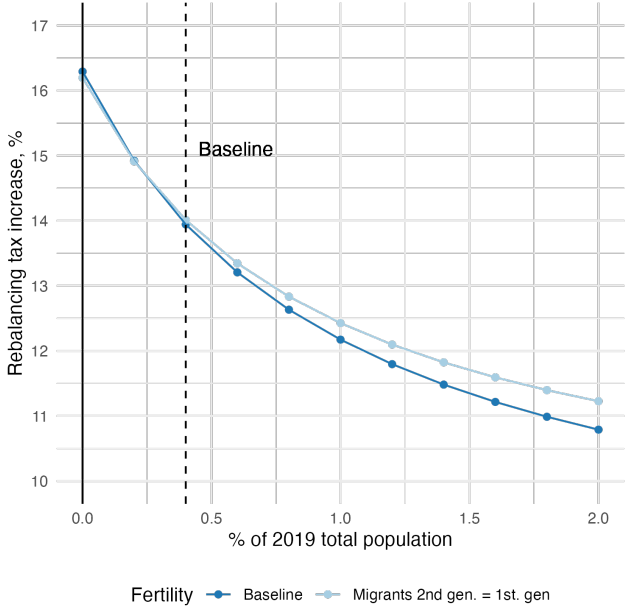

Quasi-Saturated regression for demographic groups

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$$
\begin{aligned}
Y_j \;=\; & \alpha + \beta^{\text{country}} \cdot \text{country}_j \\
& + \gamma^{\text{age}\times\text{country}} \cdot (\text{age}_j \times \text{country}_j) + \phi^{\text{gender}\times\text{country}} \cdot (\text{gender}_j \times \text{country}_j) \\
& + \delta^{\text{educ}\times\text{country}} \cdot (\text{educ}_j \times \text{country}_j) + \kappa^{\text{CoB}\times\text{country}} \cdot (\mathit{CoB}_j \times \text{country}_j) \\
& + \eta^{\text{gender}\times\text{educ}\times\text{country}} \cdot (\text{gender}_j \times \text{educ}_j \times \text{country}_j) \\
& + \psi^{\text{age}\times\text{gender}\times\text{country}} \cdot (\text{age}_j \times \text{gender}_j \times \text{country}_j) \\
& + \theta^{\text{educ}\times\text{CoB}\times\text{country}} \cdot (\text{educ}_j \times \text{CoB}_j \times \text{country}_j) \\
& + \lambda^{\text{CoB}\times\text{age}} \cdot (\mathit{CoB}_j \times \text{age}_j) + \mu^{\text{CoB}\times\text{gender}} \cdot (\mathit{CoB}_j \times \text{gender}_j) + \varepsilon_j
\end{aligned}
\tag{1}
$$