This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 613247.

INTRODUCING EDUCATION IN THE DEMOGRAPHIC DIVIDEND

THE CASE OF MEXICO AND SPAIN

agenta

Ageing Europe – An Application of National Transfer Accounts for Explaining and Projecting Trends in Public Finances

NTA 11th Global Meeting,
Senegal, 21 June 2016

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DEMOGRAPHIC DIVIDEND, EDUCATION, AND ECONOMIC GROWTH

- Education expansion has coincided over time with the demographic transition, therefore, with the demographic dividend

- Recent work has linked the demographic transition with increasing investment in human capital (Lee et al., 2000; Lee and Mason, 2010; Mason et al., 2016)

- Lutz et al. (2008) and Crespo-Cuaresma et al. (2014) link education expansion with the demographic transition. Their conclusion is that after controlling for increases in education, the effect of age structure on GDP growth is limited
  - They used panel data for different countries, and age structure is treated as an independent variable from education level

INTRODUCING EDUCATION INTO THE SUPPORT RATIO

- We extend Mason and Lee (2006) by estimating the (first) demographic dividend in terms of the growth of the **economic support ratio (ESR)**
- We take into account not only age profiles, but also variation by education level
- We decompose the ESR into age and education effects
- We apply this approach to Mexico and Spain from 1970–2100
- We conduct a sensitivity analysis using different education projections

ECONOMIC SUPPORT RATIO

- The support Ratio (SR) corresponds to the number of workers per individual:

$$\underbrace{\frac{Y(t)}{N(t)}}_{\text{Output per individual (}\textbf{income per capita}\text{)}} = \underbrace{\frac{W(t)}{N(t)}}_{\textbf{Support ratio}} \cdot \underbrace{\frac{Y(t)}{W(t)}}_{\textbf{Income per worker}}$$

- The growth in the support ratio has a direct impact on the growth of per capita income

- **SR → ECONOMIC SUPPORT RATIO,** when:
  - Individuals → number of **effective consumers**
  - Workers → number of **effective producers**

INTRODUCING EDUCATION

- Effective producers

$$L(t) = \sum_i N_i(t) \cdot ly_i = \sum_i \sum_j N_{ij}(t) \cdot ly_{ij}$$

Labor income profile by age

Labor income profile by age and education

- Effective consumers

$$C(t) = \sum_i N_i(t) \cdot c_i = \sum_i \sum_j N_{ij}(t) \cdot c_{ij}$$

Consumption profile by age

Consumption profile by age and education

DECOMPOSING THE ESR

- Growth of the economic support ratio

$$gr(ESR) = gr\left(\frac{L(t)}{C(t)}\right) = \dot{L}_t - \dot{N}_t$$

- Decomposing the change of effective producers and effective consumers (Das Gupta, 1993)

$$L(t+x) - L(t) = \underbrace{\left[\bar{R}(t+x) - \bar{R}(t)\right]}_{rate-effect} + \underbrace{\left[\bar{A}(t+x) - \bar{A}(t)\right]}_{age-effect} + \underbrace{\left[\bar{E}(t+x) - \bar{E}(t)\right]}_{education-effect}$$

- Where each effect is obtained by using the average value of the other two effects

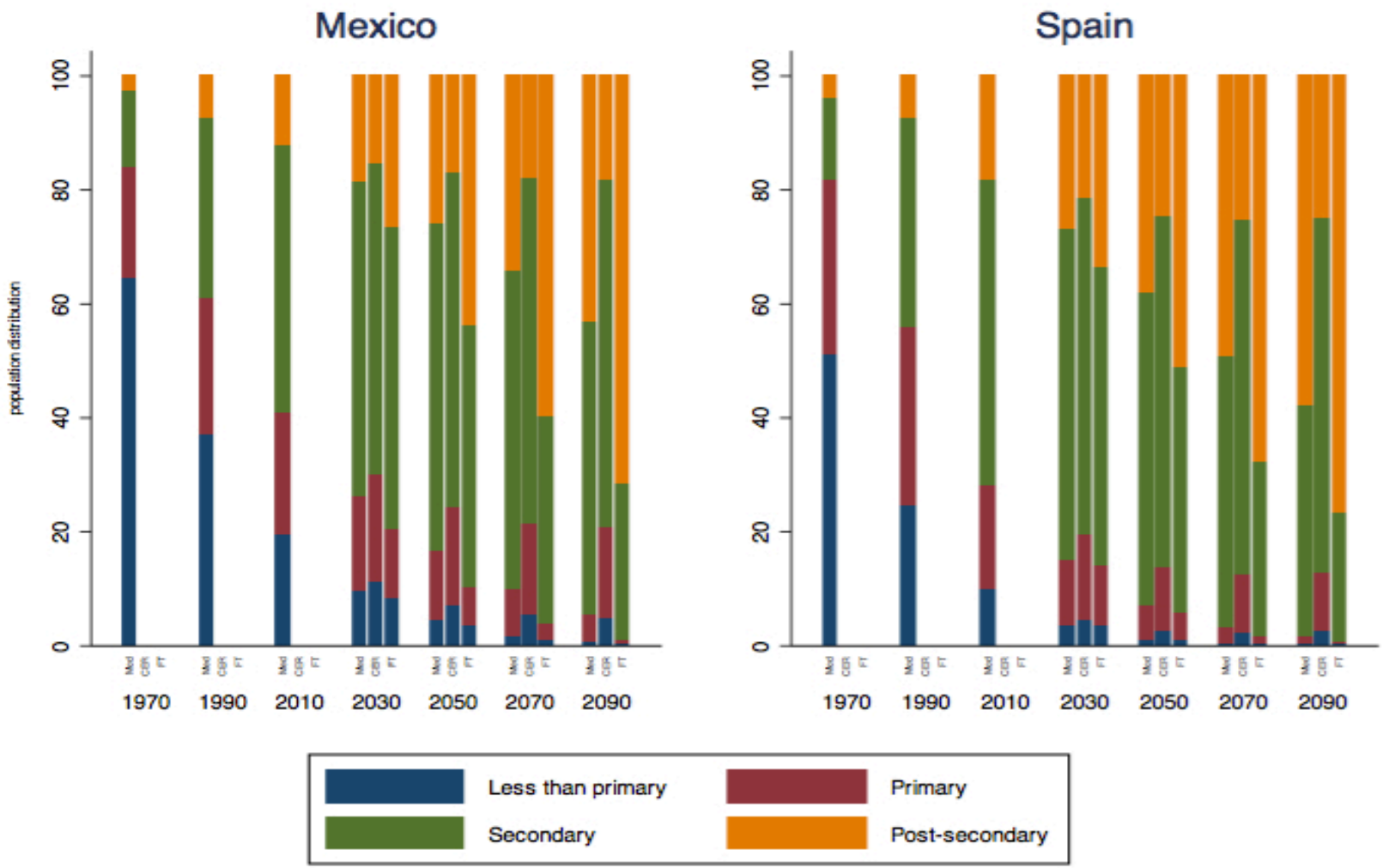
DATA

- Distribution of population by education level from 1970 to 2100 – **Wittgenstein Centre for Demography and Global Human Capital (2015)** (http://www.wittgensteincentre.org/dataexplorer)
  - **Baseline**
  - **CER** – constant enrollment rates
  - **FT** – faster track

- Economic profiles of consumption and labor income based in the **National Transfer Accounts** methodology (www.ntaccounts.org) by individual level of education
  - 2004 for Mexico
  - 2006 for Spain

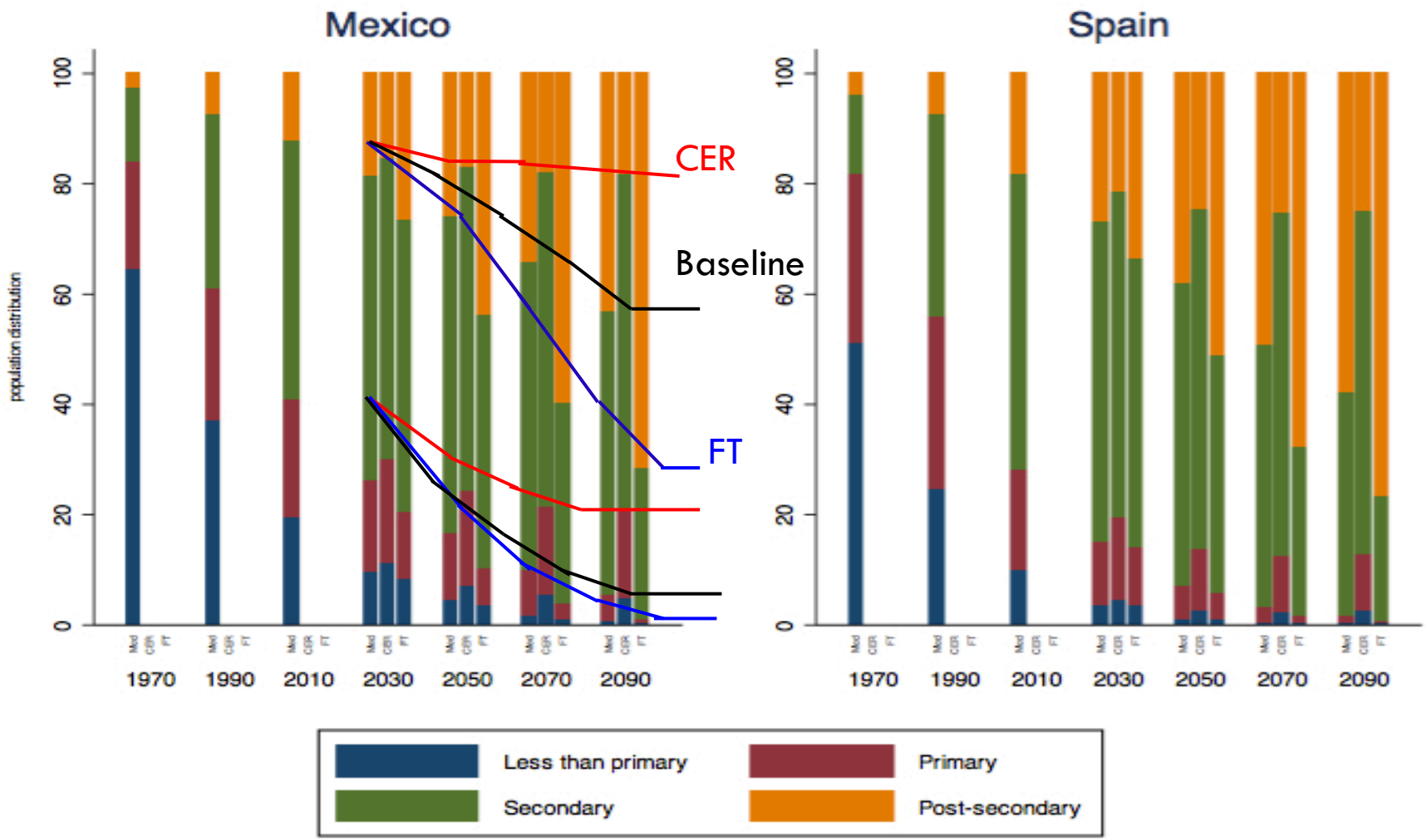
- We assume that consumption under 25 is the average consumption

EDUCATION DATA – PROJECTION SCENARIOS



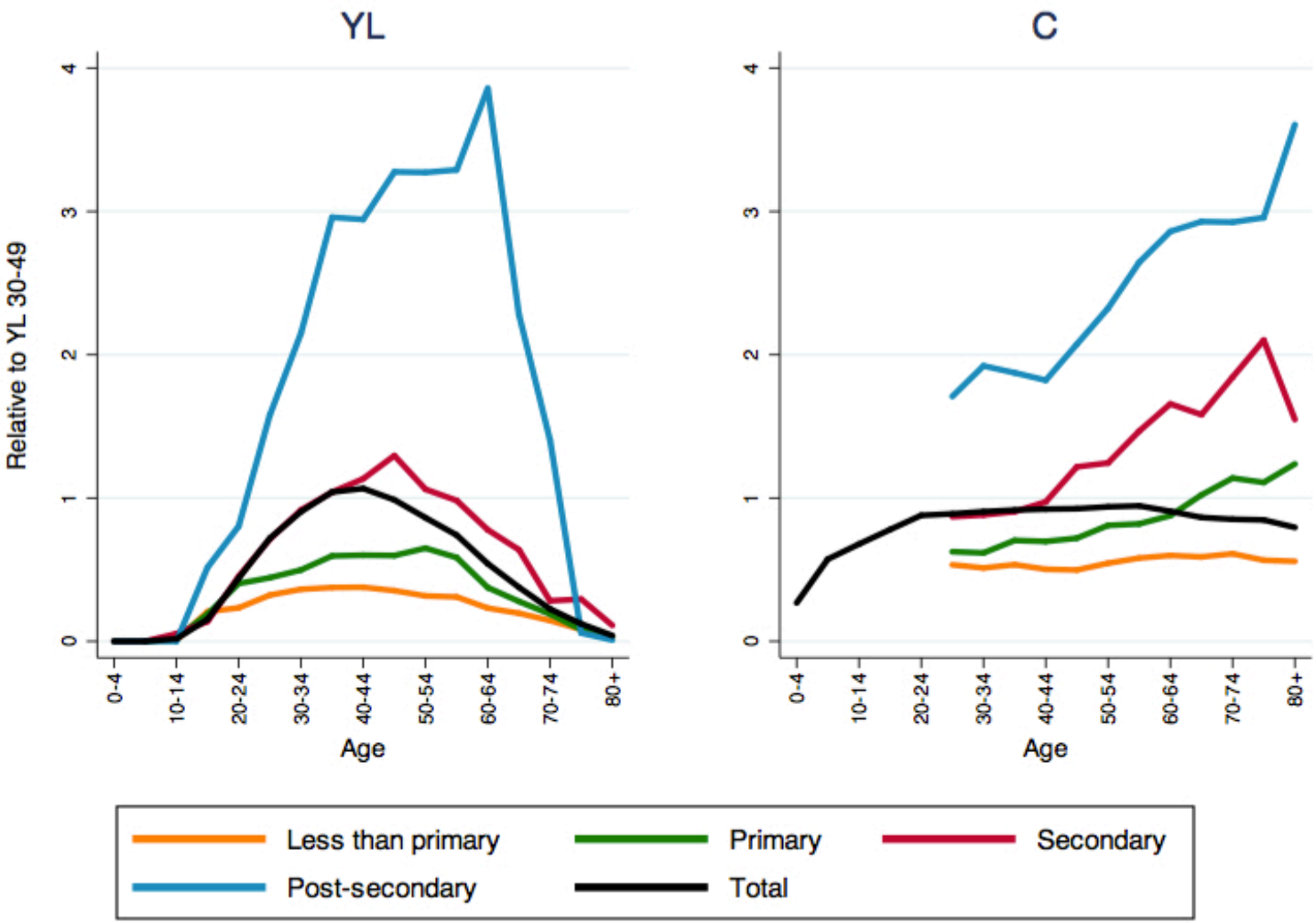
Source: Authors' calculations from Lutz et al. (2014)

EDUCATION DATA – PROJECTION SCENARIOS

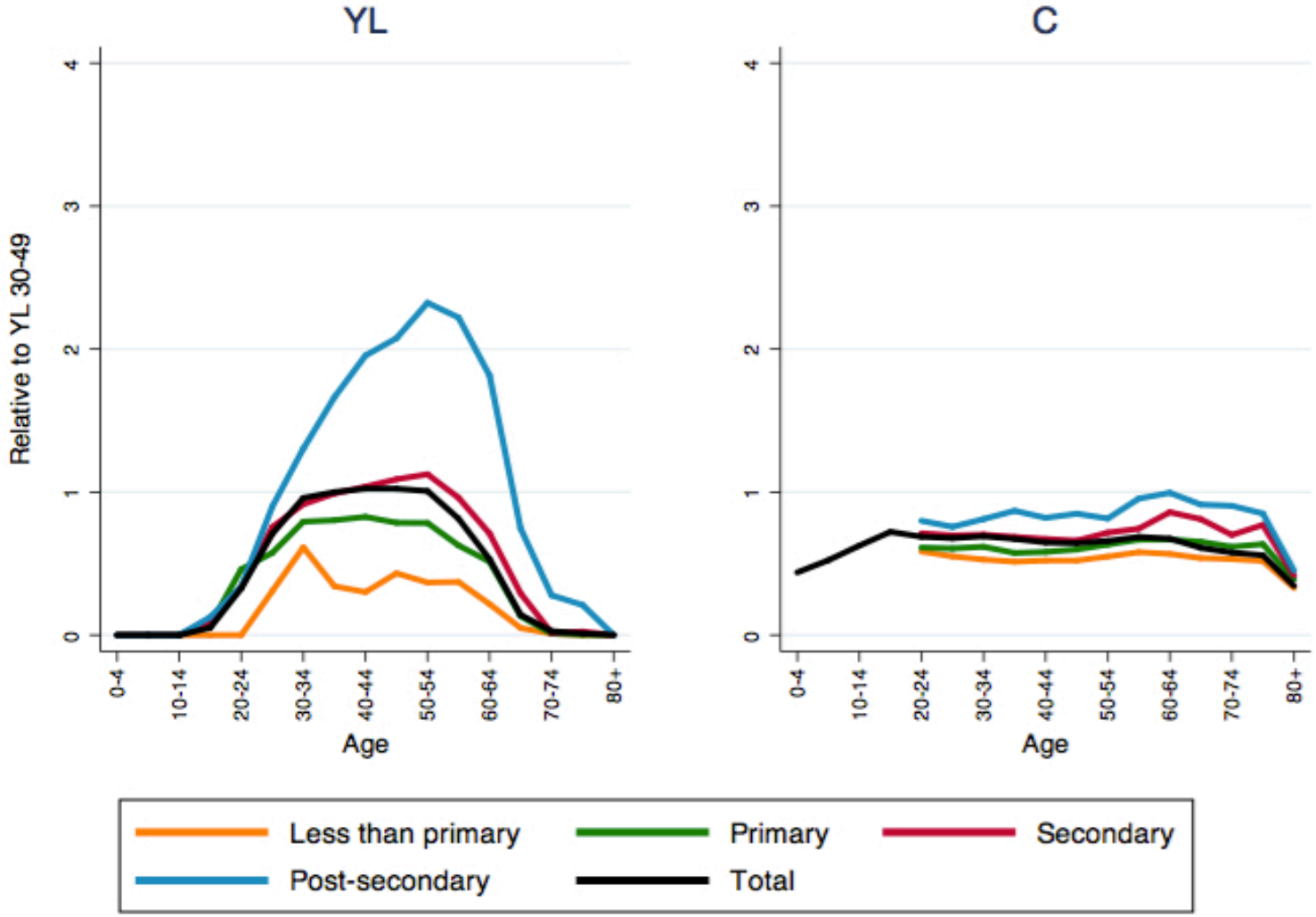


Source: Authors' calculations from Lutz et al. (2014)

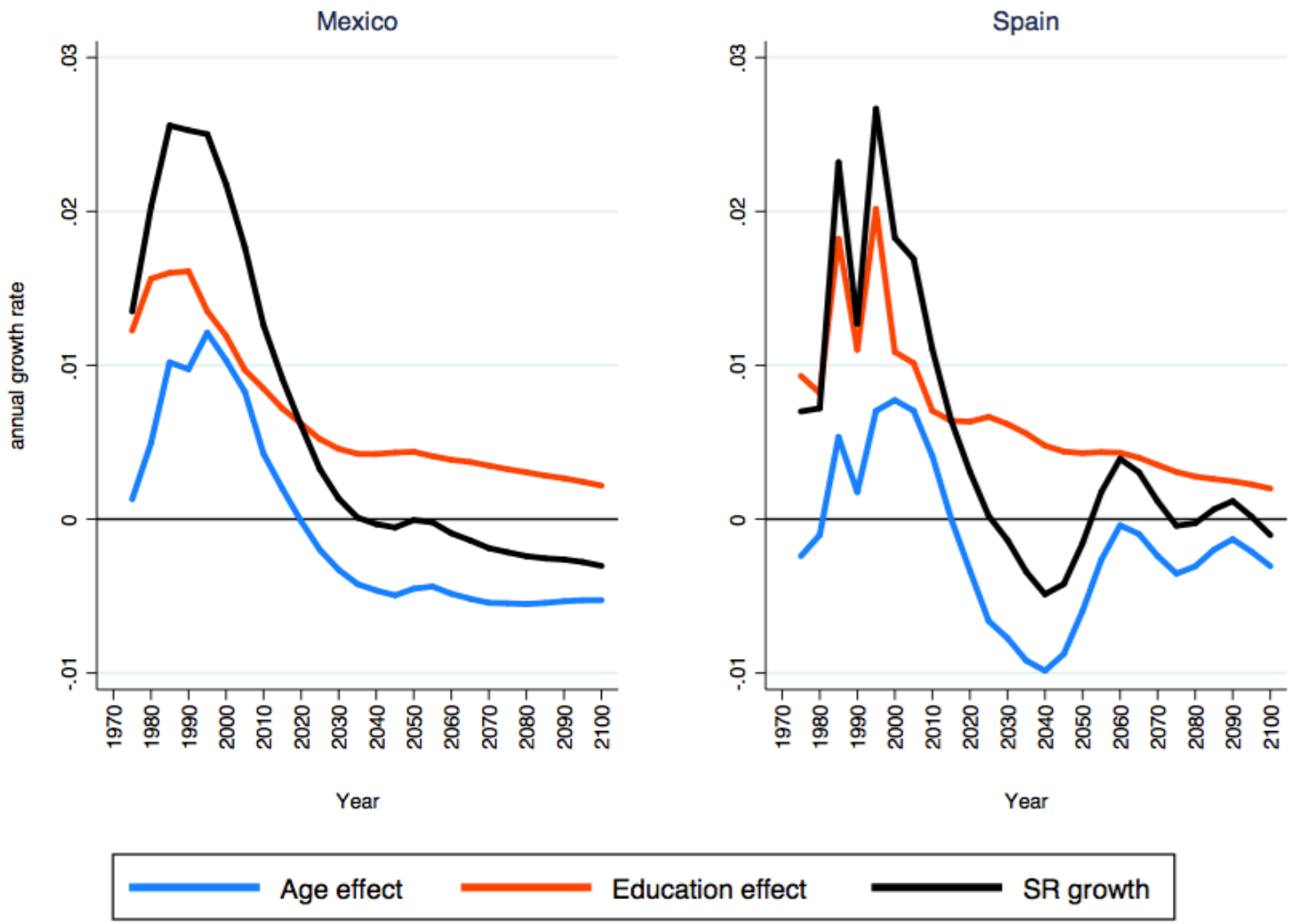
ECONOMIC PROFILES - MEXICO



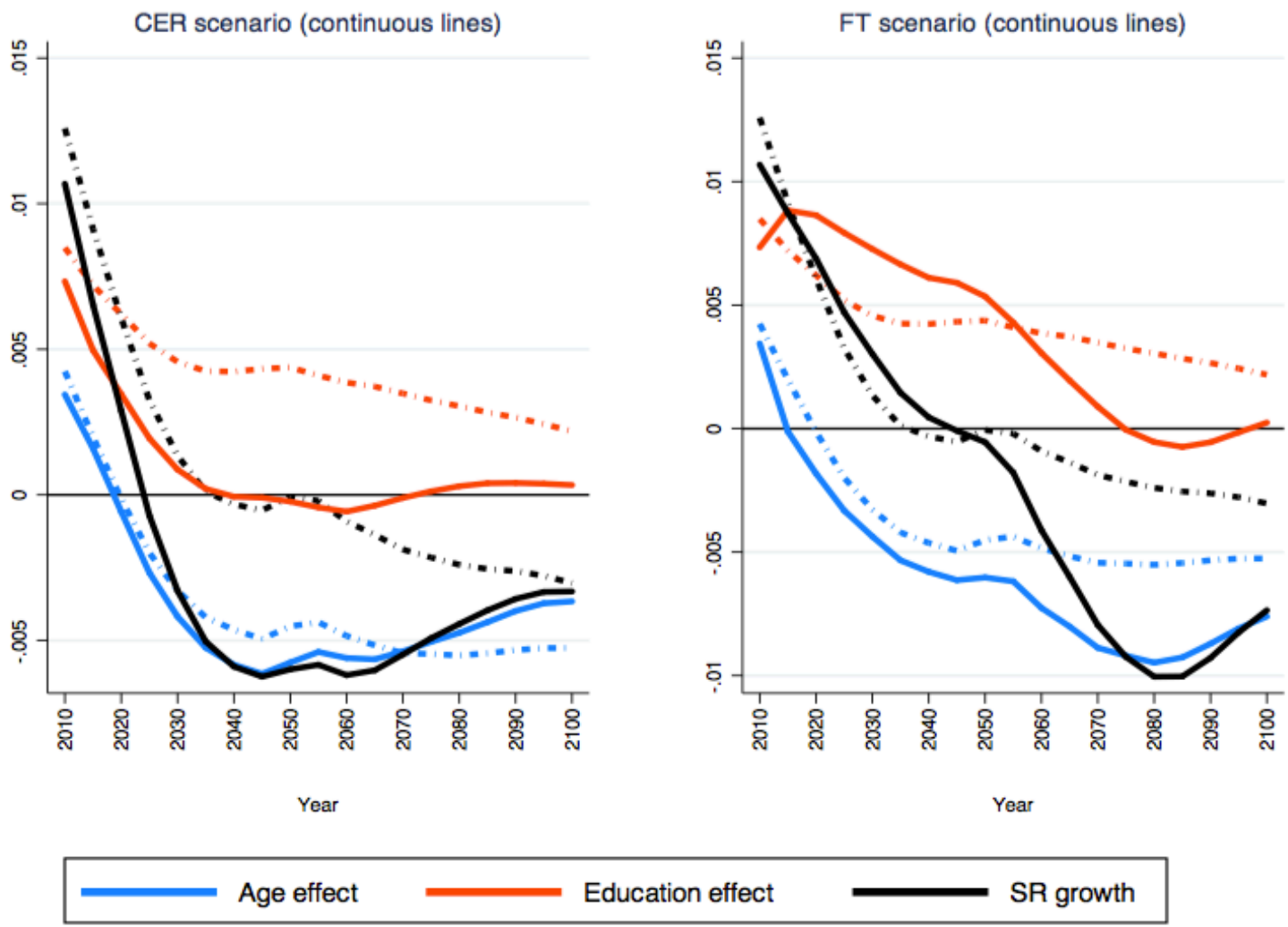
ECONOMIC PROFILES - SPAIN



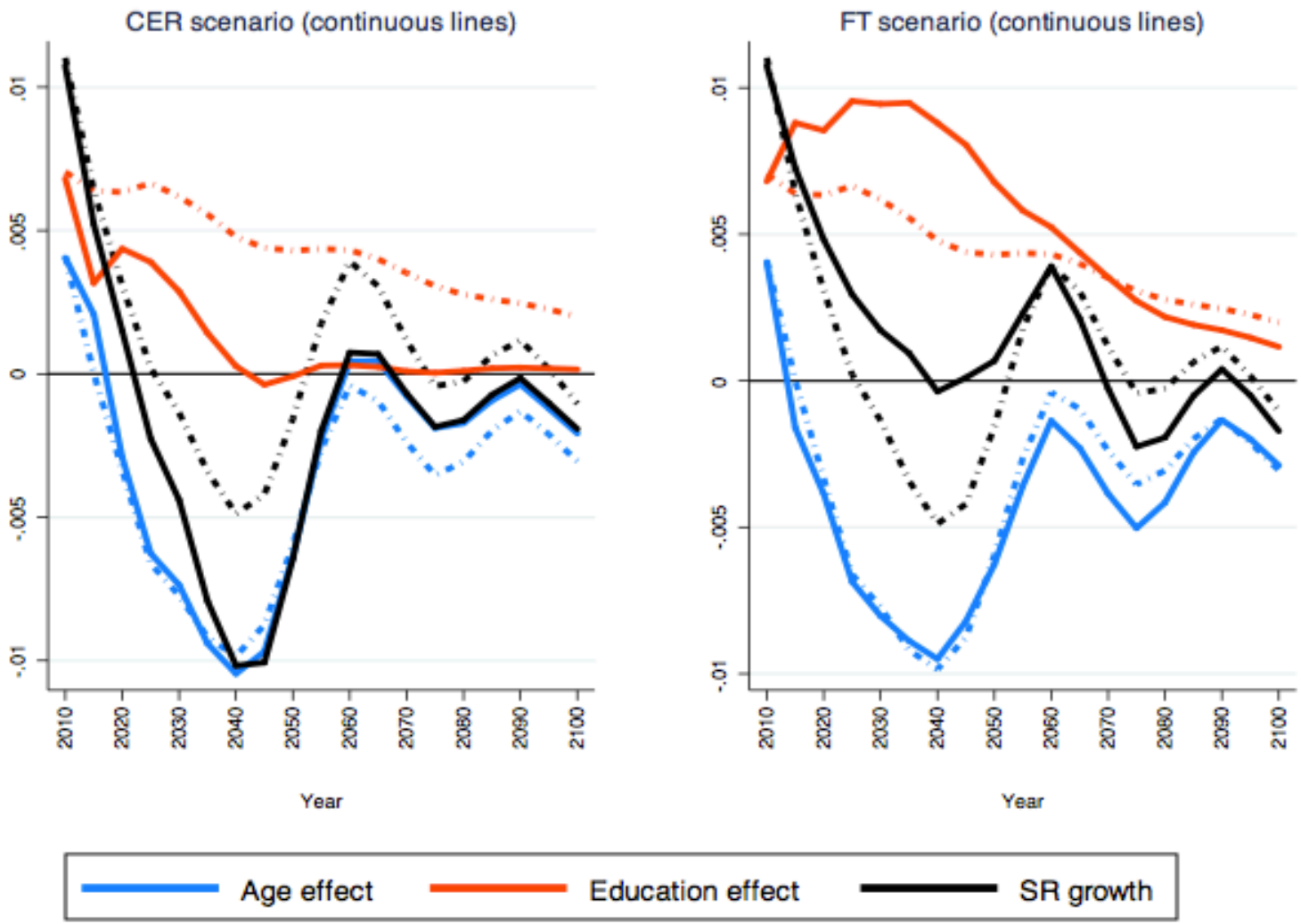
DECOMPOSING ESR GROWTH: AGE AND EDUCATION



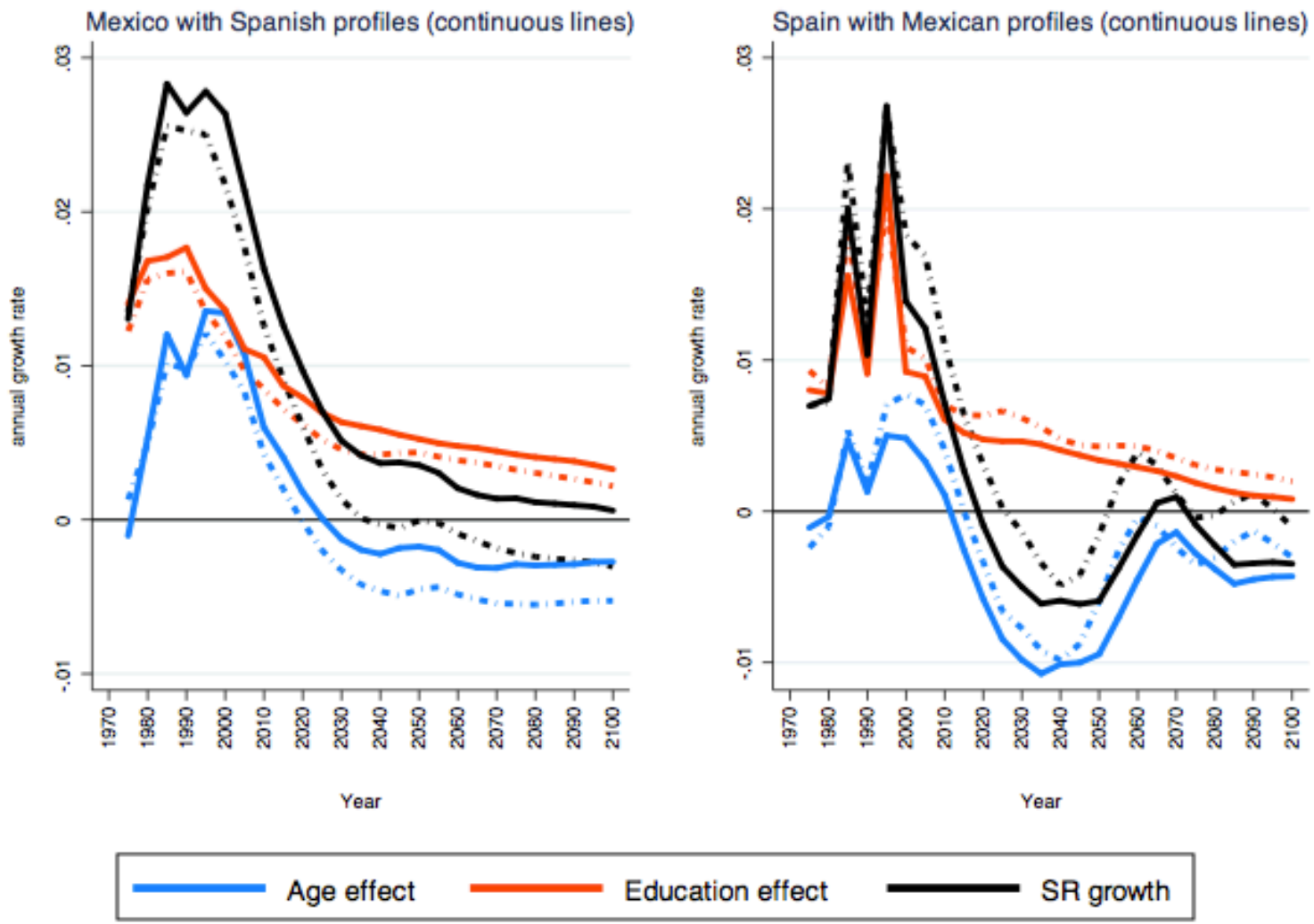
MEXICO – OTHER SCENARIOS



SPAIN – OTHER SCENARIOS



THE EFFECT OF ECONOMIC PROFILES



CONCLUSIONS

- Both countries have a positive SR growth at the beginning of the period. It turns negative in 2035 in Mexico and in 2025 in Spain.

- Spain shows a second demographic dividend after 2055 (when the baby boomers start dying).

- When decomposing the SR growth into education and age:
  - **Education** is positive during the whole period in both countries
  - **Age** effect drives the negative SR, when its negative effect is bigger than the education effect.

- Positive education effect is higher in Spain, but negative education effect is also greater than in Mexico, driving the SR growth to be more negative in Spain.

CONCLUSIONS

- **Constant enrollment rate (CER)** scenario:
  - Reduces the demographic dividend, and produces much more negative SR growth in both countries
  - Education effect turns zero at around 2040 in both countries

- **Fast track (FT)** scenario:
  - Expands the demographic dividend in **Mexico**, but as population projections are attached to education changes, aging is faster, and the age effect is more negative.
  - In **Spain**, the SR barely turns negative during the first decades.

- **Changing profiles:** If Mexico improves economic profiles (with a higher surplus), then the SR growth could remain positive throughout the period.

- The three variables (**age, education, and economic profiles**), are, therefore, decisive in determining the evolution of the support ratio.

THANKS

GRACIAS

DJEREDIEUF

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Wittgenstein Centre
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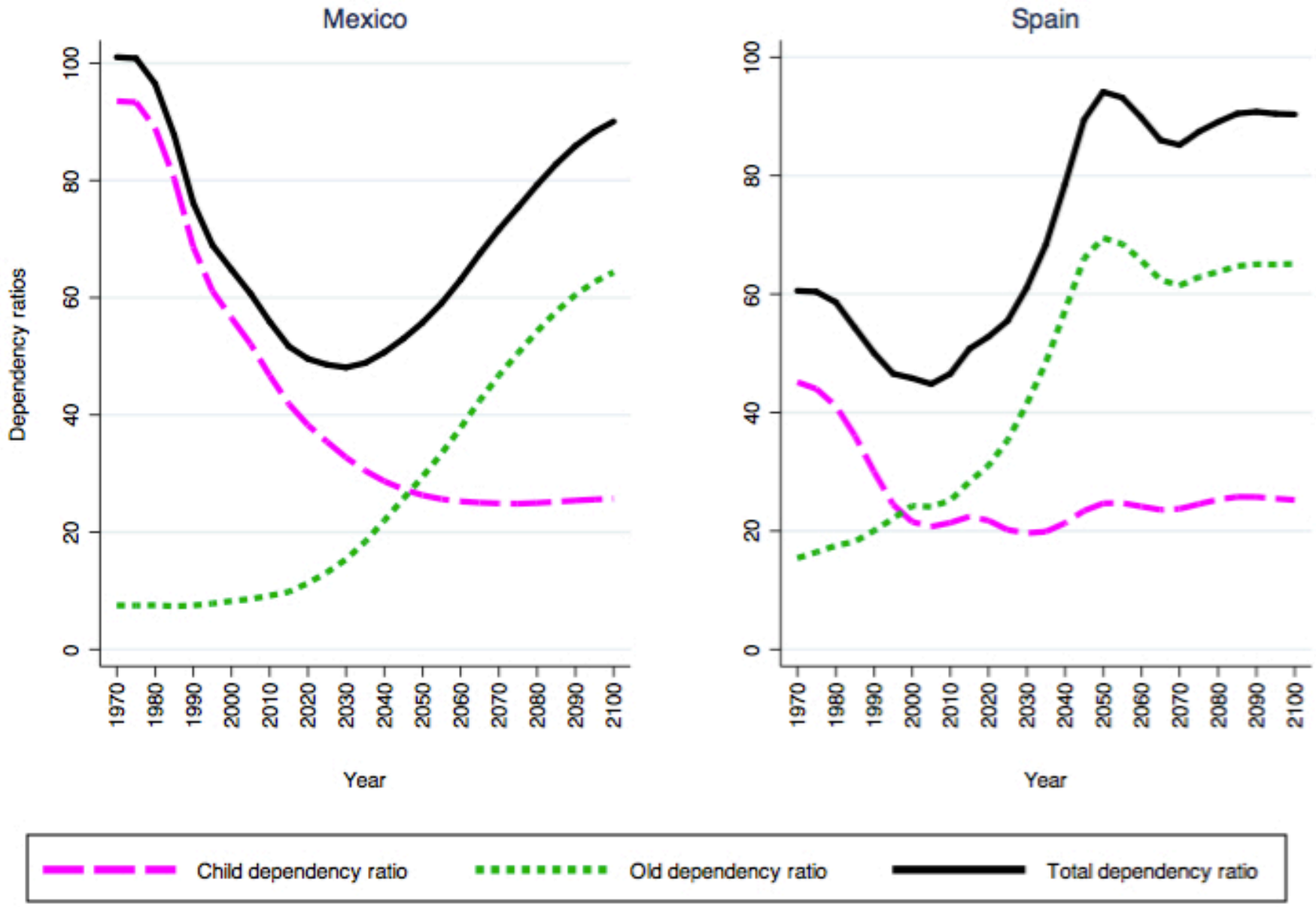
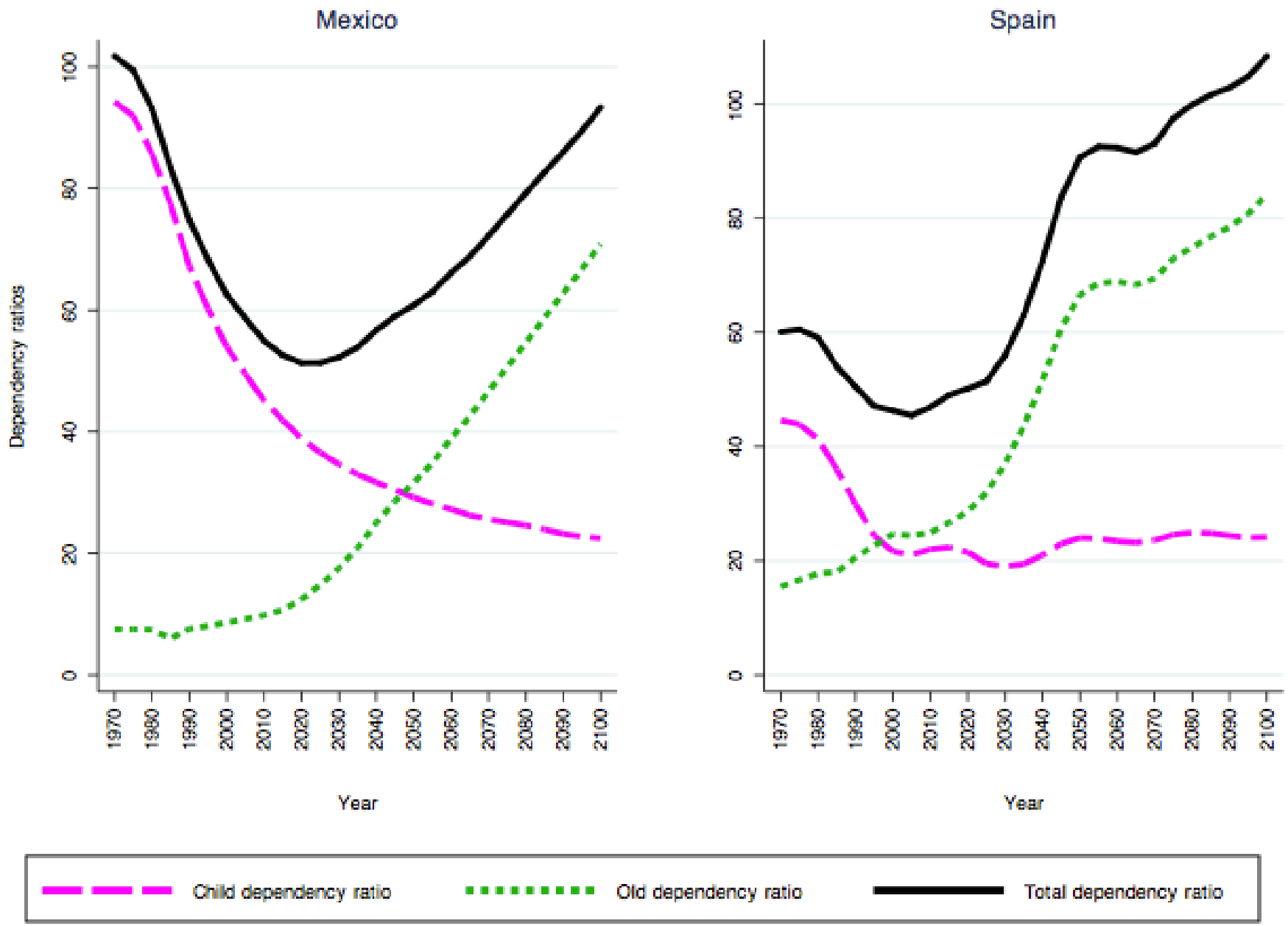
Population data – Dependency ratios (UN)



Source: Authors'calculations based in UN (2015)

Population data – Dependency ratios (WICD)



ECONOMIC PROFILES

- Labor income and consumption profiles are calculated following the National Transfer Accounts methods (www.ntaccounts.org)
- Age profiles are obtained using a population survey, divided into:
  - Labor income = Self-employment + earnings
  - Consumption = Private consumption + public consumption. Not differentiating by education level under 25.
- Aggregate values at the population level are adjusted to National Accounts values:
  - Labor income = compensation of employees + 2/3 gross mixed income
  - Consumption = private consumption + public in-kind expenditures
- Mexico data – corresponds to 2004 (ENIGH, SHCP)
- Spain data – corresponds to 2006 (EUSILC, EPF, INE, IGAE)