Macroeconomic Implications of China's Population Aging: A Dynamic OLG General Equilibrium Analysis

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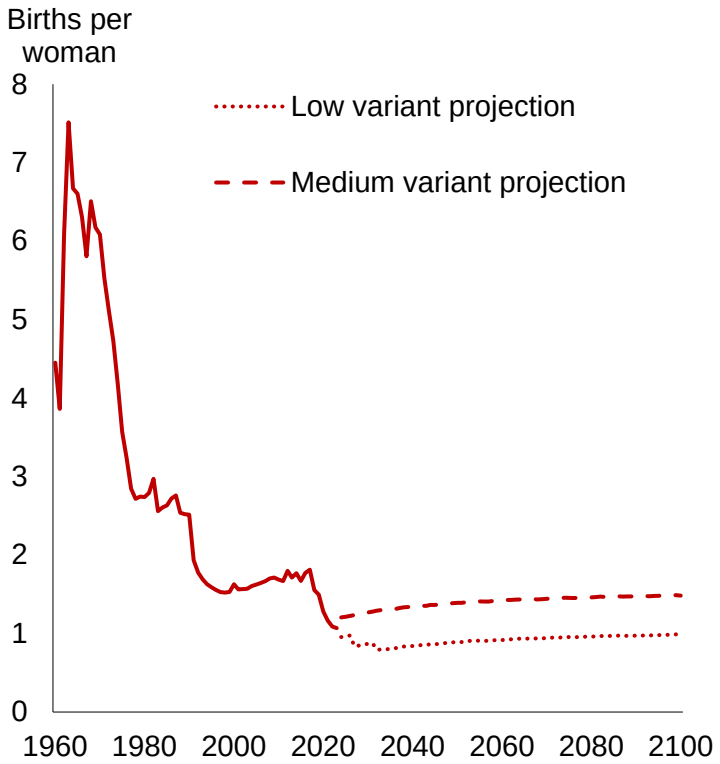
AMRO

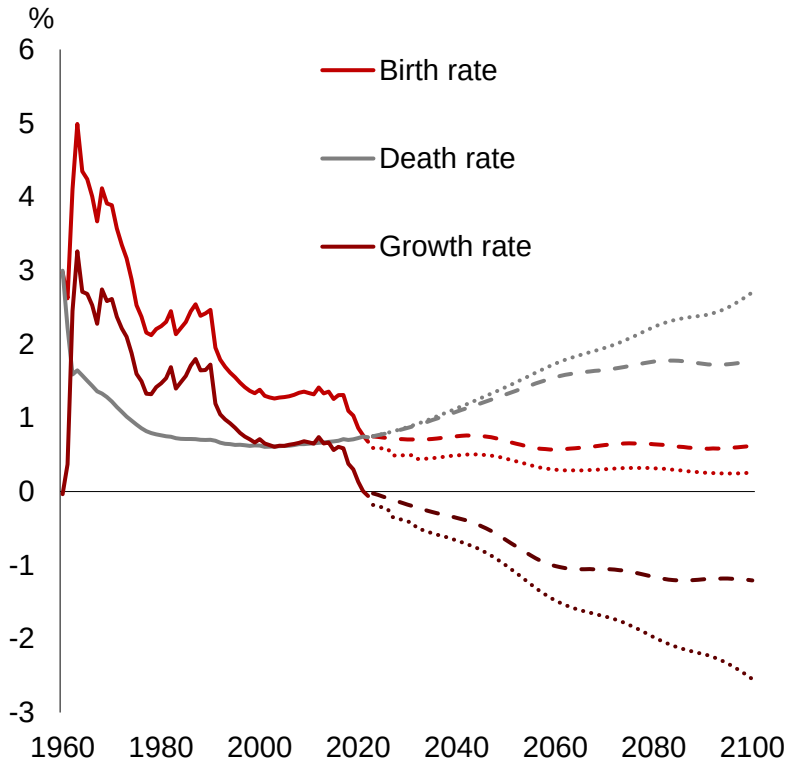
ASEAN +3 MACROECONOMIC RESEARCH OFFICE

China is experiencing dramatic demographic shift.

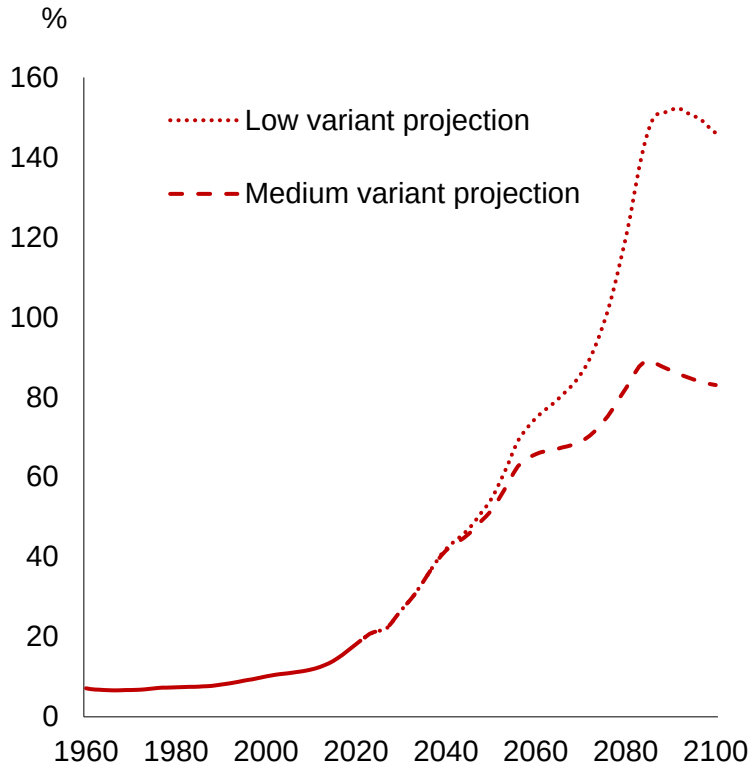
Total Fertility Rate



Population Birth, Death and Growth Rate



Old Age Dependency Ratio



Source：UN Population Statistics and Projections

Note: The dashed line represents medium variant fertility projection and the dotted line represents low variant fertility projection

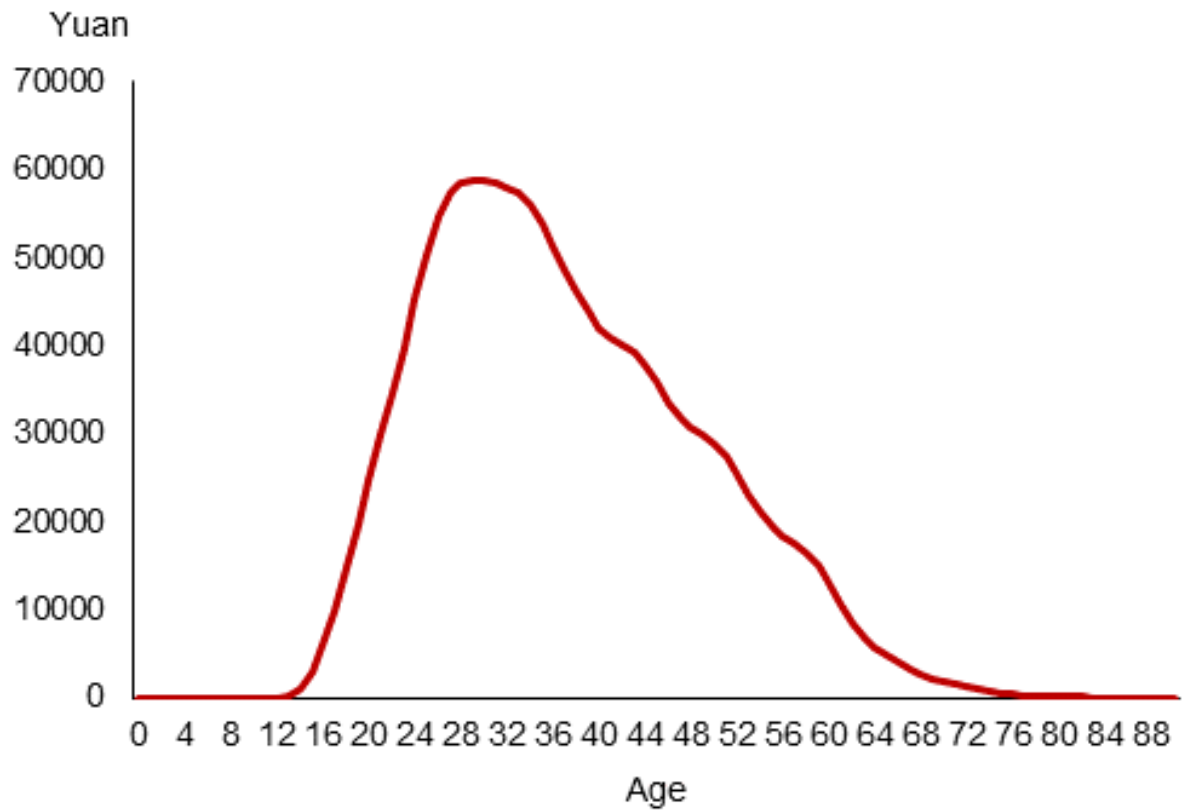
What will be its macroeconomic impacts?

- A global computable general equilibrium model with overlapping generations (OLG) is employed to investigate the impact of China's population transition on economic growth, saving and other macroeconomic variables.
- The UN's medium and low variant population projections for 2021-2100 are incorporated as the demographic shocks.
- They are contrasted with a hypothetical reference scenario that assumes a stationary population.

Key Features of the OLG Model

- Auerbach and Kotlikoff (1987) type OLG model: 70 generations with uncertain life spans
- Two regions: China and ROW
- Utility: Barro and Becker (1989) preference - parents derive their utility from both own consumption and their children's consumption
- Investment: Tobin's q
- Trade: Armington speification
- Pension: a stylized PAYG system

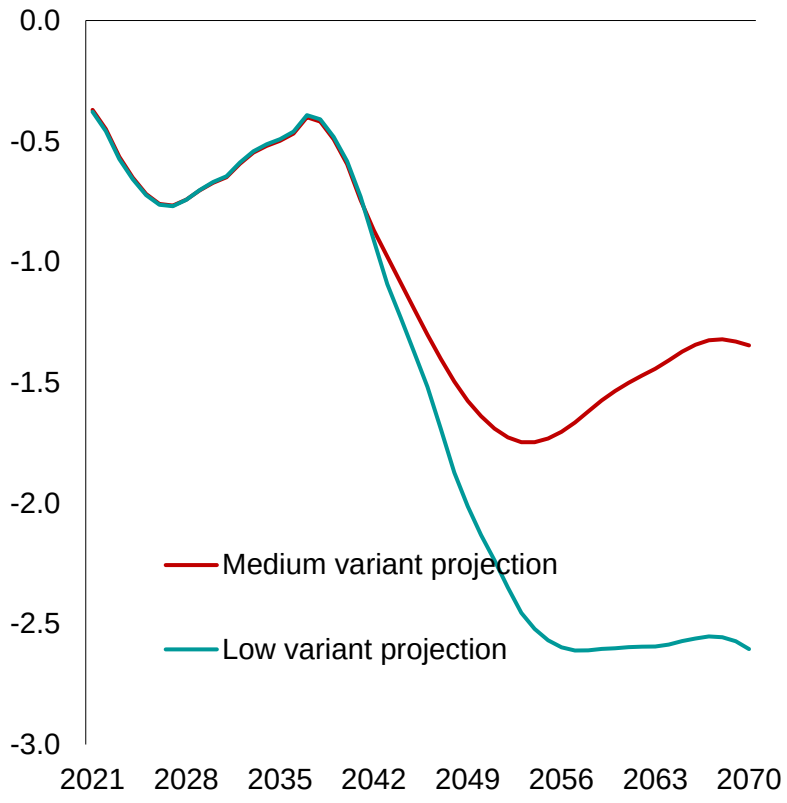
Labor Income by Age, China, 2014



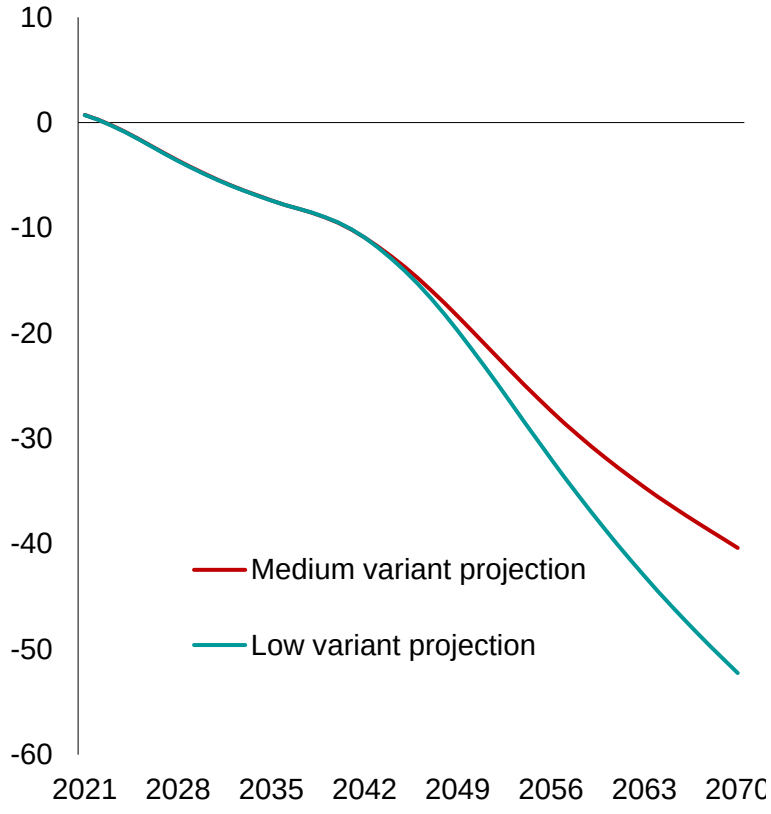
Source: National Transfer Accounts database

Slower GDP growth

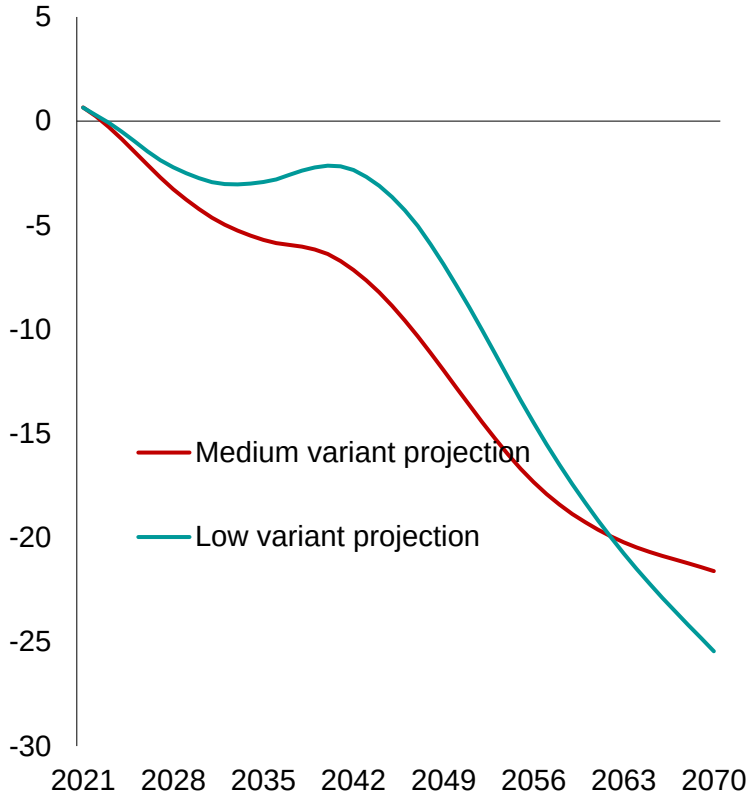
Real GDP Growth Rate
(percentage point change)



Level of Real GDP
(percent change)



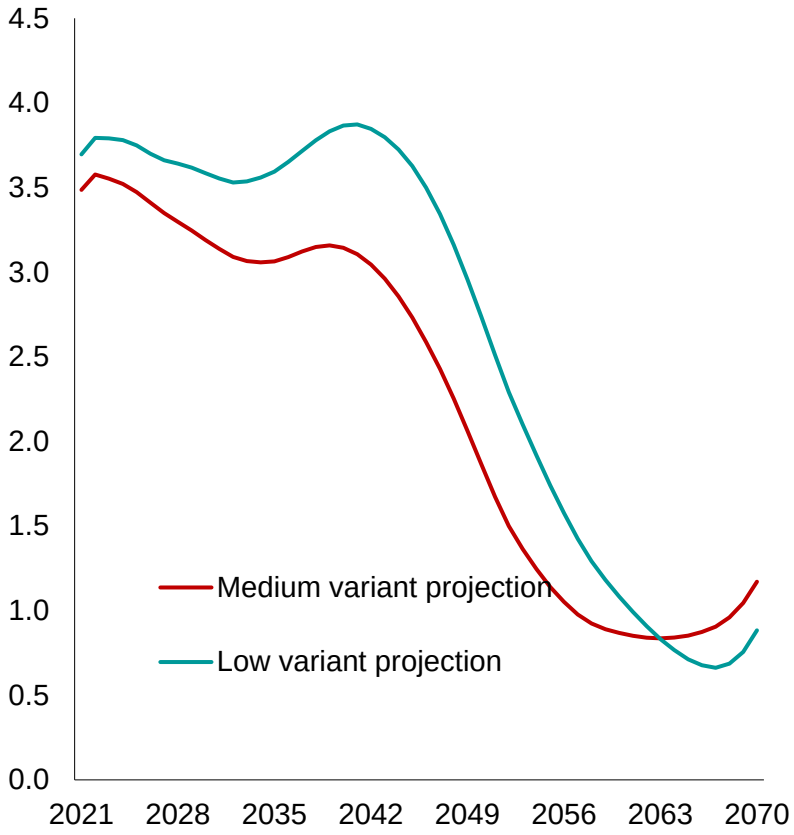
Level of per Capita Real GDP
(percent change)



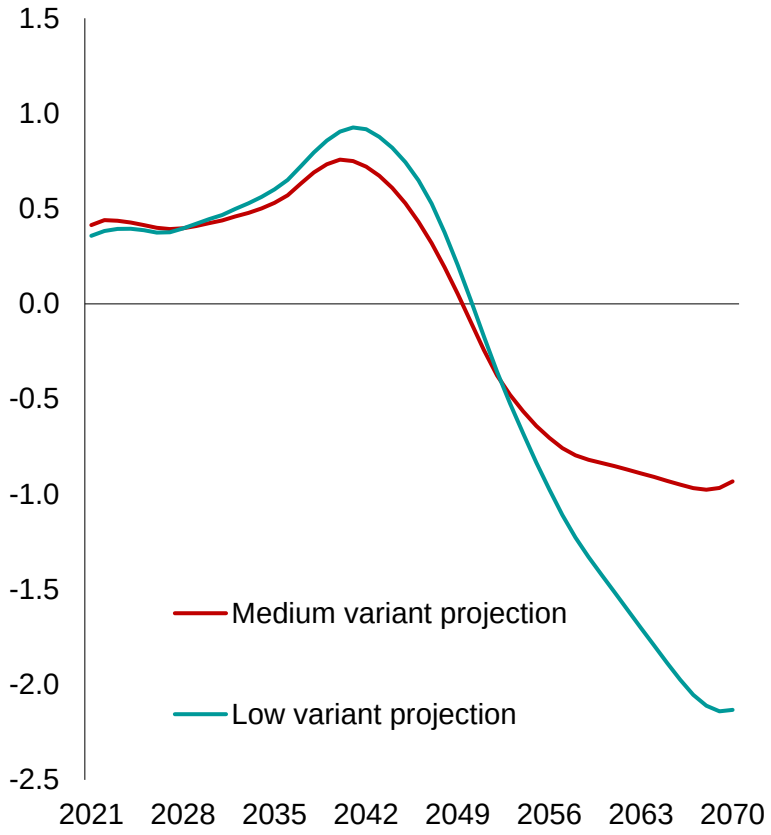
Source：Model Simulations

Higher saving, less investment and improved C/A balance

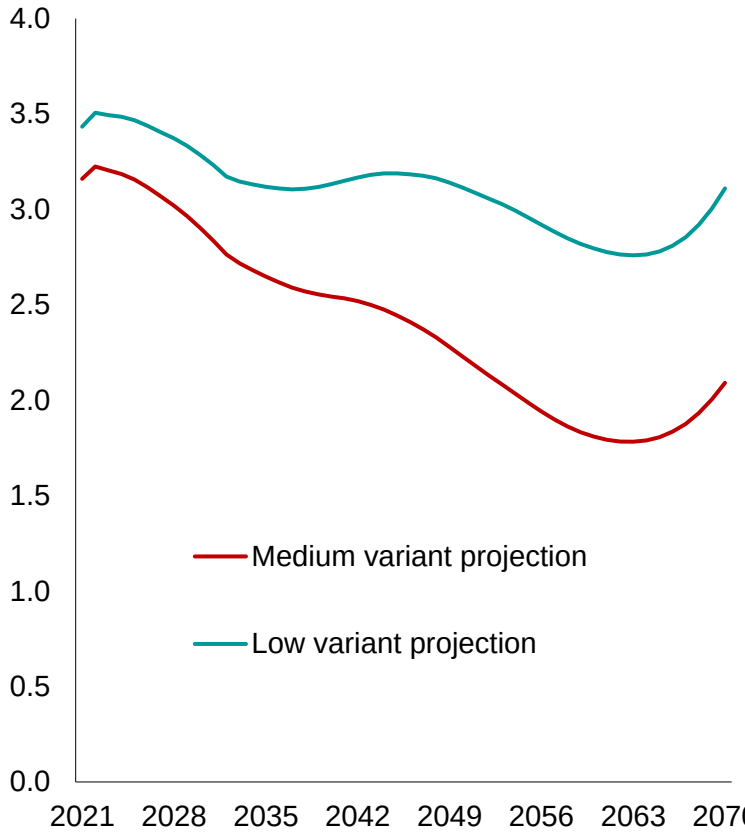
HH Saving
(change in percent of GDP)



Investment
(change in percent of GDP)



Current Account Balance
(change in percent of GDP)



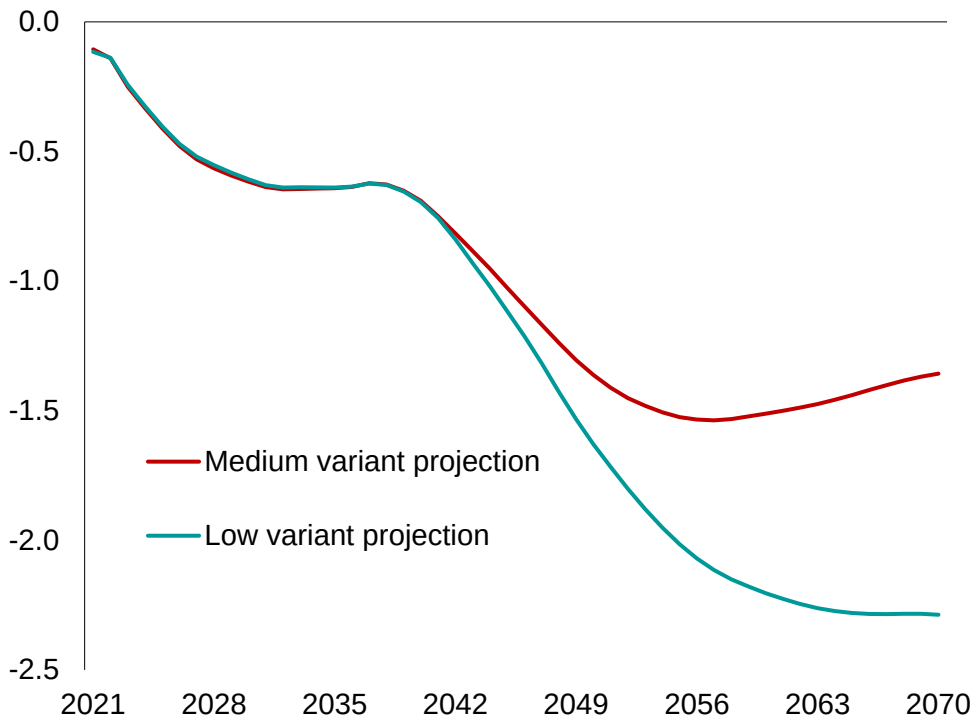
Source：Model Simulations

Decreased Interest rate

The decline in real interest rates contrasts with the arguments in Goodhart and Pradhan (2020) but is consistent with findings from other studies, including Kruger and Ludwig (2007), Carvalho, Ferrero, and Nechio (2016), and Auclert et al. (2021).

Real Interest Rate

(percentage point change)

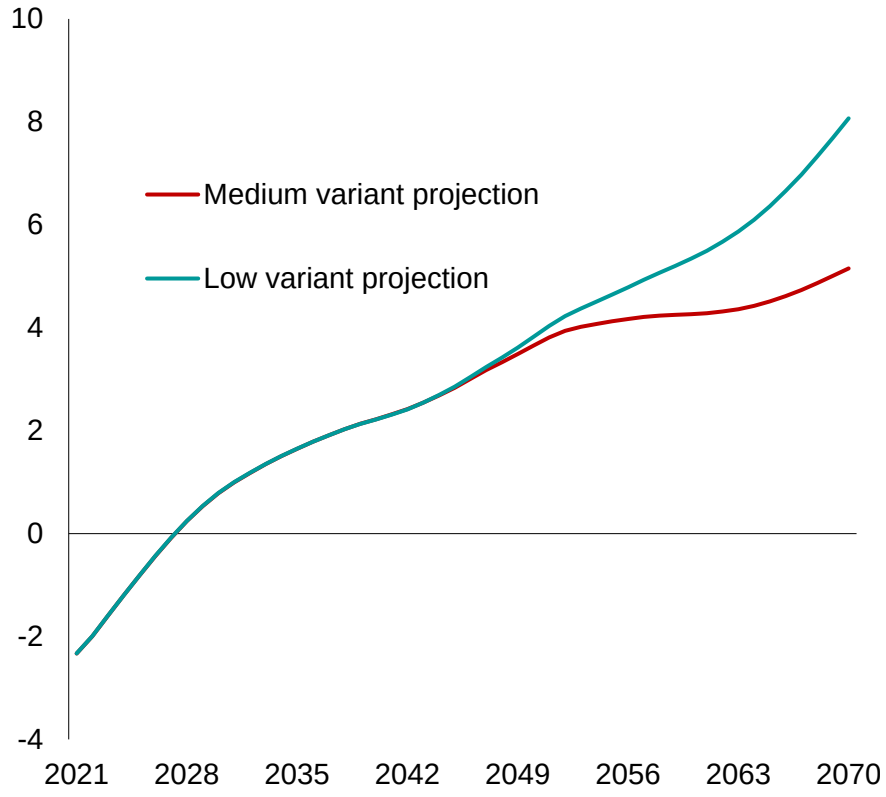


Source: Model simulations

Increased pension burden

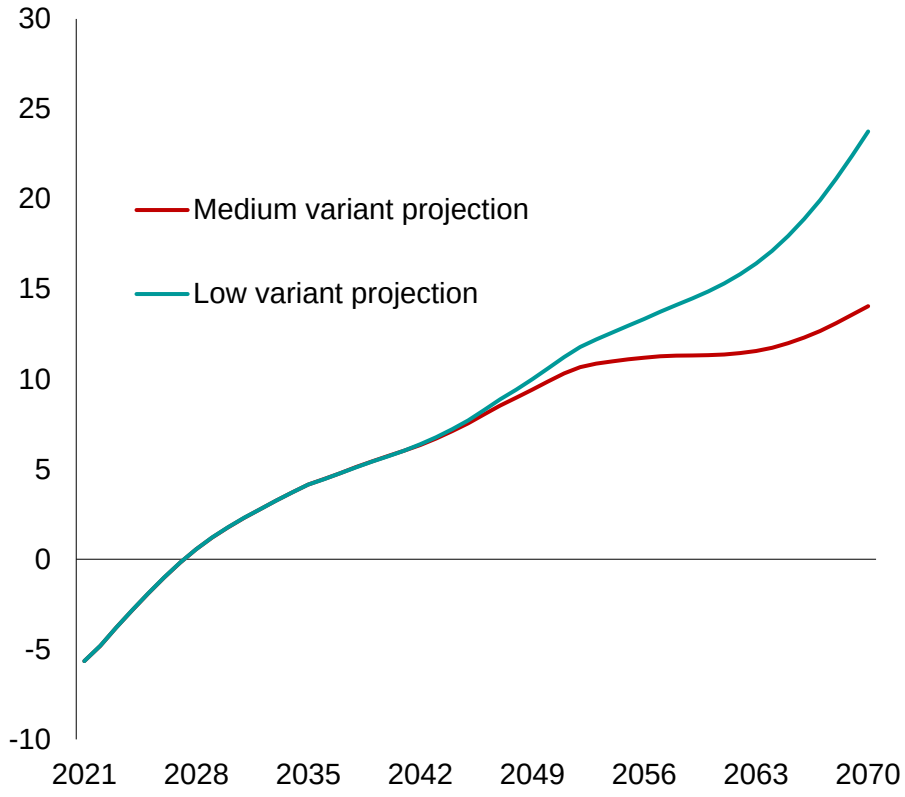
Pension Expenditure

(change in percent of GDP)



Pension Payroll Tax Rate

(percentage point change)

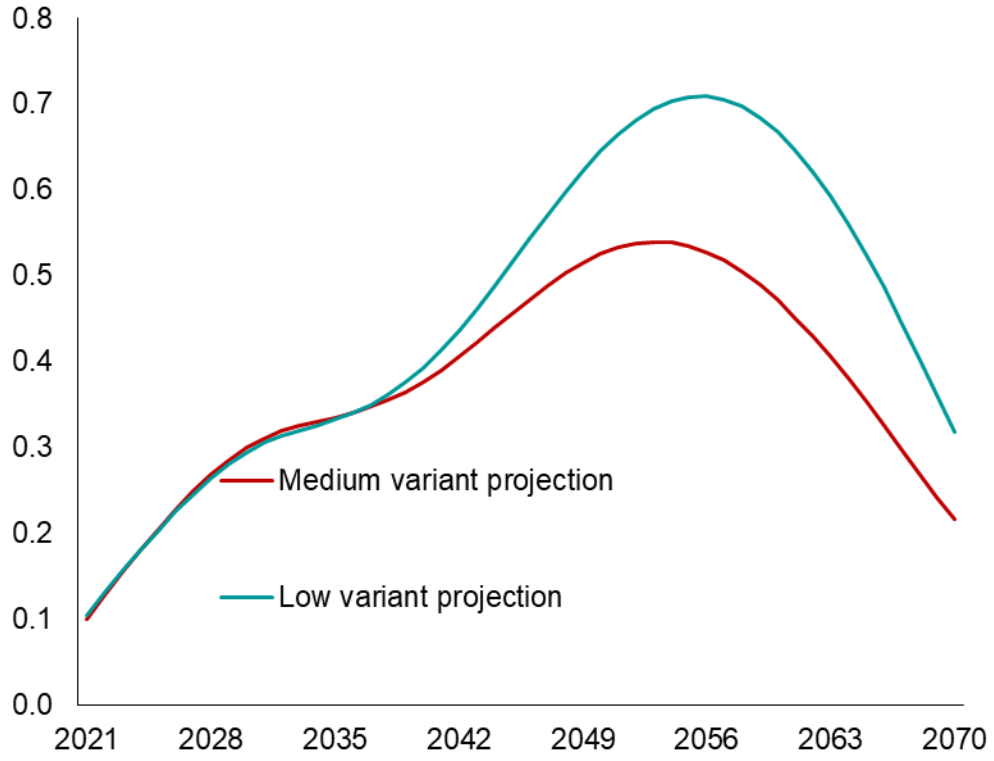


Source：Model Simulations

A boon for the rest of the world?

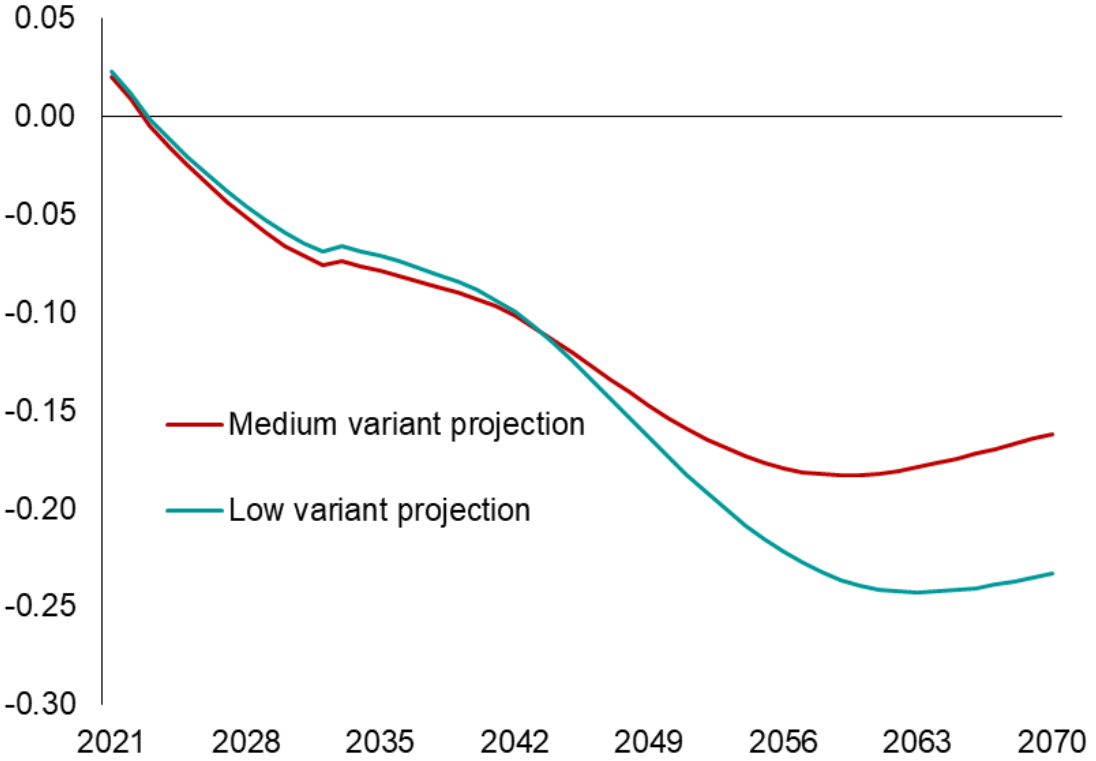
Real GDP of ROW

(percent change)



Interest Rate of ROW

(percentage point change)



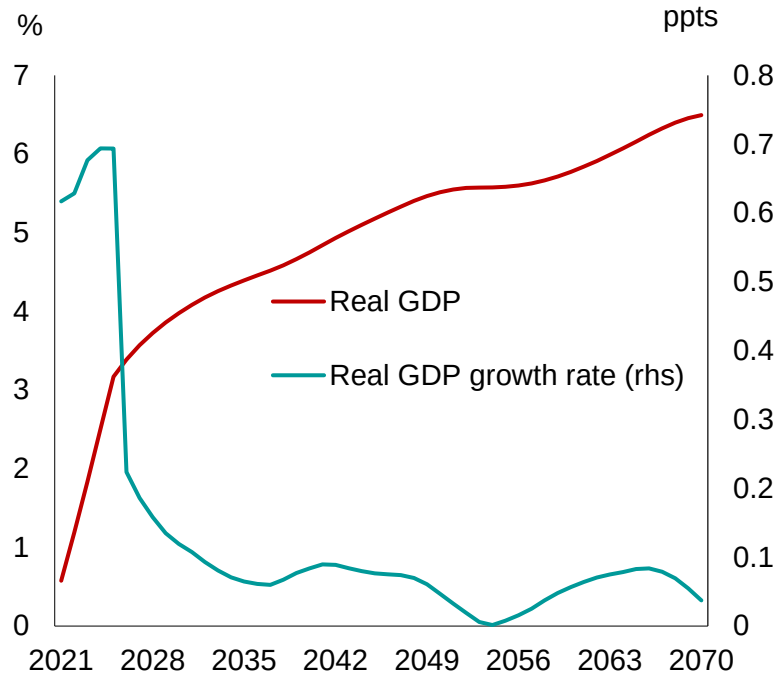
Source：Model Simulations

Raising retirement age?

- China has some of the world's lowest retirement ages (50-60).
- We simulate scenario in which the policy shock of retirement age change is added to the scenario of medium variant population projection - gradual increasing of 5 years in the retirement age over 2021-2025.

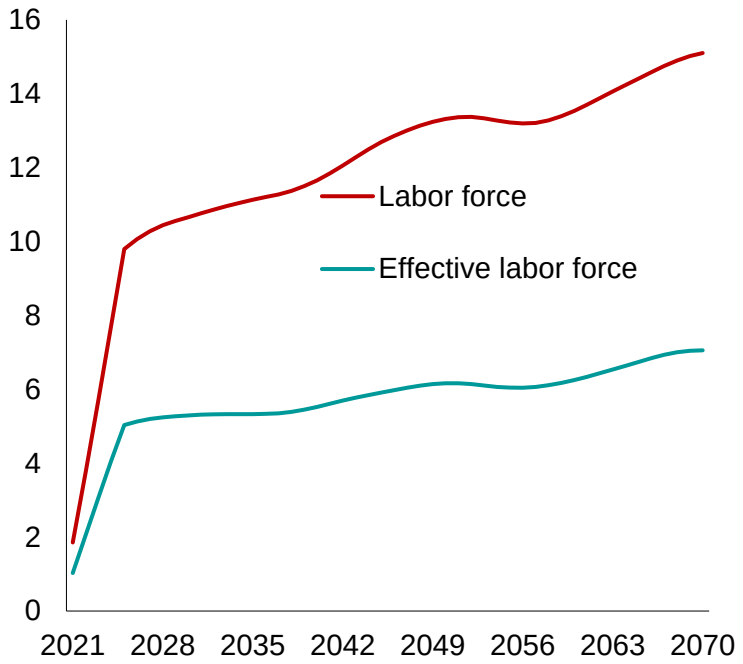
Real GDP and its Growth Rate

(percent change / percentage point change)



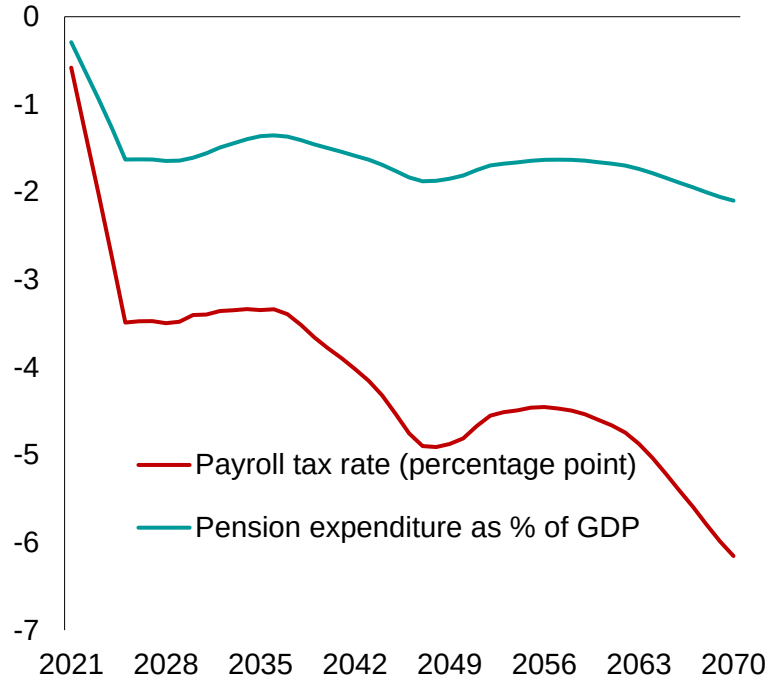
Labor Force and Effective Labor Force

(percent change)



Pension expenditure and payroll tax rate

(change in % of GDP / percentage point change)



Source：Model Simulations

Conclusions

- Simulation results indicate that China's economic growth would decelerate notably in the face of demographic shifts over the coming decades.
- The shrinking workforce, coupled with an increasing proportion of the elderly population, will exert downward pressure on labor supply, consumption, and interest rate. Furthermore, the strain on public finance is expected to intensify.
- The findings underscore the urgency of implementing structural reforms to mitigate the adverse effects of population aging.
- Raising the retirement age is a potential policy intervention to bolster labor supply and alleviate the burden on the pension system. However, the benefits it brings are limited compared to the upcoming demographic shocks.

Thank you!