Economic Implications of New Retirement Age in China –A Dynamic Computable General Equilibrium Analysis

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1 Introduction

Population in China is ageing rapidly as a result of the sustained low fertility and increasing life expectancy. At the end of 2022, the elderly - 65 and older - accounted for 14.9 per cent of the total population, compared to about 4.9 per cent in 1982, 7 per cent in 2000 and 8.9 per cent in 2010 (NBS 2022).

Population ageing has profound and long-lasting impacts on a country's economic growth. Ageing implies slower or even negative growth of the working-age population, driving up the scarcity and costs of labour. Based on the life cycle hypothesis (Modigliani, 1966), ageing also implies a lower saving rate or investment rate of the economy. The process of ageing is often accompanied by a country's changing competitive advantage in international markets. Hence ageing leads to a re-adjustment of the sources of growth and the industrial structure of the economy.

China's fertility decline and the consequent "demographic bonus" provided by the increased ratio of working-age population to dependent population had contributed to China's economic miracle of startling growth for decades (Cai, 2010). However, the progressive ageing of the population has been converting the demographic bonus into a "demographic deficit" that presents severe challenges to the country's future development. One such challenges is the financial sustainability of the country's public pension system.

2. China's pension system and the impact of population ageing on its sustainability

At present, there are two public pension schemes in China: the Basic Pension for Urban Employees (PUE) and the Basic Pension for Urban and Rural Residents (PURR). PUE is pooled and operated at the prefecture-level localities. By design, it is a combination of social pooling and individual saving accounts. The social pooling pillar is a pay-as-you-go (PAYGO) defined benefits (DB) system. financed by employers' contribution which typically equals 16 per cent of the total payroll.[4] Some provinces

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[4] It was 20 per cent for many years prior to May 2019, when the Central government decided to lower the contribution rate as one of the measures to lower the tax and fee burden on enterprises in China (General Office of the State Council 2019).

which experienced a large inflow of migrants, such as Guangdong and Zhejiang, are able to lower the contribution rate to around 14 per cent. The pillow of individual saving accounts is a funded, defined contribution (DC) system financed by employees' contributions of 8 per cent of their individual wages. Workers who have participated in the scheme and have been making contributions to the pension funds for at least 15 years upon retirement are entitled to receiving benefits from the social pooling pillar. The benefits are calculated on the basis of their years of contribution, their own wages, and the average wage in the locality. The benefits from their individual saving accounts are paid out as an annuity equal to the balance of their individual saving accounts at the time of retirement divided by the government-determined number of months reflecting the remaining life expectancy at retirement.

Employees who had contributed to the pension fund for less than 15 years at the time of retirement are not entitled to receiving benefits from the social pooling pillar. They can receive only a lump-sum payment equal to the balance of their individual saving accounts upon retirement.

Although PUE has been set up in prefecture-level localities all over the country since the late 1990s, its high contribution rates tend to exclude the low-income rural workers and self-employed workers from participating in the scheme. Consequently, these groups enjoy only a low pension coverage by the scheme..

The second pension scheme, PURR has three sources of revenue: government subsidies, individual contributions, and rural collective subsidies if available at all. The central government sets a minimum nationwide standard pension benefit for all eligible elderly participants. This minimum-standard benefit is 100 per cent financed by the central government for the western and middle provinces, and 50 per cent is financed for the eastern provinces. The provincial/local governments are encouraged to provide additional pension benefits with their own sources of funding.[5] Among the three sources of revenues government subsidies have remained the predominant source, accounting for over three-quarters of the total revenues of the scheme.

The ageing of the population has driven up the deficits of China's pension schemes. PUE's contributions have been surpassed by total expenditures since 2013. In the meantime, the government's pressures to fill the gap between revenues and expenditures have been increasing.

China's population ageing and the deteriorating financial sustainability of the country's pension system have activated discussions about responsive policies. The proposed policy options include, among

[5] See Zuo et al.(2023) for the details of PURR scheme.

others, a nationwide social pooling pillar of the PUE; lowering the mandatory contribution rate to achieve a higher participation rate of the PUE, linking the participants' pension benefits more closely to their contributions, and mandating later retirement.

Among these options, raising retirement age is an efficient one. It can reduce the number of retirees and, hence, the expenditures on pension benefits, while at the same time increasing the number of working employees and, hence, the contributions into the scheme. raising retirement age as a policy option has drawn much attention in China because mandatory retirement has been quite early. The present retirement age in China's urban sectors is 60 for male, 50 for female workers, and 55 for female officials. Those workers who are engaged in physically demanding or hazardous jobs should retire five-year earlier, that is, 55 for male and 45 for female (Ministry of Labour and Social Security, 1999). This standard was set in 1953 when life expectancy in China was only about 40 years. Life expectancy had almost doubled to 78.2 years in 2020 based on China's seventh Population Census, whereas the mandatory retirement age remains unchanged.

After many years of discussion, the Chinese government finally announced its plan to raise the retirement age starting from January 2025. The detailed plan of how to increase the retirement age for male, female officers and female workers was also released. Starting January 2015, the retirement age will increase one month for every four months for male and reaches 63 years old in 15 years, for female officers to 58 years old. For female workers, the retirement age will increase one month for every two months and reaches 55 years old.

This paper aims to explore the implications of this newly announced retirement age extension policy on economic growth and pension sustainability by applying a dynamic CGE modelling approach.

3. Methodology and modelling framework

The model we used is an extended version of a dynamic computable general equilibrium model of the Chinese economy- CHINAGEM[6]. The database of the CHINAGME model in this paper includes 157 sectors and reflects the latest 2017 input-output structure of the Chinese economy. The core CGE structure is based on ORANI, a static CGE model of the Australian economy (Dixon et al 1982). The dynamic mechanism of CHINAGEM is based on the MONASH model of the Australian economy (Dixon and Rimmer, 2002). The CHINAGEM model captures three types of dynamic links: physical capital

[6] Please refer to Peng (2023) for the details of CHINAGEM model.

accumulation; financial asset/liability accumulation; and lagged adjustment processes in the labour market.

In CHINAGEM, production is modelled using nested constant elasticity of substitution (CES) and Leontief production functions which allow substitution between domestic and imported sources of produced inputs and between labour, capital and land. The production functions are subject to constant returns to scale. Household demand is modelled by the linear expenditure system (ELES). Trade is modelled using the Armington assumption for import demand and a constant elasticity of transformation (CET) for export supply. China is considered as a small open economy in import markets where foreign import prices are determined in world markets. Exports are demanded according to constant elasticity demand curves for most of commodities. In the model, capital stock is accumulated through investment activities (net of depreciation). Investors respond to changes in expected rate of return. For the labour market as a whole, the wage rate is sticky in the short run and employment adjusts to clear the labour market. Over time, the wage rate adjusts to access supply/demand of labour so that employment returns to its long-run level. In the long run, employment is determined by demographic variables such as working age population and labour force participation rates.

3.1 Labour market module and pension module

The extended CHINAGEM has a pension module and a labour market module which is designed to capture China's unique labour market features for example, the institutional barriers.

For this paper, we will modify original labour categories and introduce new labour categories. Accordingly, we will modify the original labour market module which was introduced by Mai et al.(2014). There will be nine labour supply categories in the modified labour market module: four employment categories, three unemployment categories, and two new entrant categories. The category of labour supply in the labour market module is consistent with China's pension insurance schemes. Based on the relevant statistics, we assume that all the urban skilled workers (USE), 80 per cent of urban unskilled workers (UUSE), and 30 per cent of rural urban migrant workers (RUE) participate in the Basic Pension for Urban Employees - PUE (Scheme 1). The rest of 20 per cent of UUSE and 70 per cent of RUE participates in the Basic Pension for Urban and Rural Residents - PURR (Scheme 2) (see Table 1). PURR may include some self-employed urban workers and some workers who are employed in small private factories or companies.

Table 1: China's current pension system - coverage of each pension scheme

Labour category	Basic Pension for Urban Employees (Scheme 1)	Basic Pension for Urban and Rural Residents (Scheme 2)
urban skilled employment (USE)	100%	---
Urban unskilled employment (UUSE)	80%	20%
Rural-urban employment (RUE)	30%	70%
Rural employment (RE)	---	100%
Urban unemployment (UU)	---	100%
Rural unemployment (RU)	---	100%
Rural urban unemployment (RUU)	---	100%
REST*	---	100%

* REST includes urban and rural new entrants (NURB and NRUR) and the rest of all labour force and residents who do not include in the labour categories in Table 1.

We assume that all the rural workers participate in PURR or Scheme 2, and so do all unemployed workers including UU, RU, RUU, urban and rural new entrants, and the rest of urban and rural residents (REST) as shown in Table 10.1.

The pension module we developed for this study captures China's current pension system. Both schemes –PUE and PURR have two pillars: a social pooling pillar and individual saving accounts. However, pillar two is very small in PURR. In the current version of the pension module, for PURR, we ignore pillar two and only consider pillar one.

The detailed equations of modified pension module and labour market module will be introduced into the CHINAGEM model.

3.2 Extension of the CHINAGEM model - Government account

In China, central and local governments provide subsidies to both PUE and PURR. With the expected rapid ageing, we would like to know if the Chinese government maintains the current pension system, and how large a deficit of the social pool (pillar one) will accumulate. If the government chooses to finance the deficit we would like to know the effect on the government general budget deficit and the

impact of the deficit on the macro economy. To answer these questions, we introduce the government account into the CHINAGEM model.

4 Development of baseline scenario and simulation results

To analyse the economic effects of new retirement policy, we first develop a baseline scenario - a business as usual without introducing any policy changes[7]. Then we conduct a policy simulation, an alternative forecast with the change in the retirement age. The effects of the policy change are measured by deviations of variables in the alternative forecast from their baseline levels.

To develop the baseline scenario, using the data from China Statistical Yearbooks and the World Bank Development Indicators database, we first update the model's database from 2017 to 2023. Then for the forecast period from 2024 to 2100 we assume that the growth pattern of the Chinese economy will follow its historical trend but at progressively lower rates.

The growth rates of rural urban migrant workers and other labour categories in the baseline scenario are endogenised and determined by the exogenous macro variables such as investment, export, and GDP, and the growth rate of the total labour force. The growth rate of the exogenous variable such as total labour force is calculated based on the growth rate of the working-age population and the aggregate labour force participation rate (LFPR). In the baseline scenario, we assume that the cohort LFPRs will remain at their 2020 levels until 2100. The growth rate of the working-age population is from the medium variant of population projection conducted by United Nations in 2024.

5. The effects of retirement age extension policy

This section contains a comprehensive analysis of the economic effects of raising the retirement age.

5.1 Retirement age and labour force participation rate

In the policy scenario, based on the age and sex - specific labour force participation rates (LFPR) in China in 2020, using the detailed retirement age extension plan released by the Chinese government in September 2024, we will calculate the new sex-specific LFPRs for the age cohorts females aged 50 and above and makes 55 and above.

[7] For more detail about how the business-as-usual scenario is developed for the CHINAGEM model, please see Peng (2023)

However, to our knowledge, there is no research on the precise extent to which a one-year increase in the retirement age increases the LFPRs of the corresponding age group. We will use the corresponding age groups' LFPRs of Japan, South Korea, G7 countries and OECD countries in 2022 as a reference to calculate the new LFPRs for both male and female of the relevant cohorts. We will then shock the changes of LFPRs based on the calculation which will affect the labour supply of all categories and the contributions to the pension account

Meanwhile, we shock the new retirement age which will affect the pension account. These shocks mean that compared with the baseline scenario, in the policy scenario the labour force will be larger from 2025, the contribution to the pension fund will increase and the new retirees which get the pension income will be smaller.

5.2 The effects of retirement age extension policy on the economy and pension account

This section will analyse the effects of the new retirement age extension on macro economy, including real GDP, employment, capital stock, real wage rate, household consumption, government consumption, imports and exports. The effects on the labour supply, labour demand and real wage of nine labour categories will also be explained.

We will also display the effect on the industry output and employment. The change of pension account under the new retirement age will also be presented and explained.

6. Conclusions and policy implications

The main findings of this CGE research and policy implications will be presented and discussed in this section.

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