How low fertility and shrinking populations will impact our economies

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1. Introduction

- Fertility is falling rapidly in Poland
  - Now at 1.1 births per woman (Total Fertility Rate or TFR).
- Six countries have fertility below 1.0 and thirteen at 1.2 or below.
- More than 2/3 of world population is in countries where fertility is below "replacement", that is TFR less than 2.1.
- 39 countries have negative "natural increase" (excluding net migration).

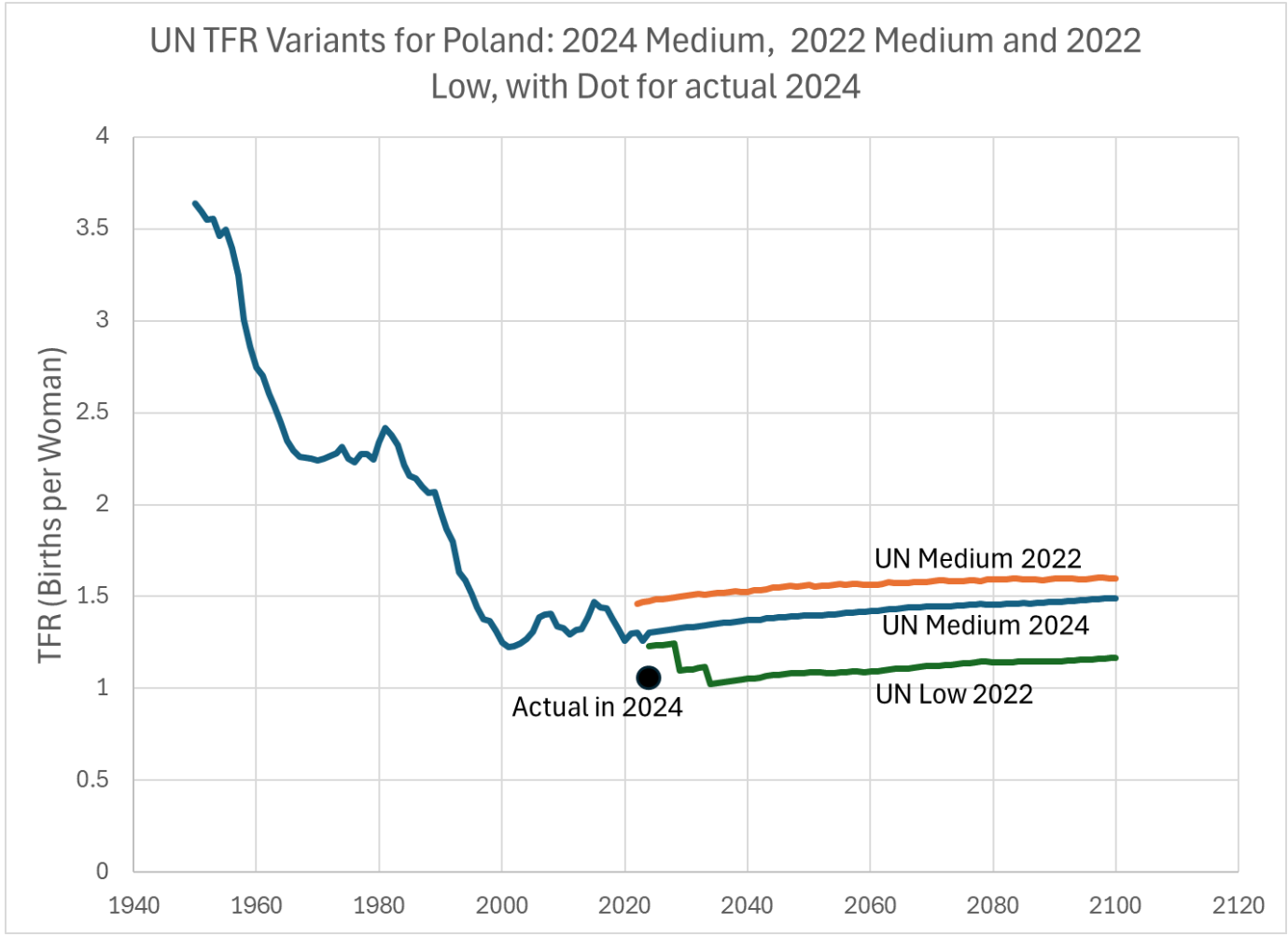
- No country has yet experienced full-blown population aging.
- Even in Japan the Old Age Dependency Ratio will rise 50% by mid-century.
- To anticipate the economic consequences of full population aging we can only extrapolate based on our current range of experience.

Will fertility keep declining, stabilize, or rise? No one knows.

UN projections did not foresee recent decline to 1.1 births per woman (TFR).

- Transitory shock or long run trend?

Projections of economic impact I will show are based on 2022 UN projections, Medium and Low fertility.



Growth rate of "Working age pop" ages 20-64.

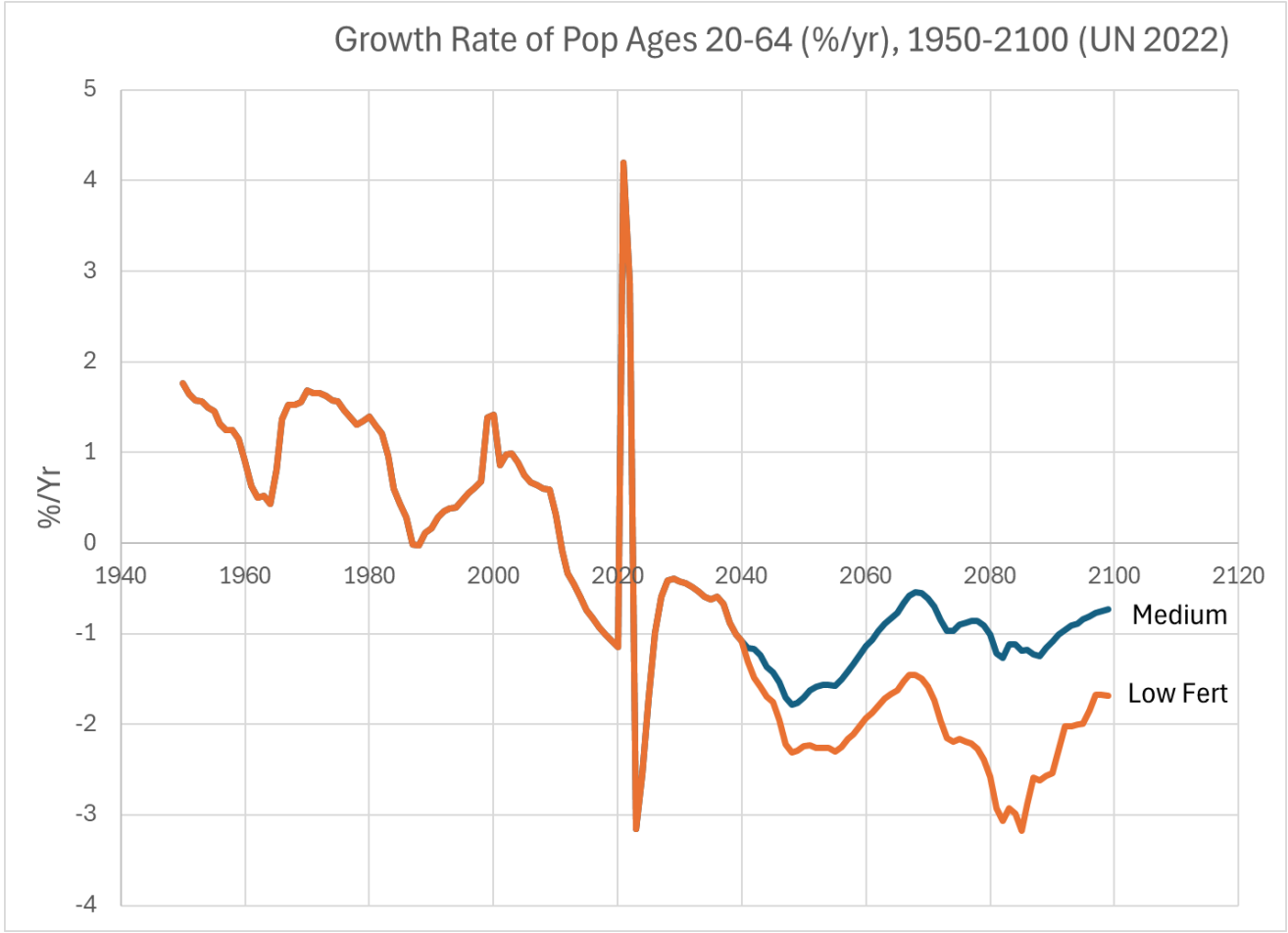
Around 1%/yr until 2000

Following fertility decline starting 1980, working age pop began to fall in 2000.

If TFR heads toward 1.6 (medium) then growth rate may stabilize around -1%/yr.

If TFR heads toward 1.2 (low) then it may stabilize around -2%/yr.

GDP growth will be reduced correspondingly.

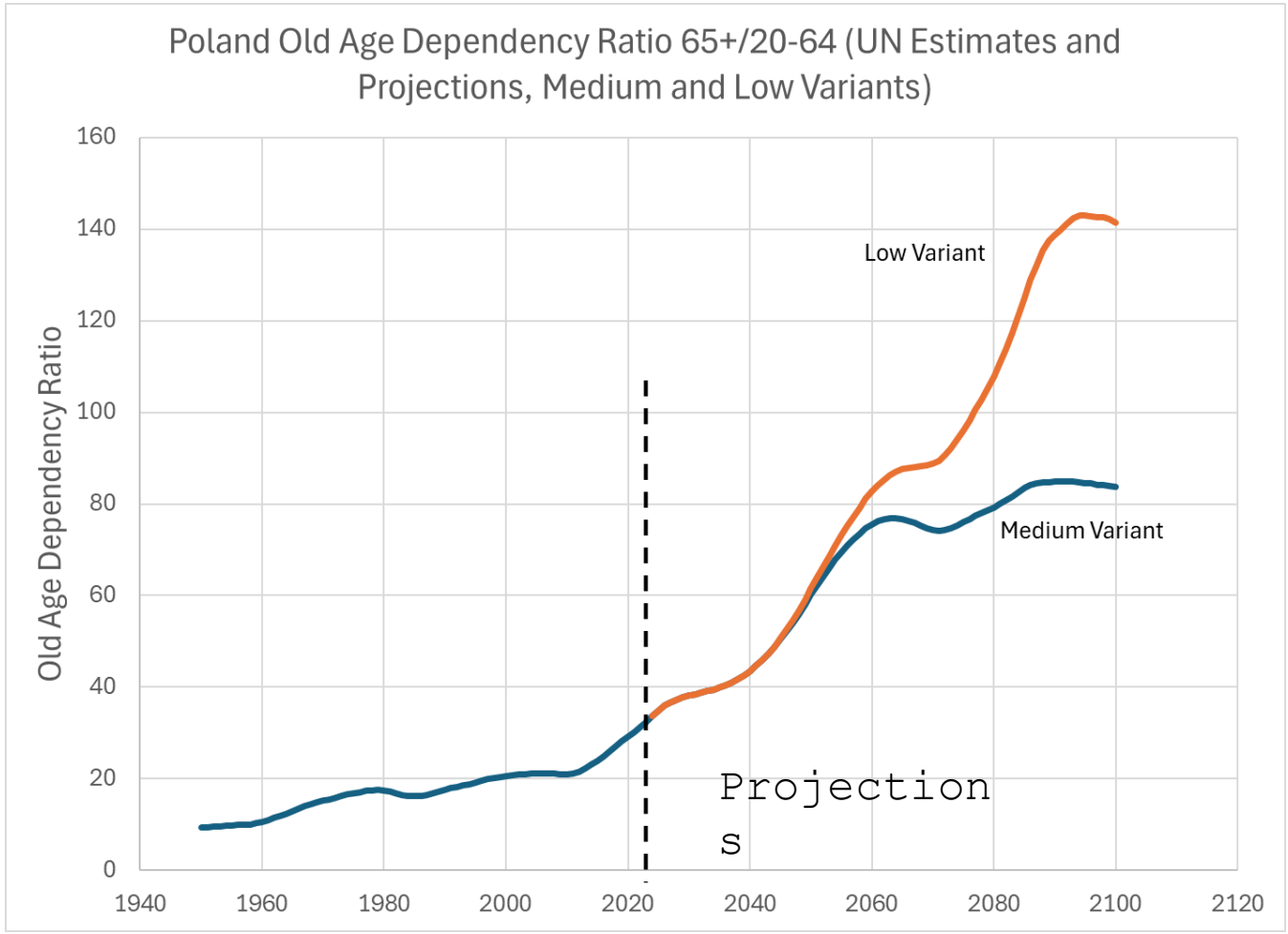


measured as ratio of pop 65+ to 20-64, Old Age Dependency Ratio, OADR

OADR will double in 25 years no matter what happens to fertility.

Takes many years for births to become workers.

Under Low variant OADR could quadruple by end of century.



How much will this matter for economy?

Preview of my main points

- The Macroeconomy
  - Yes, GDP growth will slow.
  - Offsetting effects on per capita income:
    - Reduced by rising old age dependency
    - Raised by increased capital per worker
  - Per capita GDP could rise or fall with aging and slower growth.
  - Real wages will rise relative to real interest rates as labor becomes scarce relative to capital.
- The intergenerational redistribution system is the big problem.
  - Children and the elderly are supported by transfers from the working age population: education, public pensions, health care.
  - As pop age distribution changes, the numbers giving transfers and receiving transfers change in different ways.
  - Amount given per donor or received per recipient must be adjusted.
  - Public systems in many countries are unsustainable without deep modification.
- Higher fertility would make the fiscal problem worse for 40 to 60 years before helping.

- What to do?
  - Retire later, save more, pay more taxes, share costs of population aging more fairly across the generations.
  - Pensions: Automatic stabilization structures
  - Raise retirement age more for higher income workers, less for lower inc.

- Great uncertainty on all sides, including how robotics and AI will alter the economic landscape.

Approaches to this topic

- Theoretical economic models featuring changing behaviors and policies in response to population aging and declining pop growth.
- Cross-section time-series regressions on international data
- Demographic – how economic behavior varies with age and interacts with changing population age distributions.
  - This is my approach
  - Draws on National Transfer Accounts (NTA).

- Fortunately, these different approaches reach similar conclusions

- Some economic growth theorists warn that

2. Polish NTA in international context

Demographic-style analysis linked to economic measures offers insights and estimates size of impacts

Data from National Transfer Accounts (NTA) (ntaccounts.org)

Thanks to Polish NTA team led by Agnieszka Chłoń-Domińczak

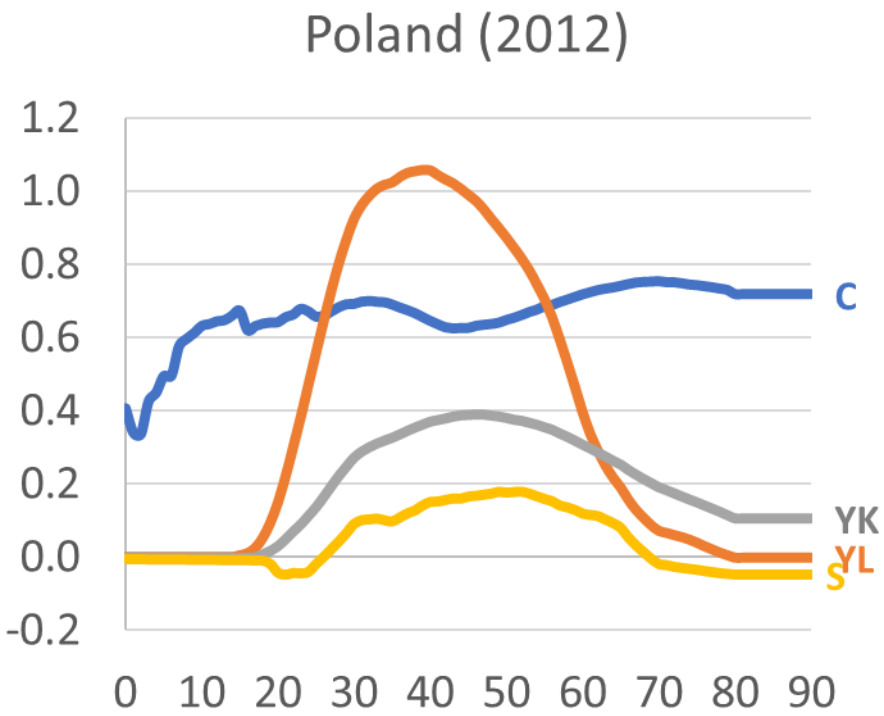
- Labor income is
  - Wages and salaries
  - Fringe benefits
  - 2/3 of self employment inc
  - Averaged over sex and zeros

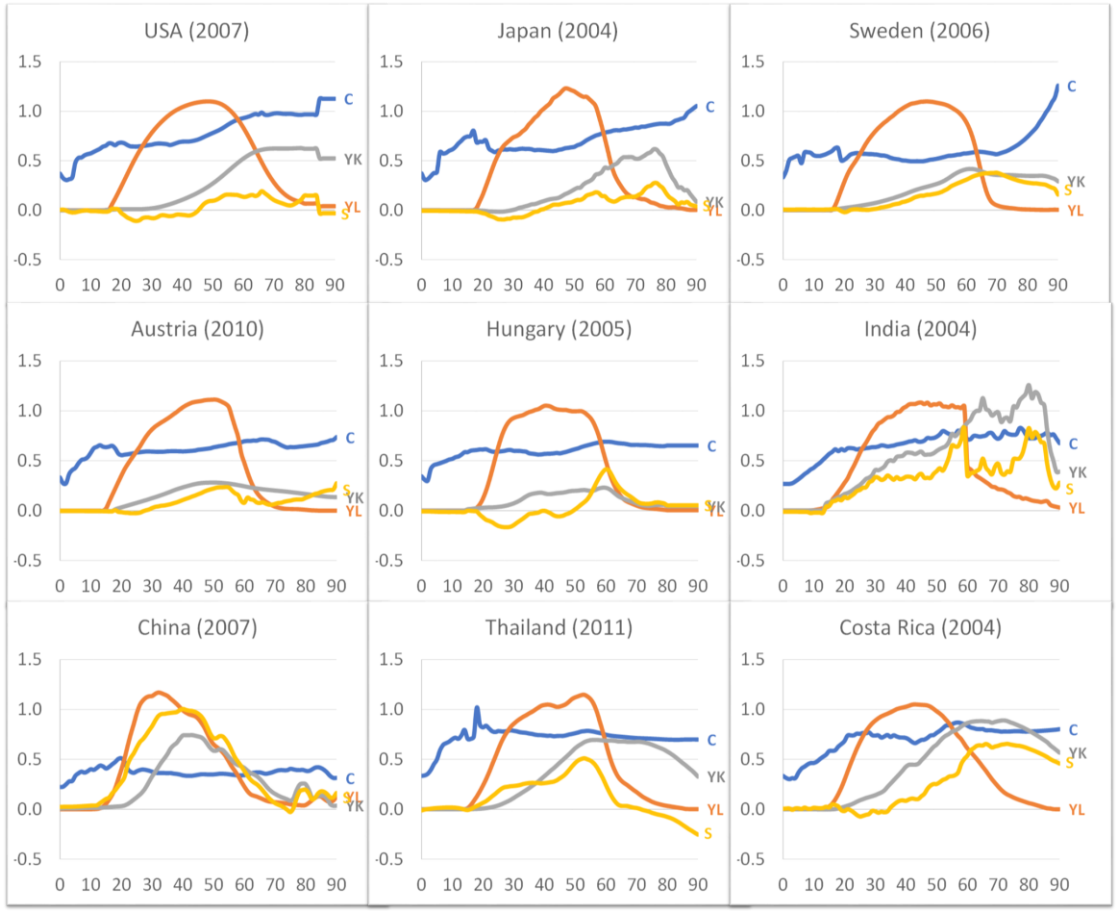
- Consumption includes:
  - Private household cons allocated to members (food, housing, etc.)
  - Public in-kind transfers (educ, healthcare, long term care, assistance, prorated public goods, but not cash)

- Asset inc is net receipts minus payments
  - Dividends and interest
  - Imputed rental value of owned home
  - Corporate retained earnings (share)
  - Rent received on property
  - 1/3 of self employment inc

International context:
Poland has early peak in labor inc, old age cons does not rise, and old age asset income is low.

ratios to average labor inc ages 30-49 for comparison





3. Population and the Economy

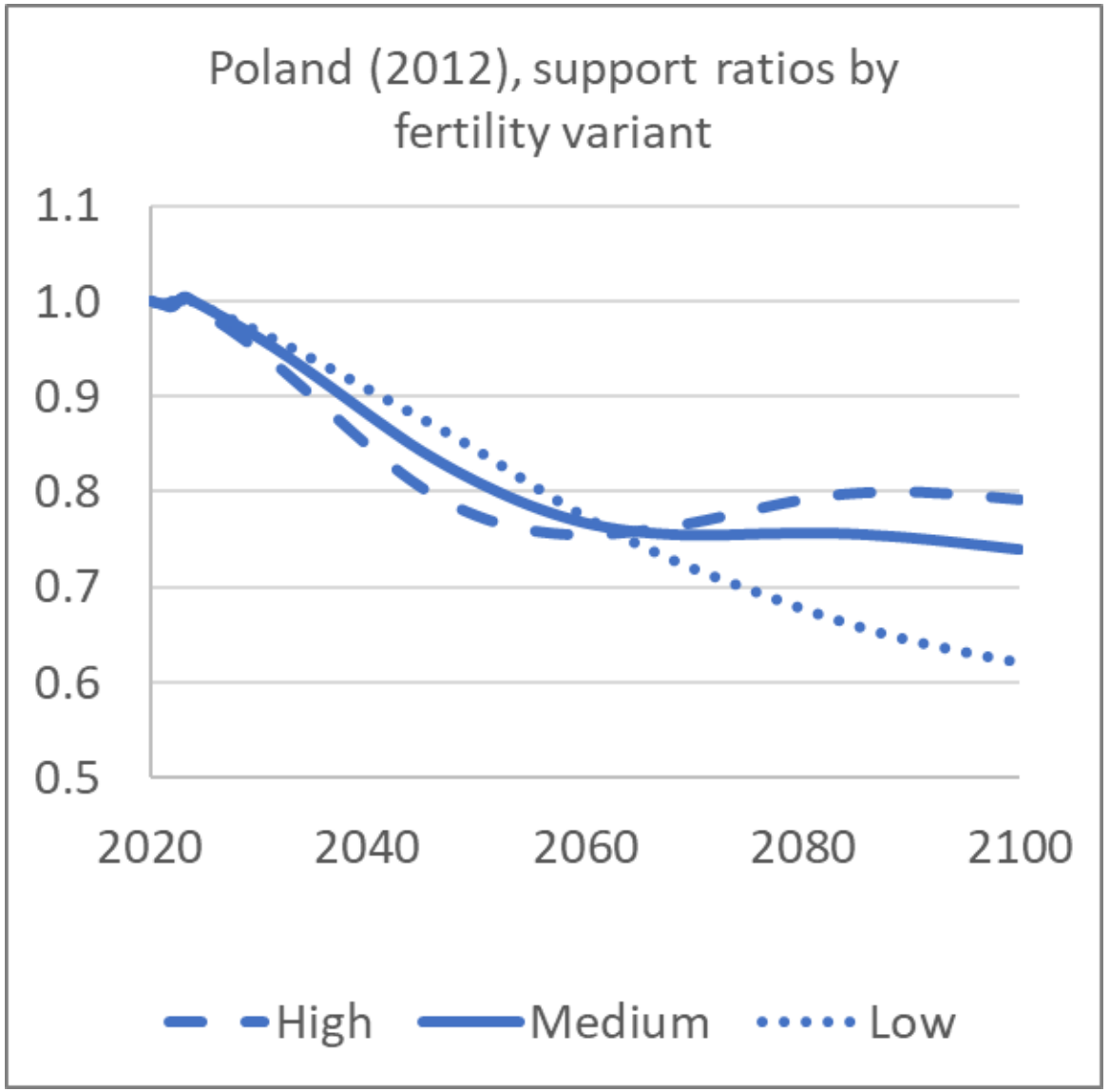
Now move from individual life cycle to the macro economy using UN population projs.

- Multiply each age profile by projected population age distribution and sum.
- This gives an "other things equal" projection of the aggregate quantity.
  - Of course, other things will change.
  - Labor productivity will rise with education, technology, capital.
  - Behavior will change – people may work more or less than in 2012.
  - Consumption will change.
- Think of this is an added effect of changing population age distribution on top of these other changes.

Widely used outcome measure is Economic Support Ratio (SR)

- Projected “effective labor” is population age distribution weighted by labor income age profile.
- Projected “effective consumers” is population age distribution weighted by consumption age profile.
- Weights are held constant while population varies.
- Support Ratio = Effective labor/Effective consumers

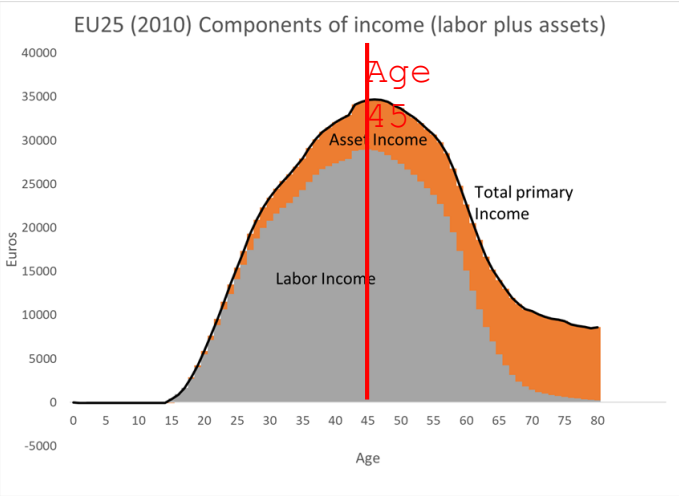
- From 2020 to 2060, the SR declines .7%/yr under all fertility scenarios due to rising costs of redistributing to elderly.
- Consumption per consumer will rise .7%/yr less rapidly than otherwise.
- Support ratio is highest under lowest fertility scenario until 2060. Higher fertility would be more costly.
- After 2060-70, higher fertility becomes beneficial, while support ratio keeps falling under low scenario.

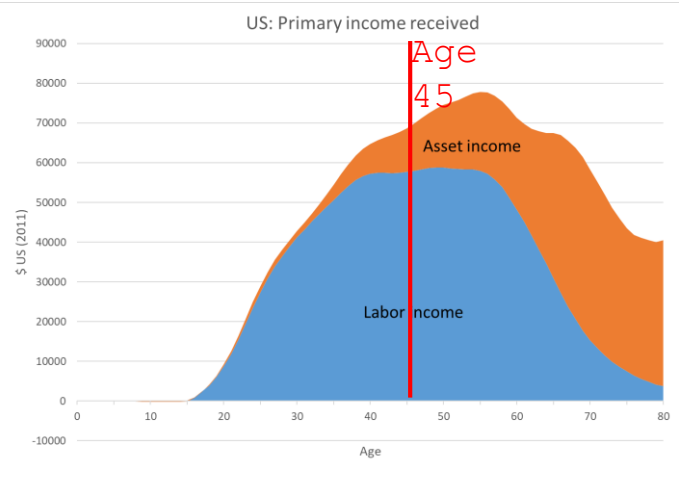


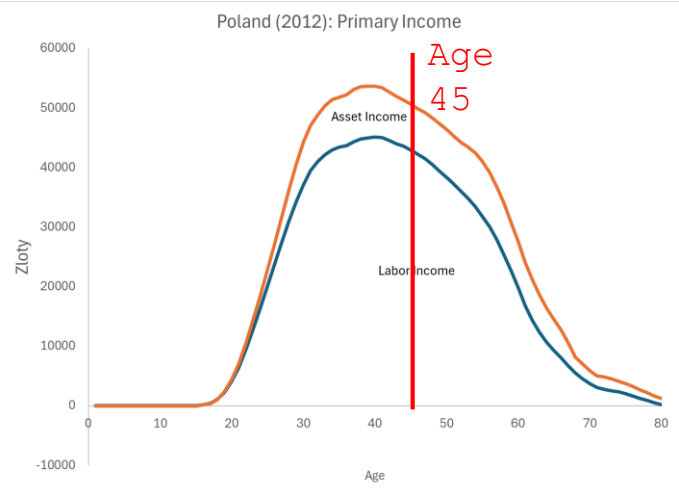
But why consider only labor income? What about asset income?

- Elderly earn little labor income but in many countries they hold most of the assets and receive substantial asset income.
- In closed economy, assets, particularly capital, raise labor productivity.
- We can incorporate asset income with two different assumptions
  - Open economy: wages and profit rates are set on international market. Then we just use the baseline age profiles as usual.
  - Closed economy: wages and profit rates depend on the ratio of capital to labor, which varies with population aging. More complicated analysis.

Primary inc per cap by age







US has much more labor income at older ages than Poland, which has more than EU.
Poland labor income peaks at at 40, EU at 45, and US has a very broad peak.
US has more asset income at older ages than EU. Poland has little at older ages.

Poland's early peak earning and relatively low old age asset income probably reflects rapid wage growth for young workers and previous economic regime.

Population aging and primary income (the sum of labor inc and asset inc, similar to GDP).

- Construct aggregates by multiplying baseline age profiles by the projected population age distributions and summing.
- Start with aggregate labor income Y_l and asset income Y_a

Identity for aggregates in economy closed to transfers:

Primary income ≡ Primary Uses

$$Y_l + Y_a = C + S$$

Labor Inc + Asset Inc = Consumption + Savings

Identity holds at NTA baseline with baseline pop.

In future projections, they diverge.

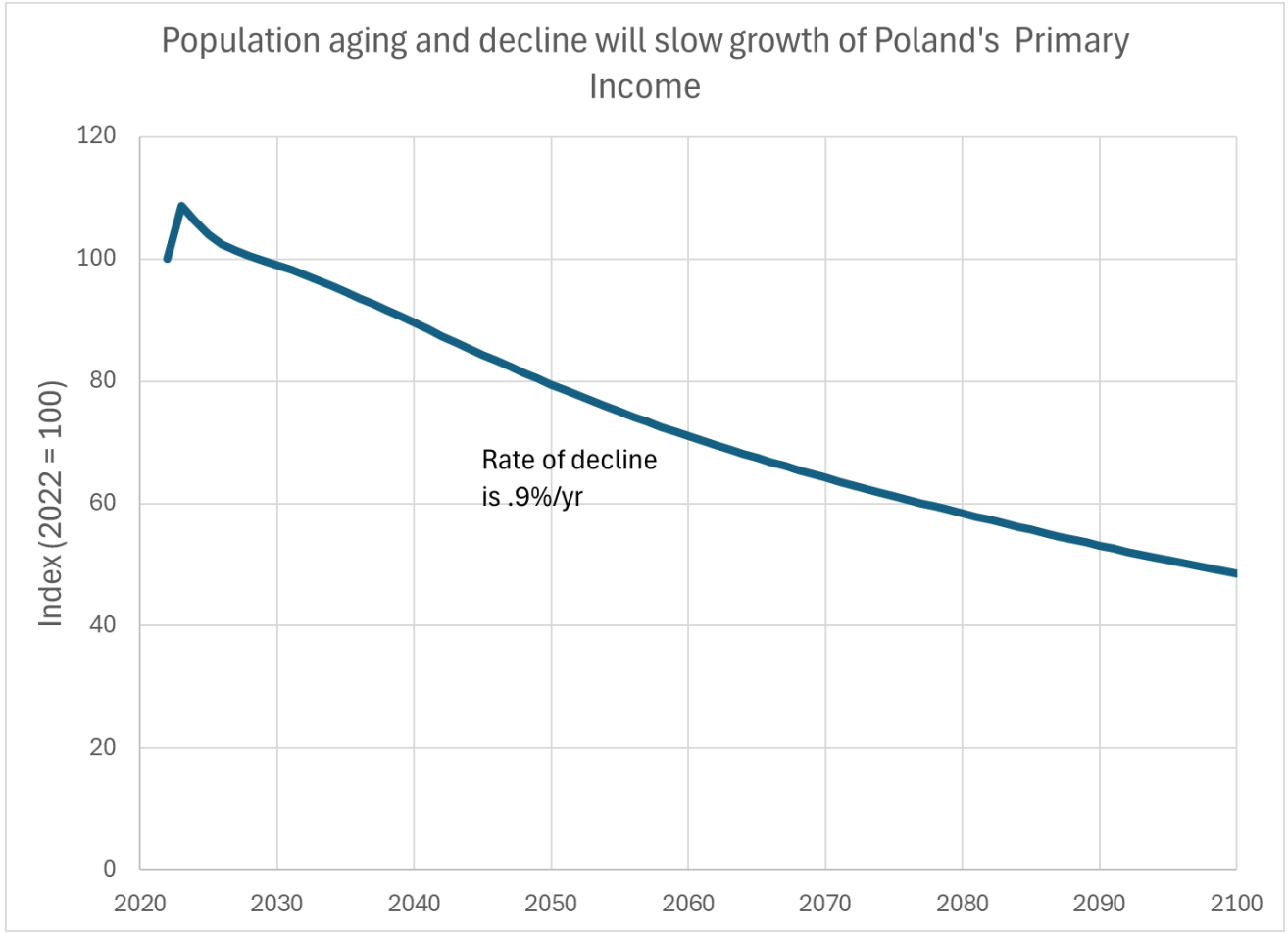
Imbalance will be eliminated by unknown changes in age profiles.

.9%/yr slower than otherwise, due to pop aging and decline.

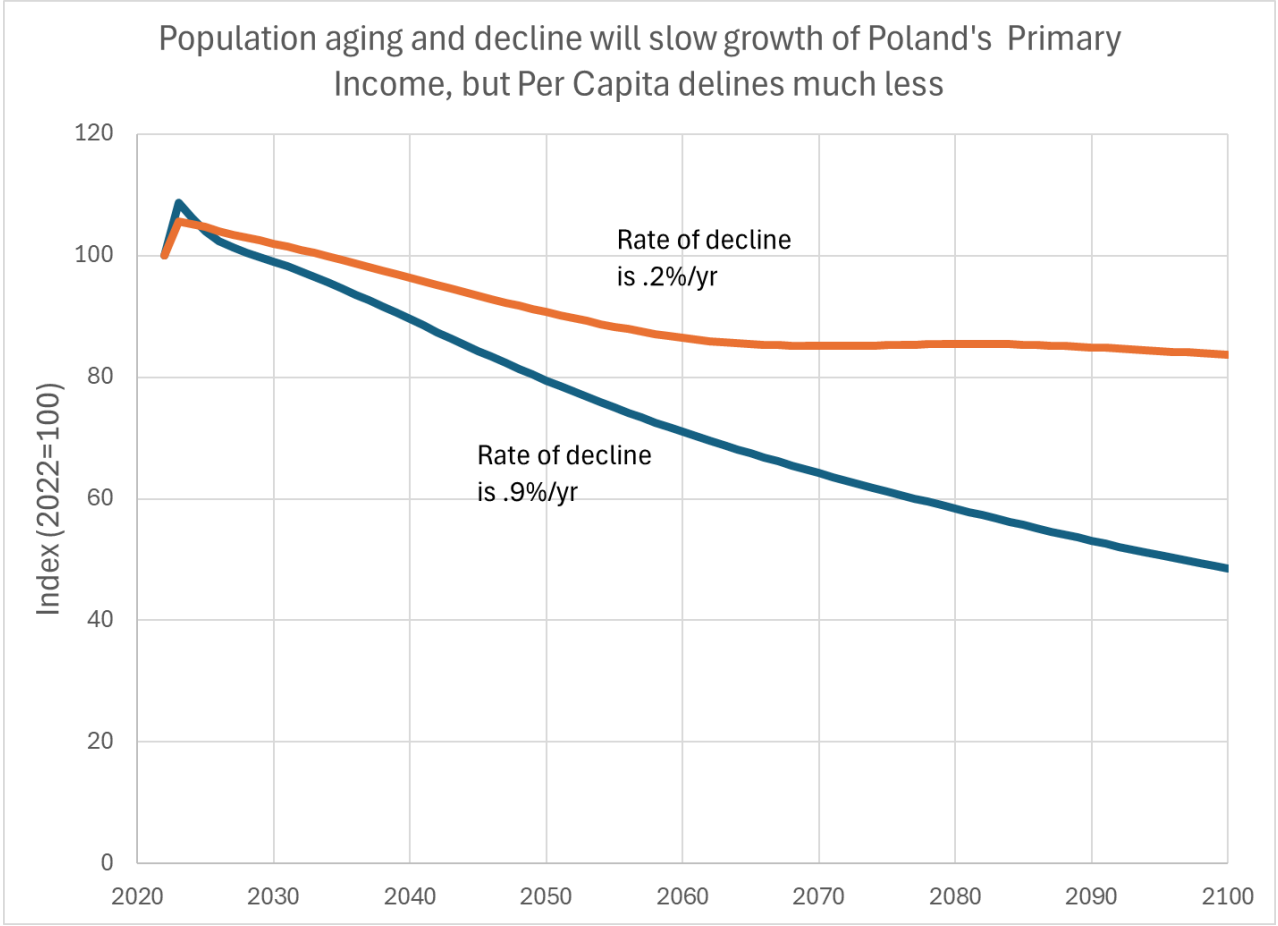
Under open economy assumption.

Does not mean GDP will decline.

Means if it would have increased by 4%/yr without population aging and decline, then with pop aging it will increase only 3.1%/yr.

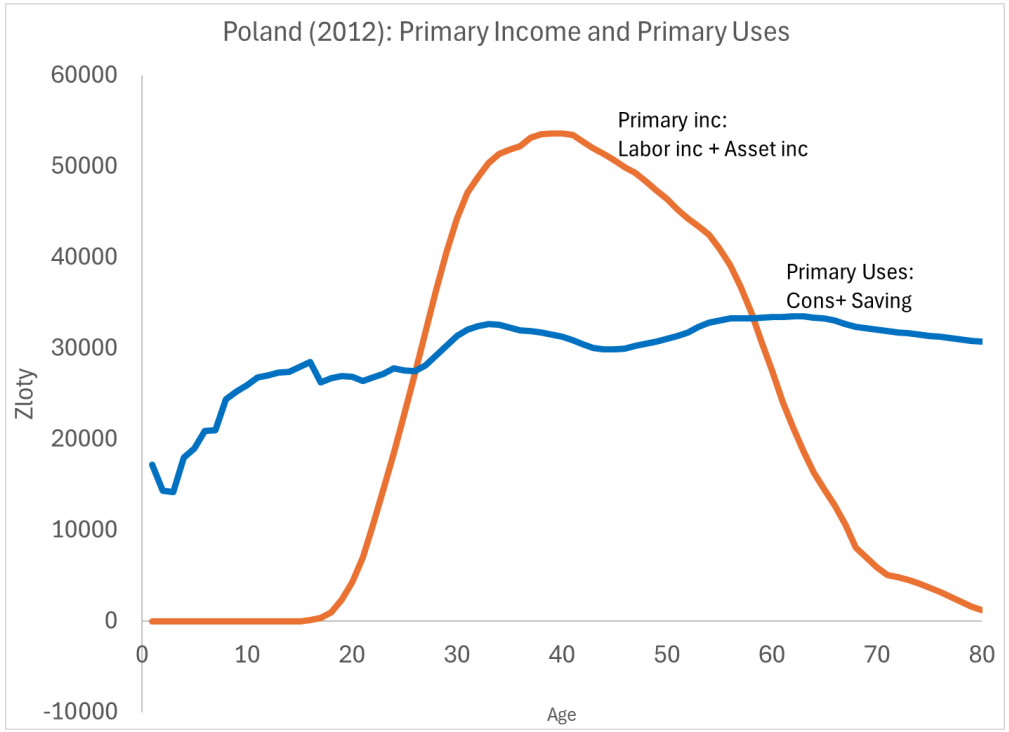


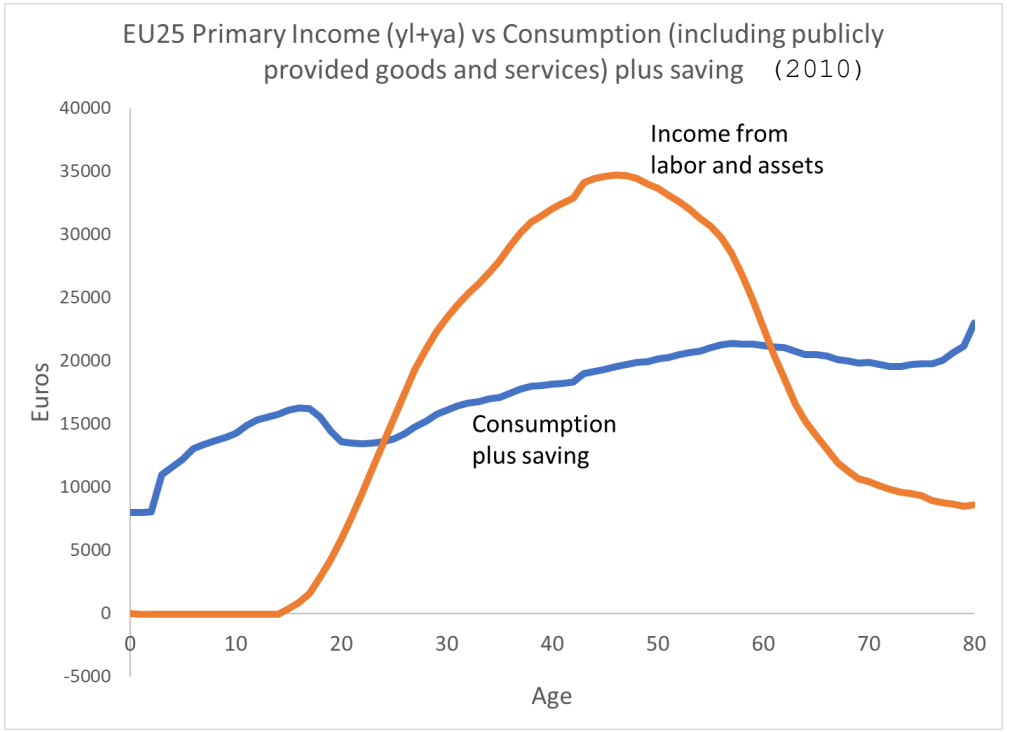
GDP will grow only .2%/yr slower than otherwise



4. Intergenerational redistribution

Primary income and primary uses by age



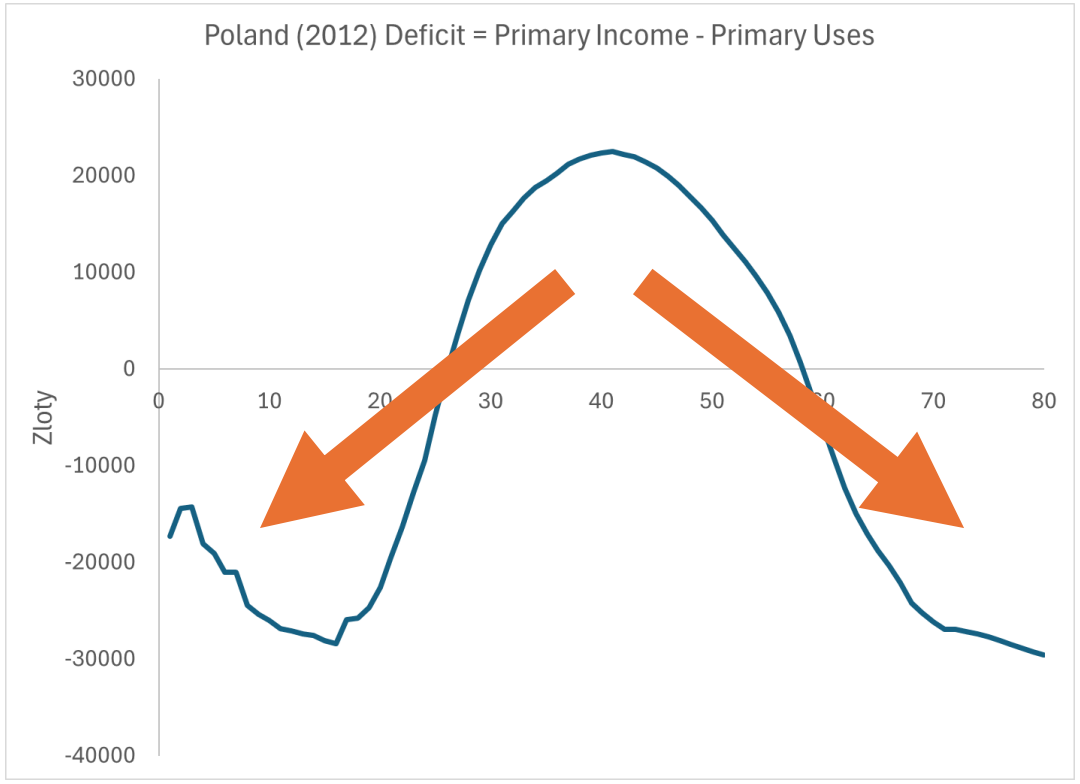


Gaps in childhood and old age are greater for Poland than EU

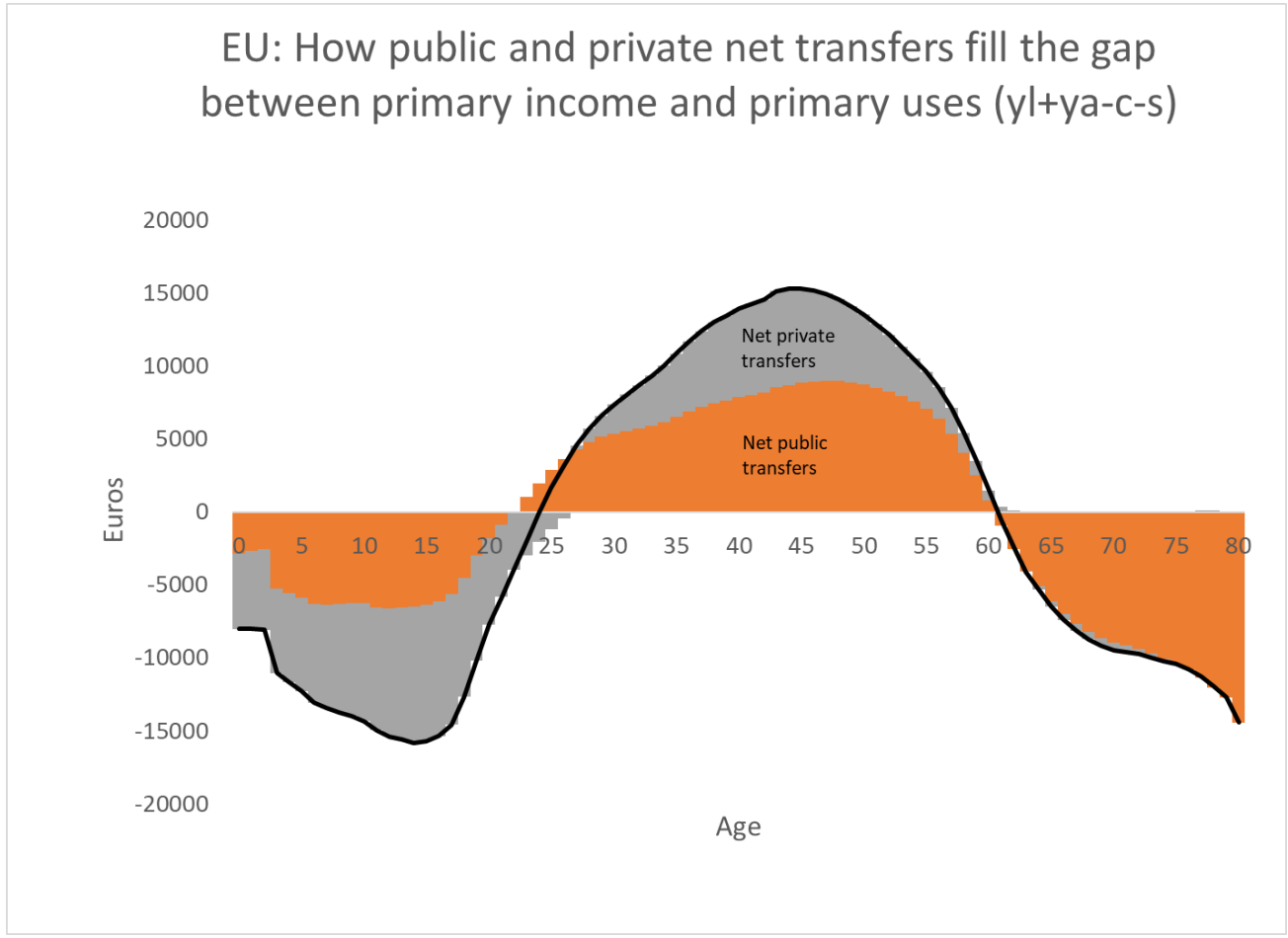
Cost of population aging will be greater in Poland, but savings from fewer children will also be greater.

Secondary redistribution of primary income

Gaps between primary income and primary uses are filled by public and private net transfers.
Public: education, pensions, healthcare, assistance, etc.
Private: costs of rearing children, help to or from elderly parents, etc.



How public and private transfers filled the gaps in EU 2010



How consumption is paid for at ages 65+ strongly affects the impact of pop aging

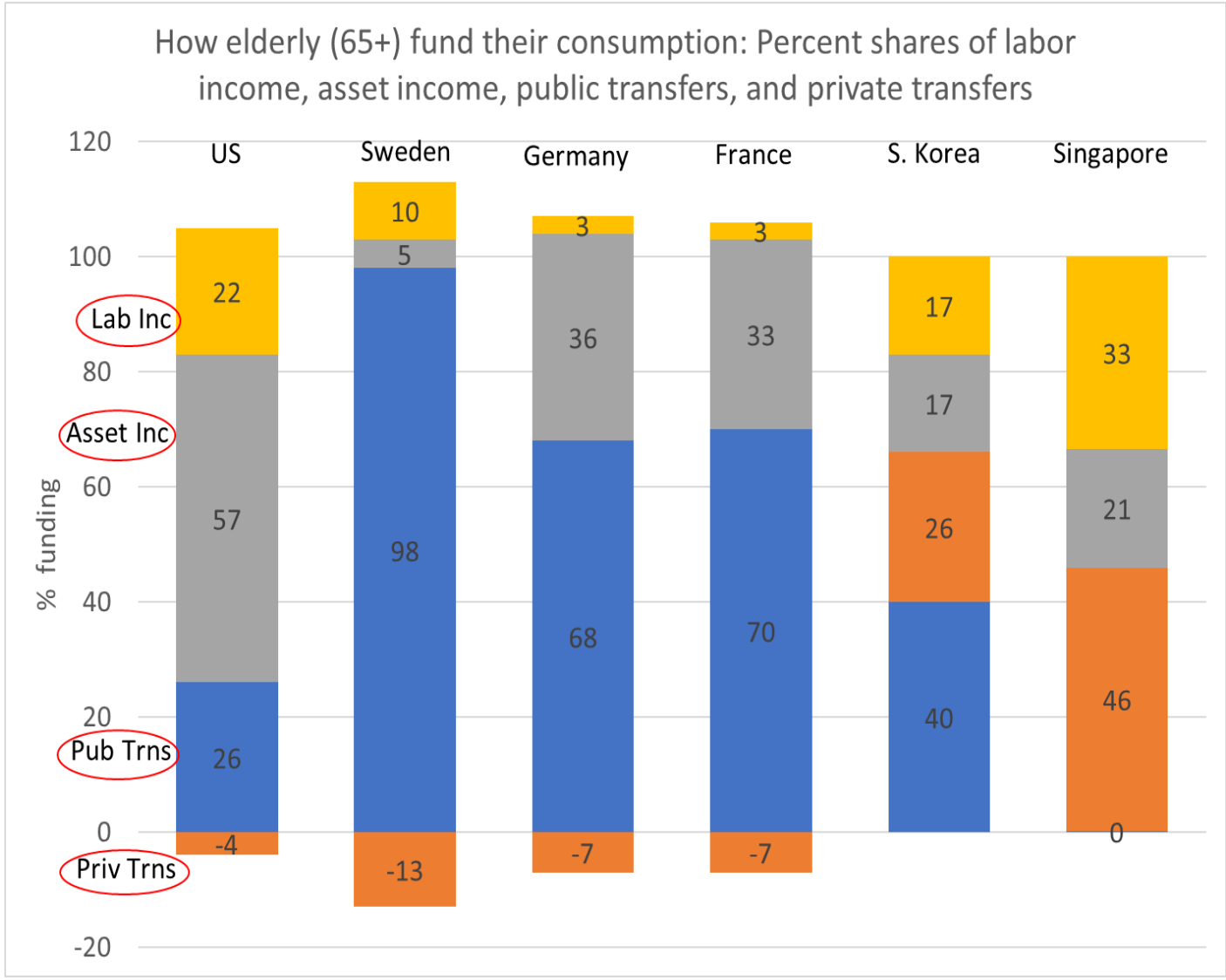
US public pension costs 5% gdp.

EU costs 13% of gdp.

Hungary 7% of gdp.

Poland (2023) 11% of gdp.

IMF says would rise to 17% by 2050 if benefit structure kept.

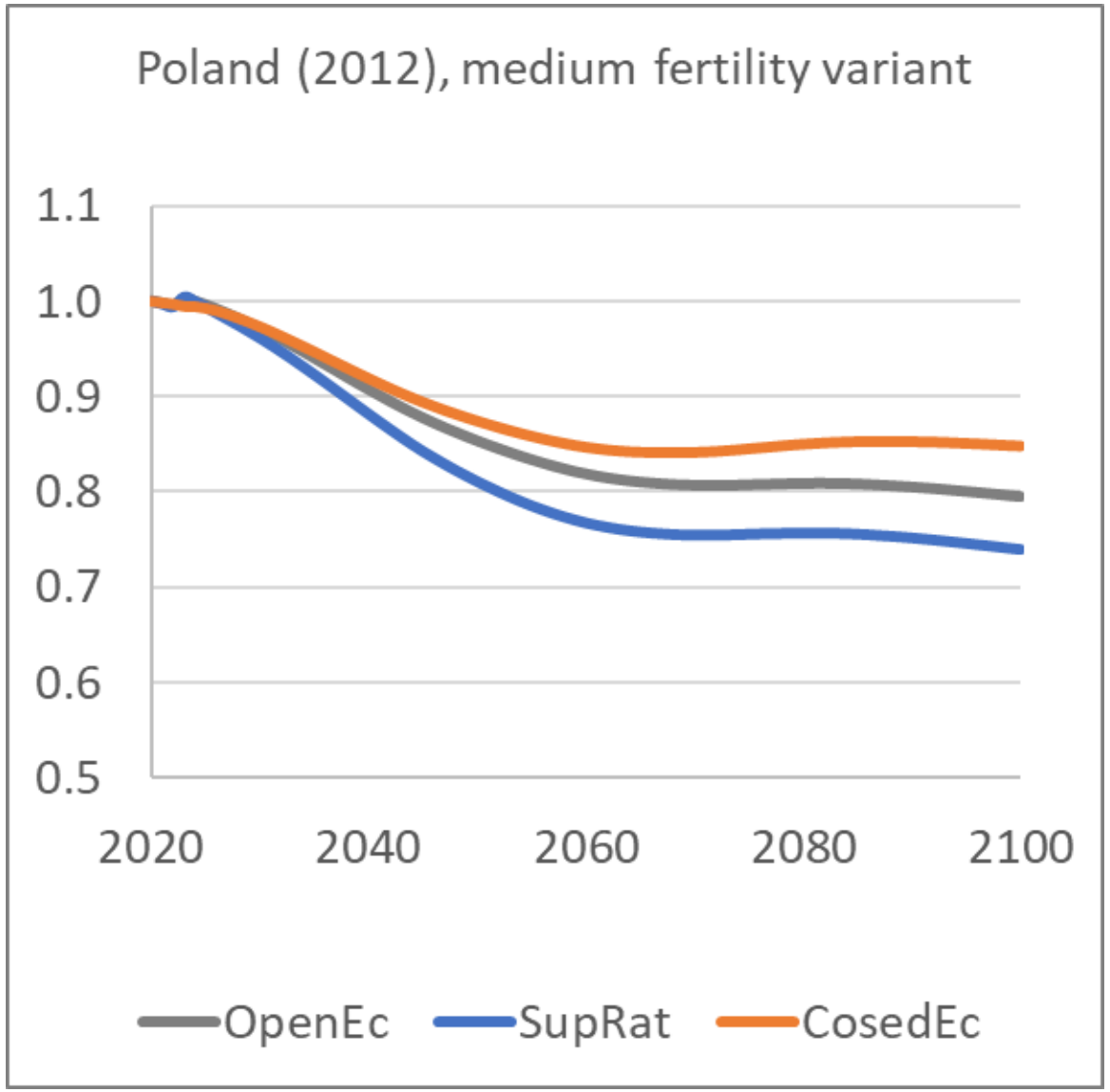


6. The costs of population aging in Poland and other countries and the EU

equivalent consumer by three measures under medium fert scenario

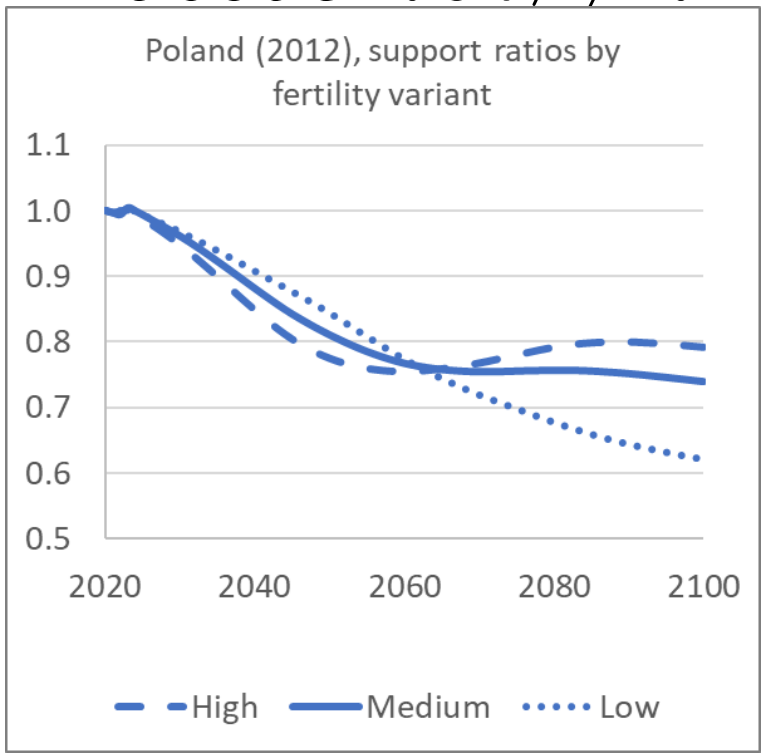
Rising asset income partially offsets cost of rising old age dependency.

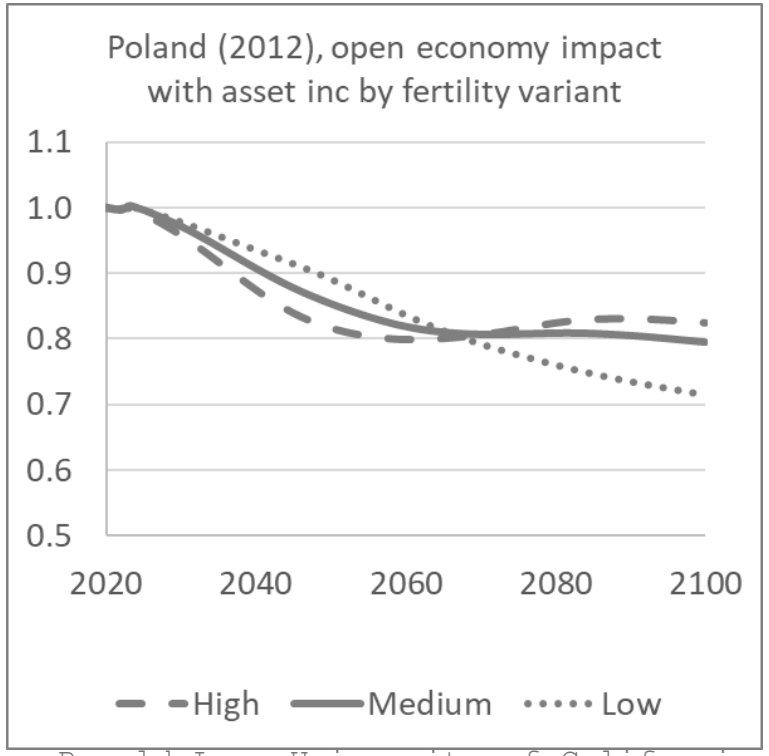
Effect is strongest under closed economy assumption.

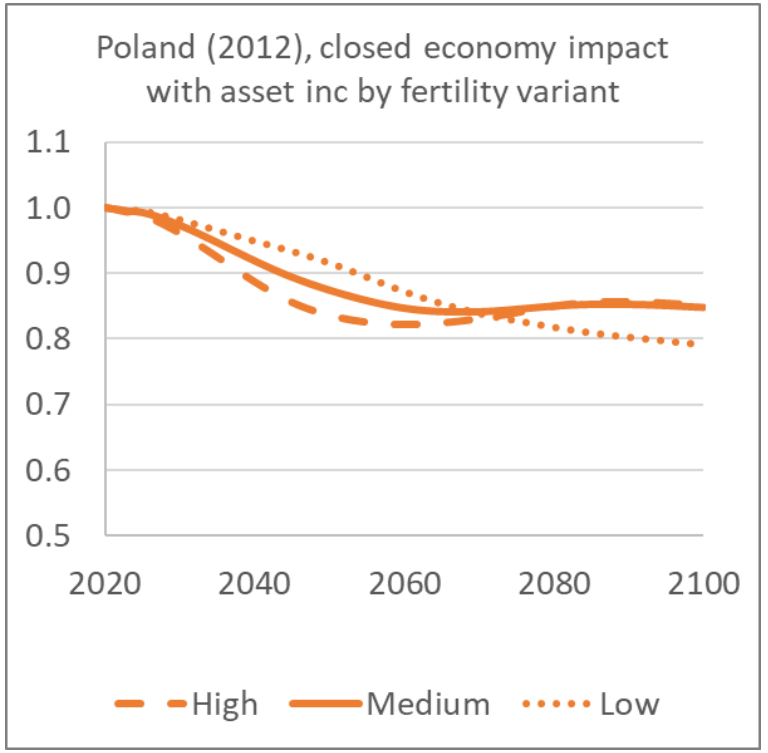


In all cases, lower fertility is beneficial for the first 40 to 50 years, after which higher is better.

Asset income reduces the impact of fertility and pop aging.
Polish decline to 2060 with asset income is about .5%/yr.





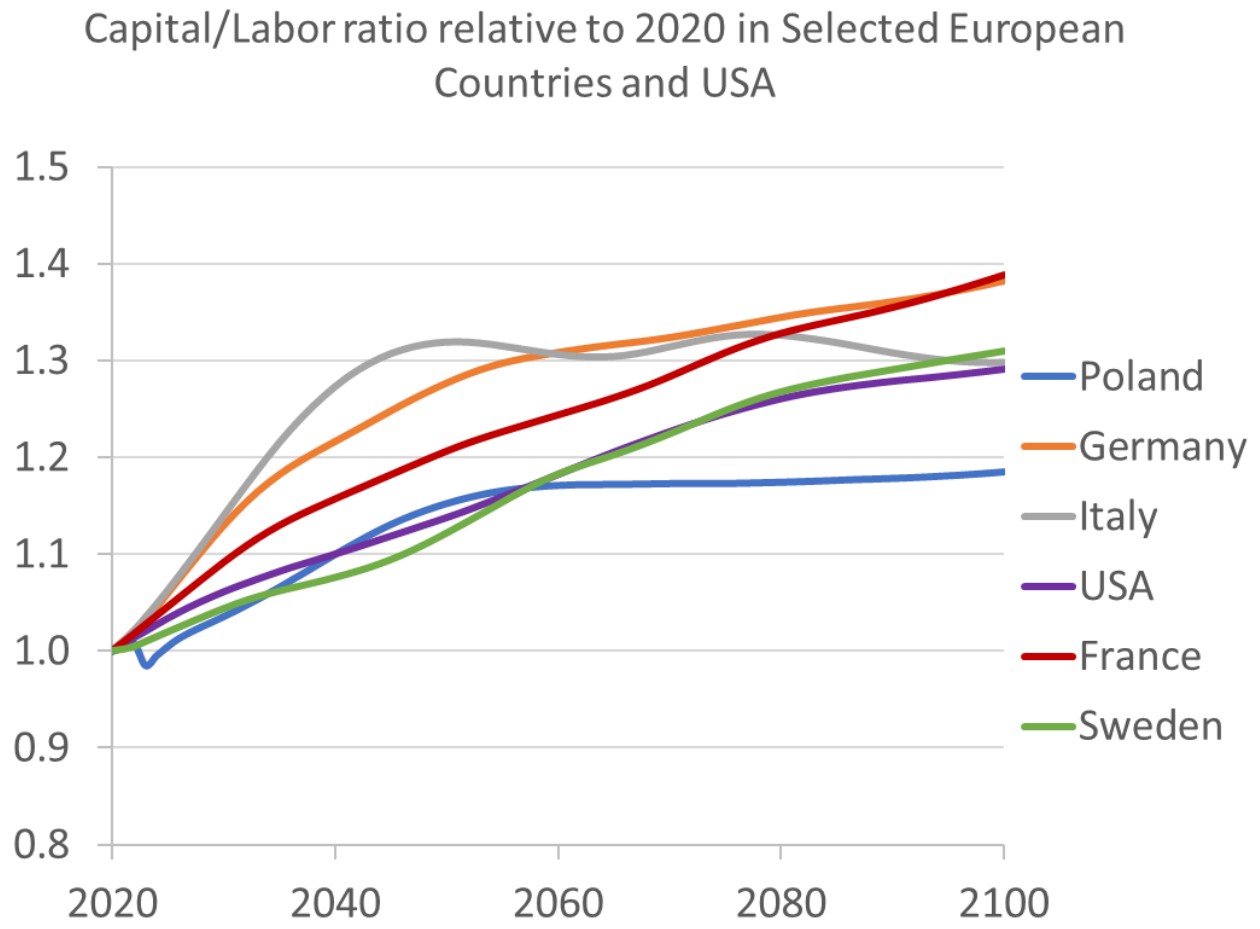


All three measures drop more with pop aging than does per capita income.

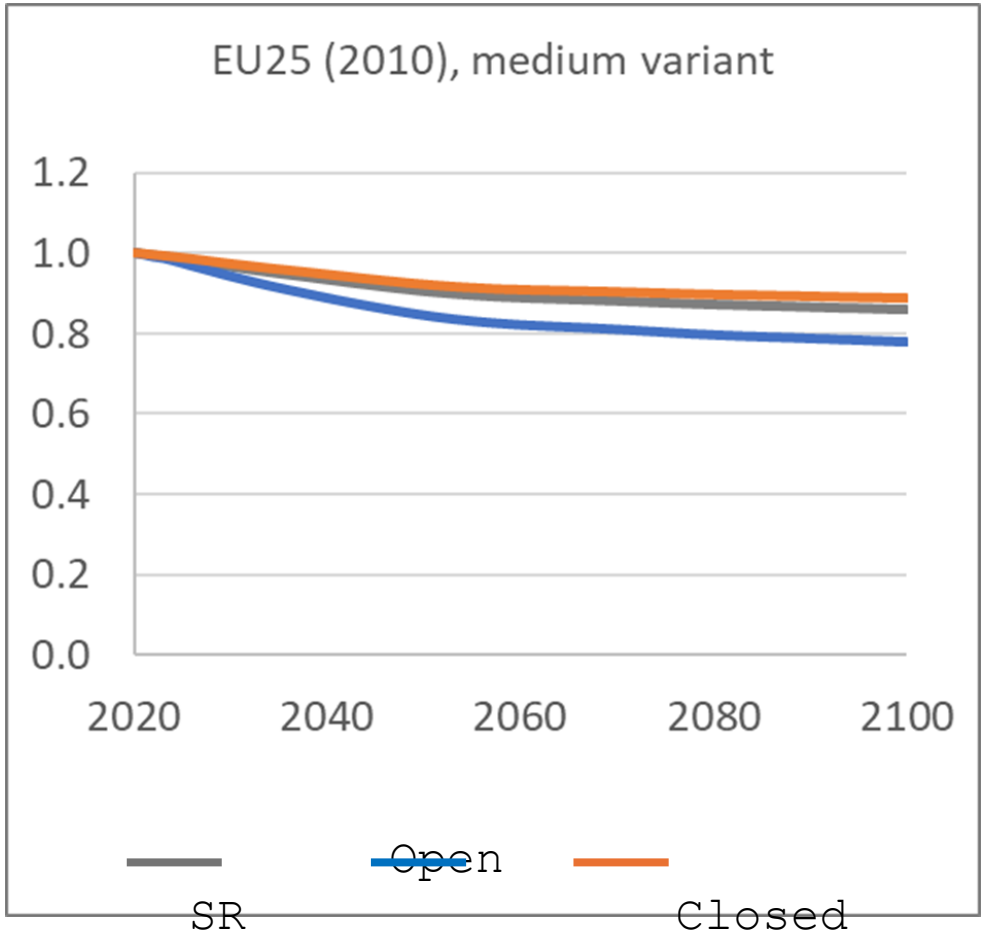
- Per capita income measure counts each person in the denominator with an equal weight of 1.0.
- These measures have equivalent consumers in the denominator, weighted according to their current consumption by age.
  - Elderly consume much more than children, so population aging has a greater effect.

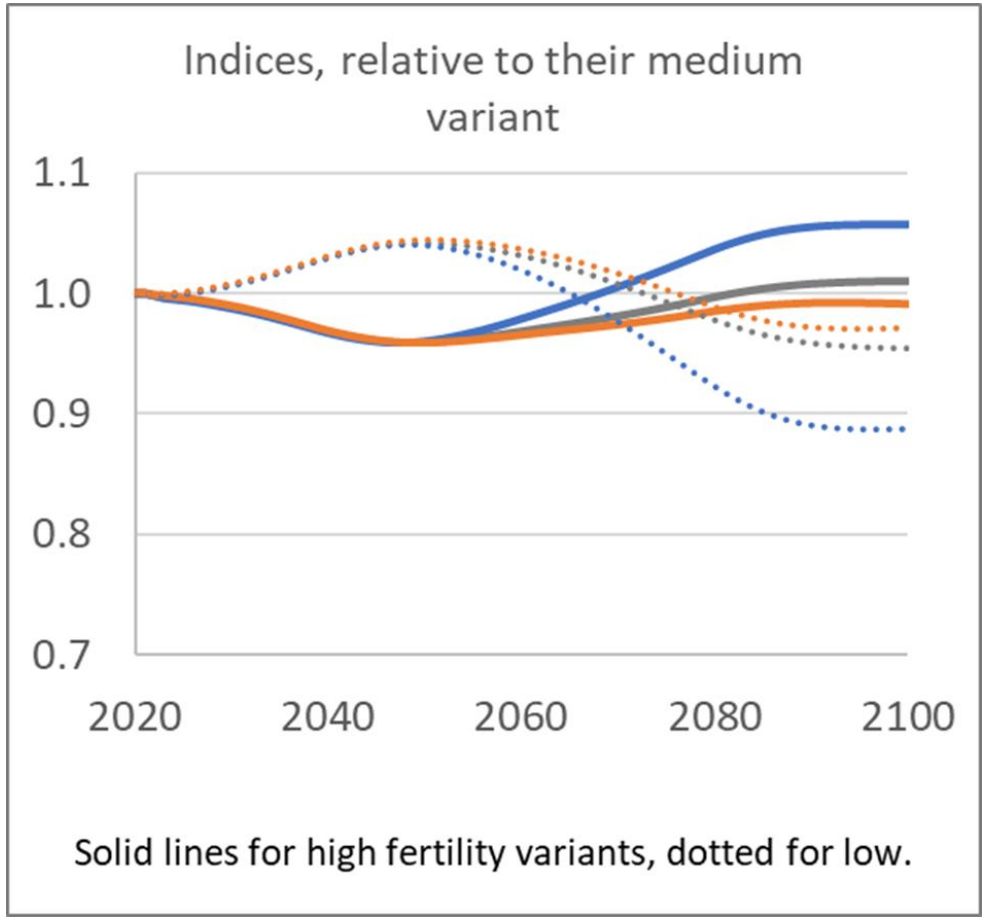
Impact of pop aging on Capital/Labor ratio depends on

- How much a country ages
- Whether elderly have more assets/capital than younger pop.
- Poland will age a lot, but the elderly hold little assets/capital.

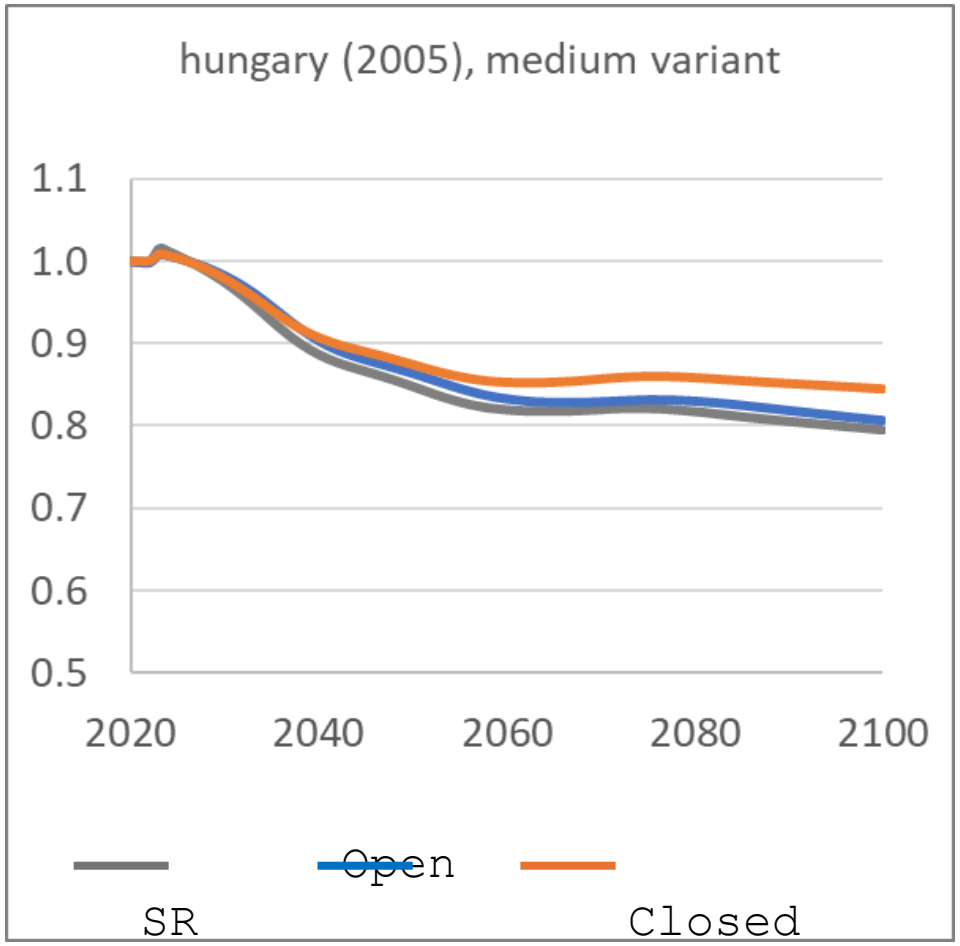


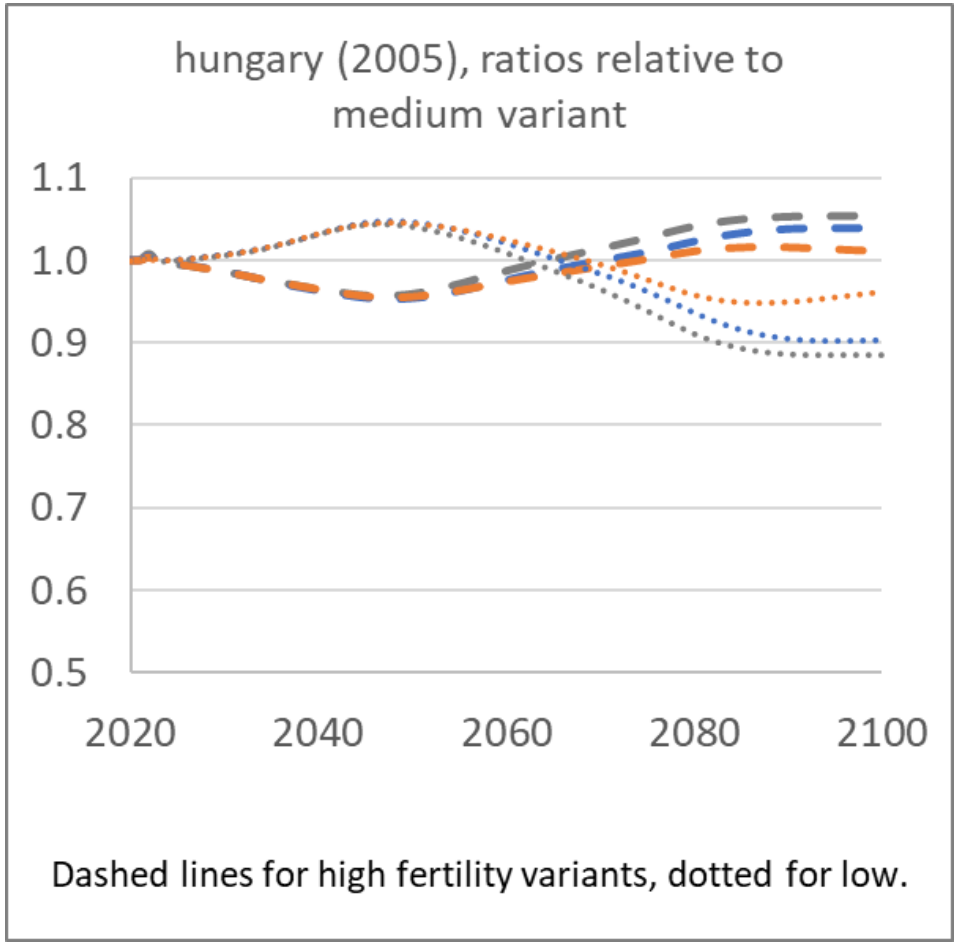
Europe: TFR=1.40 (2023)
Support ratio drops 22% by 2100, but with asset inc, drops only 10 or 11%.
With asset inc, lower fert is beneficial for 75 years!



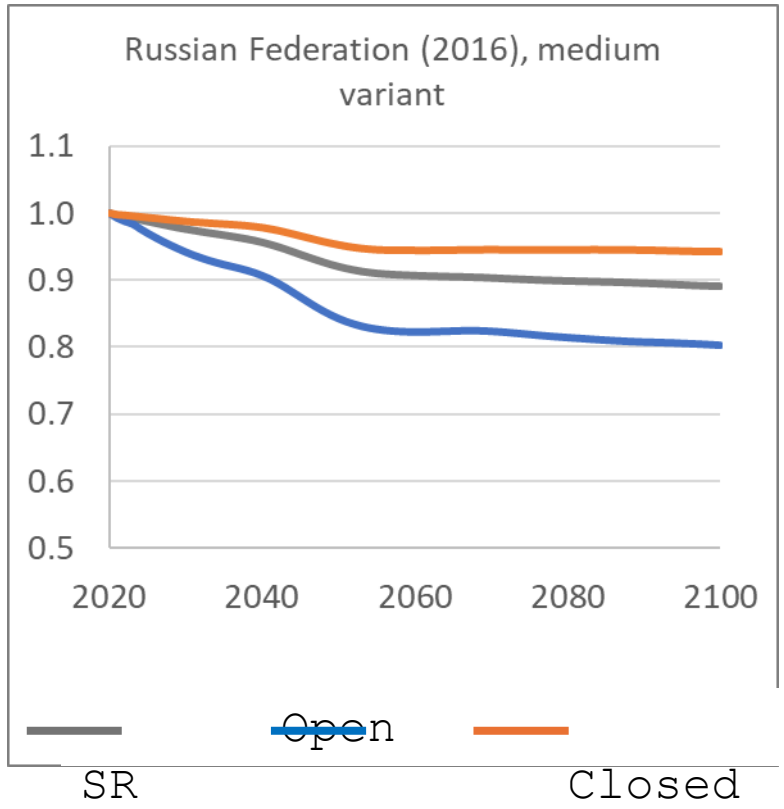


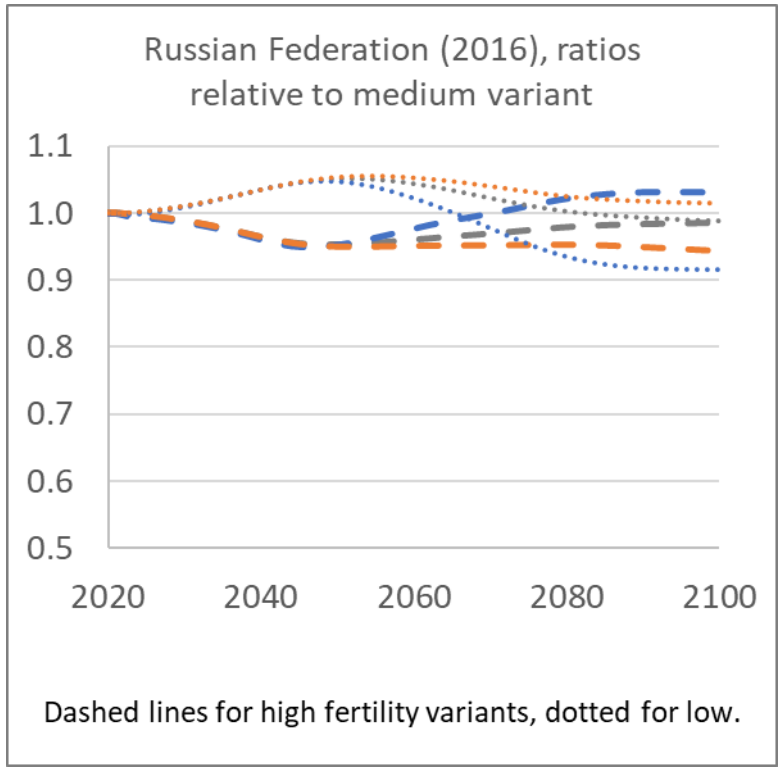
Hungary: TFR=1.49 (2023) Decline is .4% to .5% to 2060.



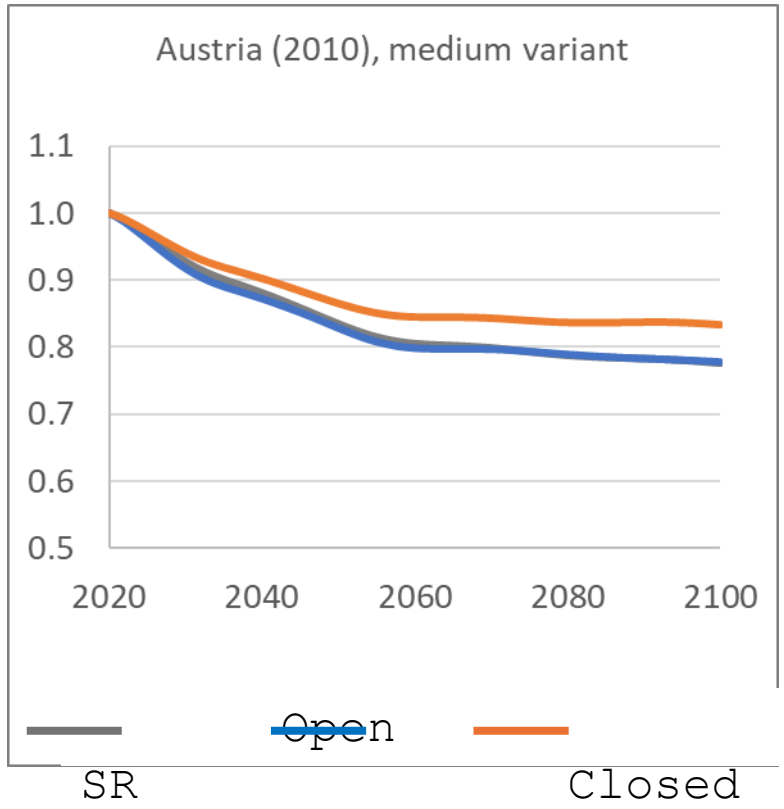


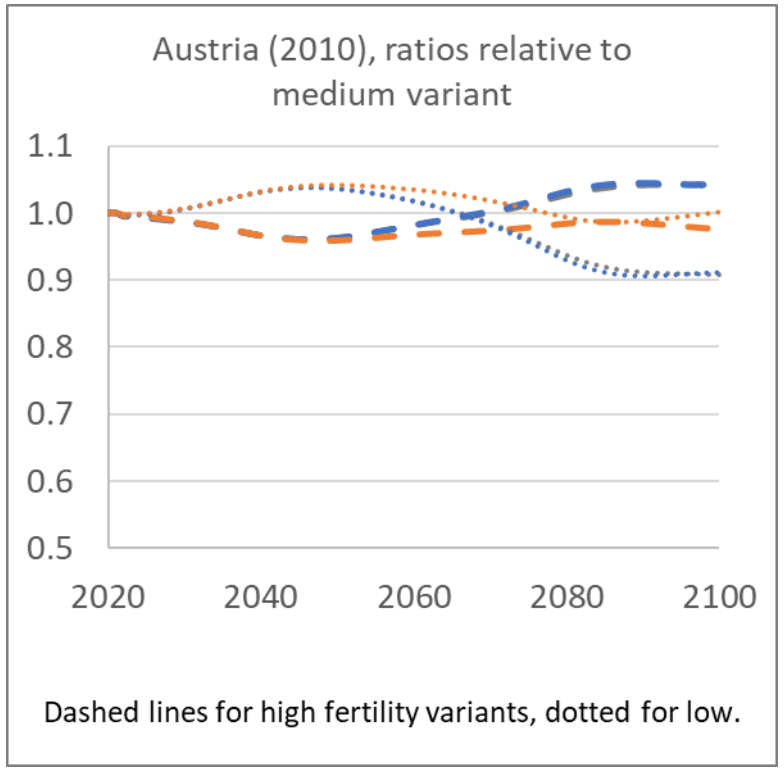
Russian Fed: TFR=1.45 (2023) Modest impact with asset income.



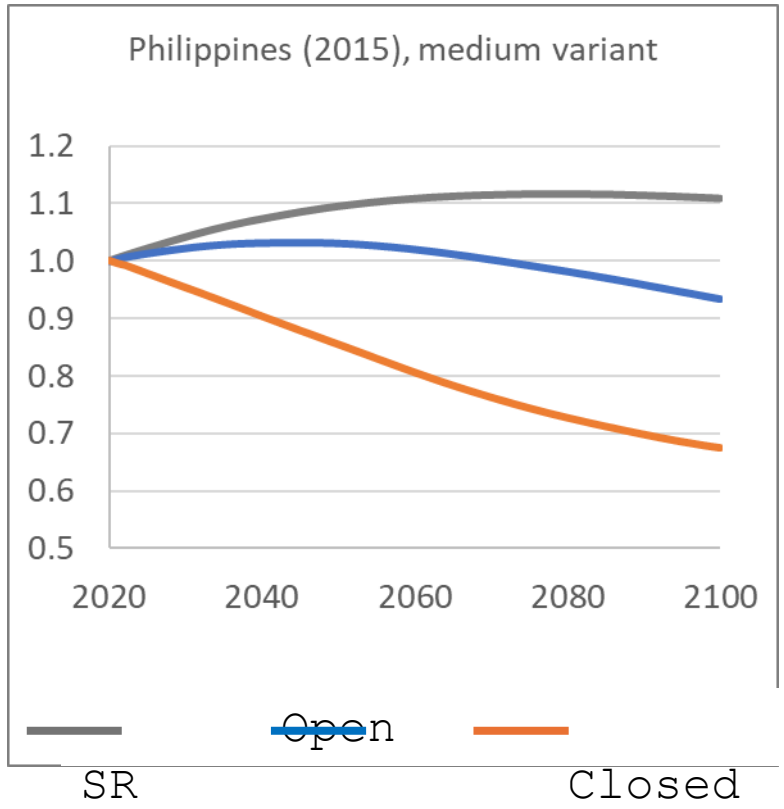


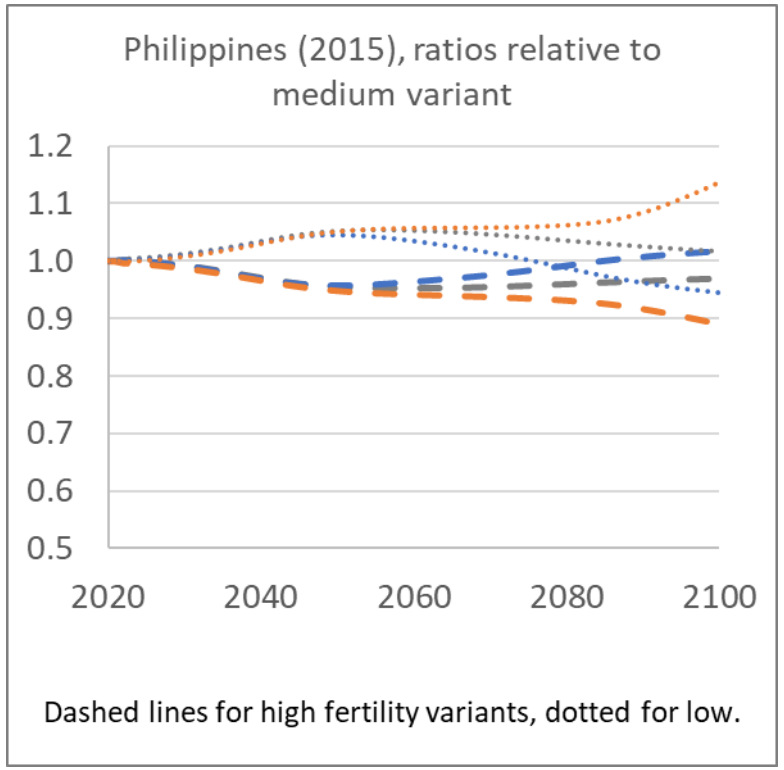
Austria: TFR=1.32 (2023) Nearly .5%/yr decline to 2060.



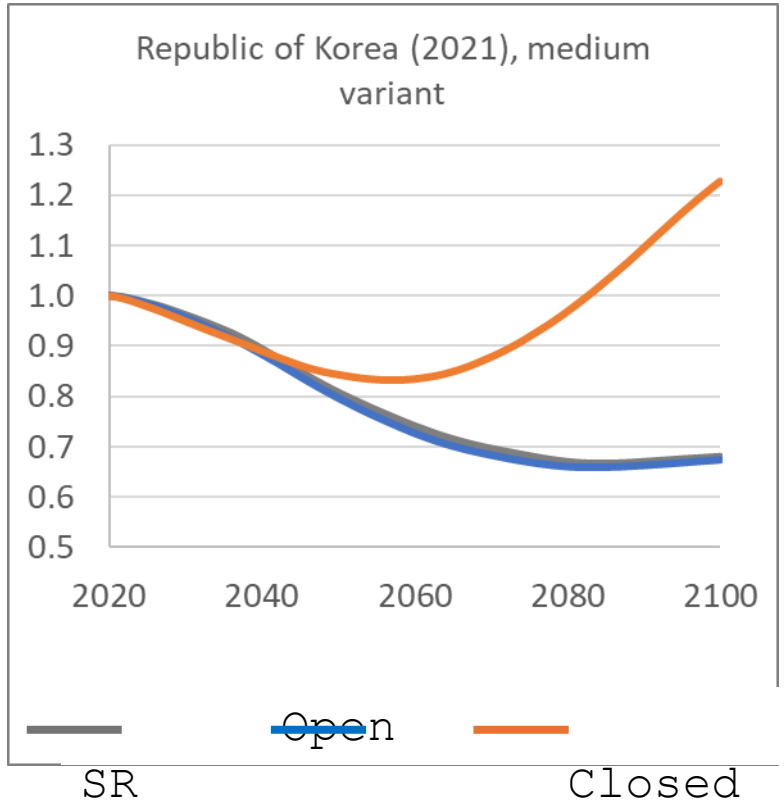


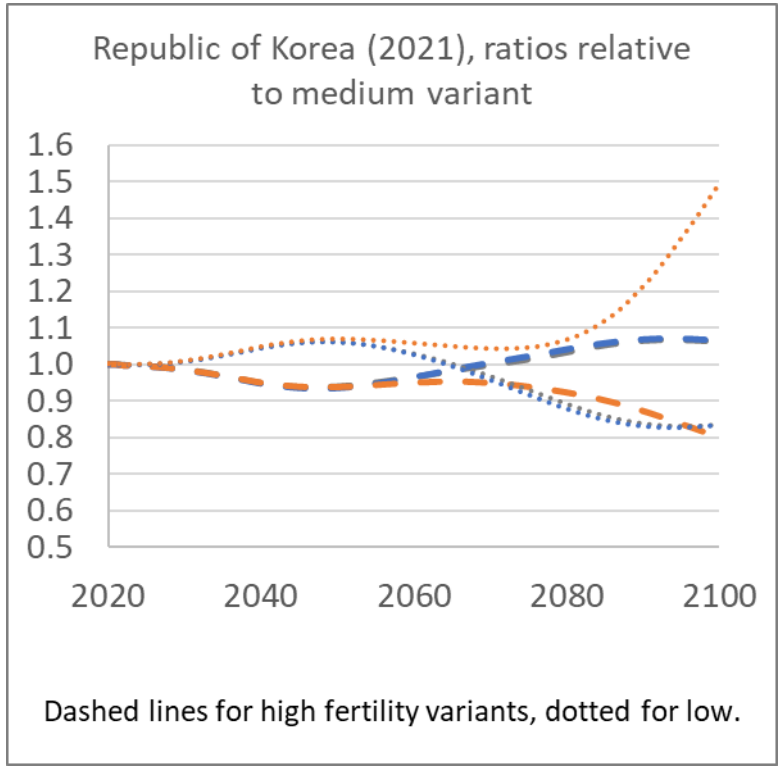
Philippines. TFR = 1.92 (2023)
The SR shows demog div followed by pop aging.
The GSR with open econ asset inc, shows sustained demog div.
The Impact Index with closed econ shows decline due to falling ret to assets.



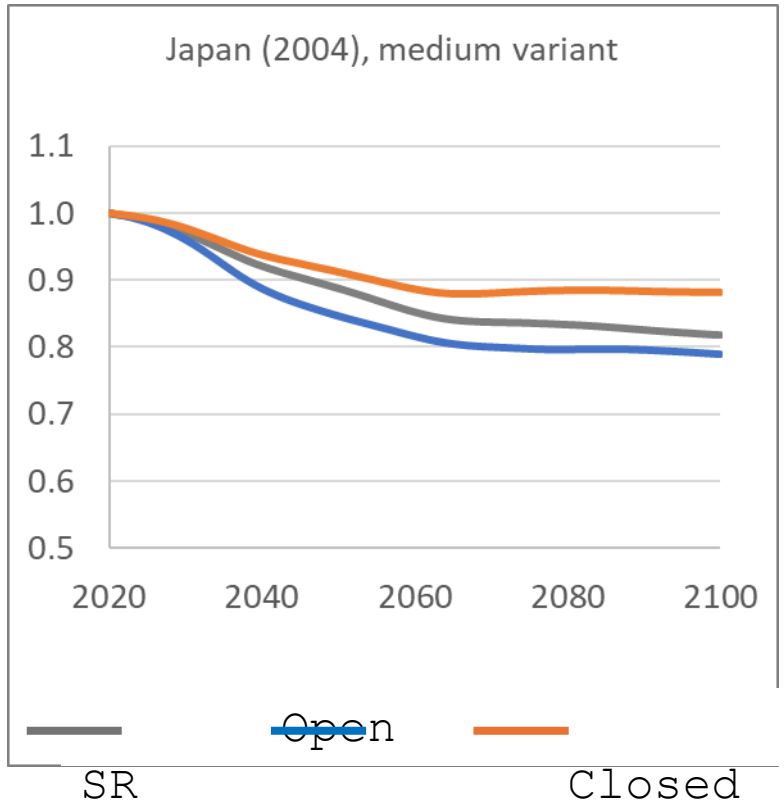


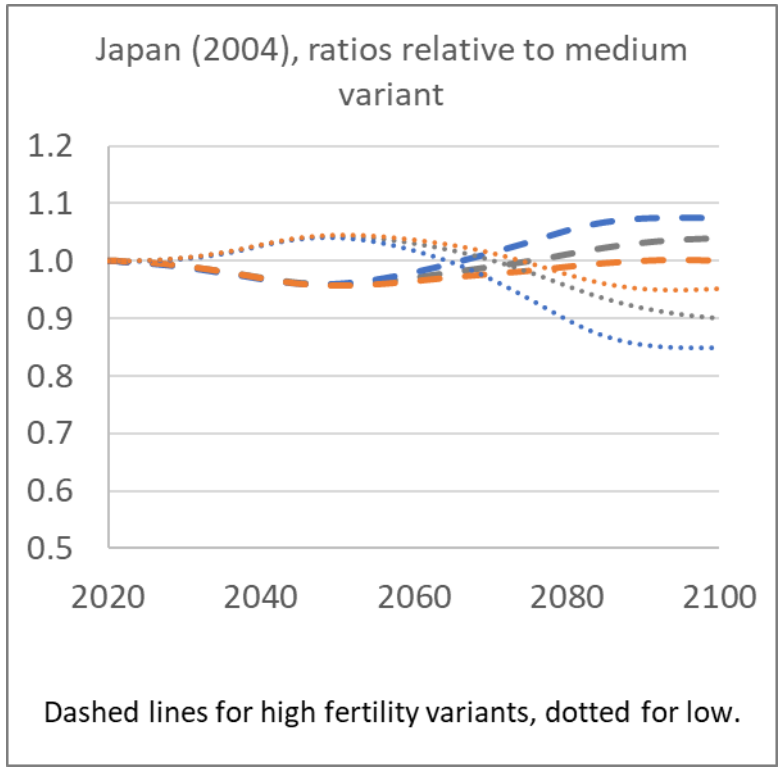
Republic of Korea. TFR = .72 (2023)
Both SR and GSR (open economy) show deep decline. .5%/yr to 2080.
The closed economy impact index shows first decline, then rise.
Assets become so abundant they effectively substitute for the little labor.





Japan: TFR=1.21 (2023)





8. Summary/Conclusions

- In most cases population aging does not appear to be an overwhelming problem, reducing per capita consumption growth through 2060 by only .1 to .3% per year, or .8% per year for S. Korea. Task is to adjust our culture, policies and behavior to the new realities of lower fertility and a longer and healthier life. We have choices.
- Some may choose to maintain current public transfers and retirement age. This will require major increases in already high taxes for transfers, and reduced consumption throughout life to enable a long period of leisure in old age. Possible dead weight loss in efficiency and intergenerational resentment.
- My personal view is that primary income of the elderly should be increased through work until older ages and increased saving so transfers are

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