

Labour market and inflation: the case of China

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Abstract

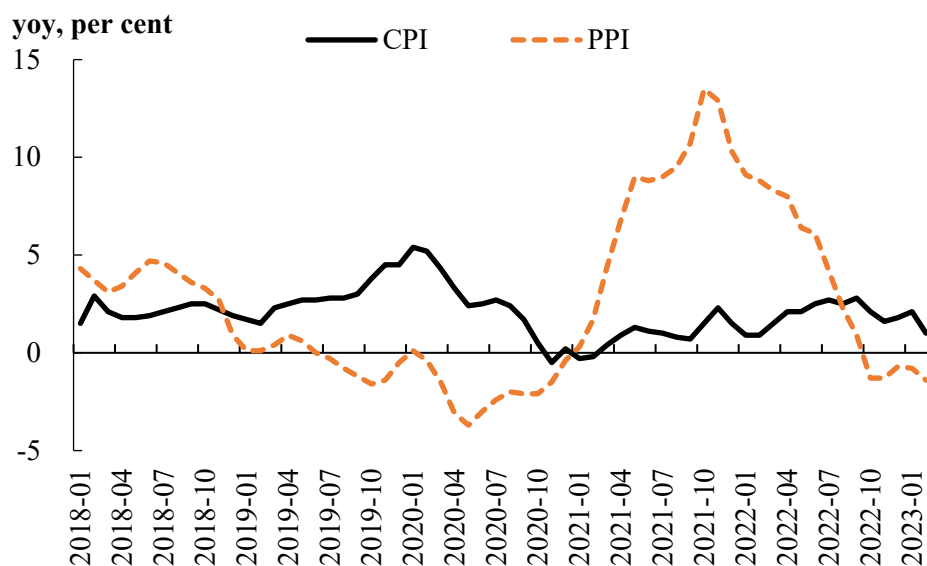
China's labour market has limited short-run but notable long-run impacts on inflation. In the short run, China's inflation is expected to remain mild given the moderate aggregate demand. Data show that the epidemic has not changed China's labour market structure, and the employment pattern has not changed significantly. So far, changes in the labour market have not been the main factor affecting China's inflation trend. In the medium term, due to increased labour migration between urban and rural areas, as well as among industries and regions, the relationship between inflation, economic growth and the urban unemployment rate in China is not stable. As a result, the trend and short-term changes to labour migration in China are closely related to macroeconomic cycles, while the link between the labour market and inflation is relatively weak. In the long run, with a shrinking population and labour force, and moderating urbanisation process, population growth and structural changes will have a greater impact on inflation.

1. Recent inflation developments

In 2022, China's economy was hit by many unexpected factors at home and abroad, and GDP grew by 3%, the lowest level for more than 30 years. Nevertheless, the urban unemployment rate had dropped to 5.5% by the end of the year, and the consumer price index (CPI) rose by 2%.

1.1 Inflation stable

In February 2023, China's CPI rose by 1.0% year on year, and the cumulative year-on-year increase from January to February was 1.5%. Food prices rose 2.6% year on year, and non-food prices rose 0.6% year on year. The producer price index (PPI) saw year-on-year drops of 1.4% and 1.1% in January and February, respectively. The price of subsistence means rose 1.1% year on year, and the price of capital goods fell 2.0% year on year. On the whole, short-term inflation is generally moderate. The trend of CPI growth is mainly affected by factors such as the fall of consumer demand after the Spring Festival and sufficient market supply. The change in the PPI growth rate is mainly restricted by the acceleration of industrial enterprises' production recovery, the improvement of market demand and the relatively high base effect in the same period of last year (Graph 1).



Source: National Bureau of Statistics.

1.2 Stable market expectations

According to the Caixin Media survey of 14 institutions¹, the average market forecast for CPI growth in February 2023 is 1.8% year on year, down 0.3 percentage points from the previous month. The average forecast range is between 1.2 and 2.2%, with most institutions expecting slower year-on-year CPI growth. In terms of causes, the fall in food prices and the base effect brought about by the Spring Festival are the main factors dragging down CPI. With regard to food products, weaker demand and relatively ample supply after the Spring Festival were the main reasons for the drop in pork and egg prices. In terms of non-food products, the retail prices of refined oil products were stable. Core inflation will continue to be driven by the recovery of services demand after the pandemic peak.

The respondents' average forecast for February's year-on-year PPI growth was –1.2%, widening by 0.4 percentage points from the previous month, with forecasts ranging between –1.5 and –0.9%, with all respondents expecting the year-on-year decline to widen. According to Caixin Media's survey, China's economy is gradually recovering and inflation is generally stable, and will not pose a constraint on macro policy.

¹ Available at <https://economy.caixin.com/2023-03-09/102006258.html>

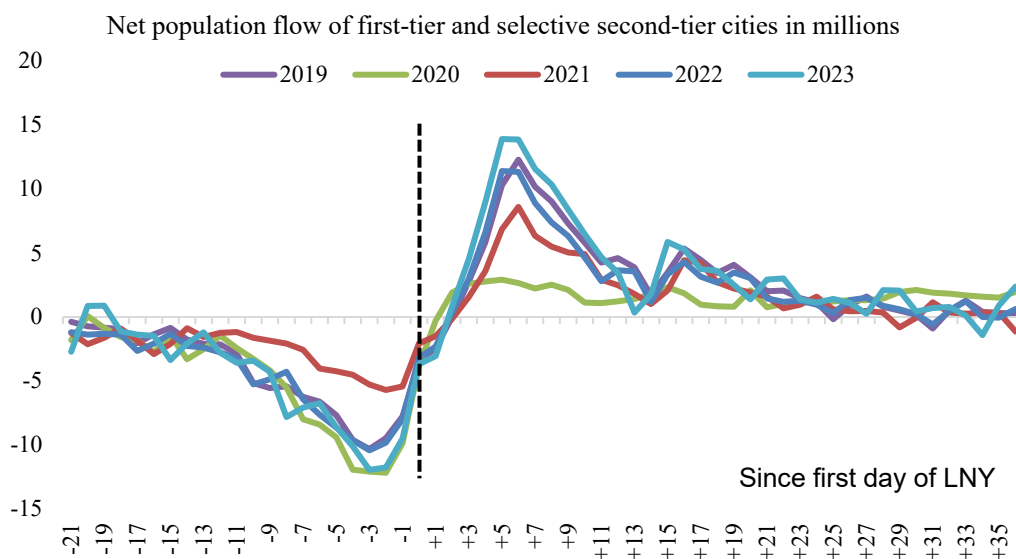
1.3 Macroeconomic targets for 2023

The *Report on the Work of the Government for 2023*² has set out the main targets for China's economic development this year: GDP growth of approximately 5.5%; more than 11 million new urban jobs; a surveyed urban unemployment rate of no more than 5.5%; CPI increase of approximately 3%; growth in personal income that is basically in line with economic growth; steady increases in both the volume and quality of imports and exports; a basic equilibrium in the balance of payments; grain output of more than 650 million metric tons; further improvements to the environment; and continued reduction in the discharge of major pollutants. Looking ahead to 2023, China's economy is expected to pick up, the economic cycle will become smoother, inflation will remain moderate on the whole and the fundamentals of long-run economic growth will remain unchanged.

2. China's labour market is recovering fast

In 2022, China's labour market was generally stable. A total of 11.06 million new jobs were created, exceeding the annual target of 11 million which was set at the beginning of the year. The surveyed urban unemployment rate has risen in some months due to the Covid-19 pandemic and other factors, reaching an average of 5.6% for the whole year. The employment situation of key groups improved, with 295.62 million migrant workers, an increase of 3.11 million over the previous year. The surveyed youth unemployment rate has been falling steadily since the third quarter, to 16.7% in December, down 3.2 percentage points from the July level. High-frequency data show that China's labour market has recovered rapidly since the adjustment to the epidemic prevention and control policy. In the short run, the epidemic has not exerted a significant structural impact on China's labour market.

² Report on the Work of the Government, http://english.www.gov.cn/news/topnews/202303/15/content_WS64110ba2c6d0f528699db479.html.



Sources: Baidu; Morgan Stanley research.

2.1 Population migration has increased and interregional labour migration has recovered rapidly

The data on population movement show that the impact of the epidemic prevention and control policy has dissipated. Intracity and intercity population mobility, as well as the transport volume of domestic flights and high-speed railways, have returned to levels before the outbreak of the Covid-19 pandemic. The Baidu migration index³ shows that after the Spring Festival in 2023, the net population inflow of first-tier cities is stronger than that in 2019 and 2022 (Graph 2). This may reflect not only the rapid recovery of labour demand but also the significant improvement of employment expectations from the perspective of workers (especially those who return to cities to look for jobs).

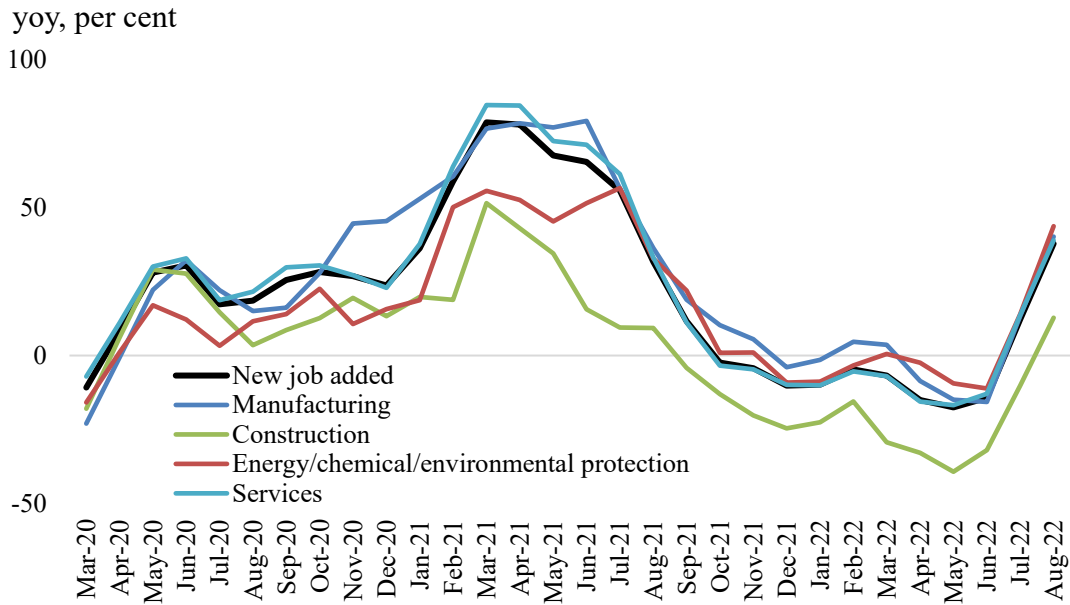
2.2 The relationship between supply and demand in the labour market has improved, and the demand for employment in the manufacturing sector has increased

Combined with data from China's major recruitment platforms such as Zhaopin.com, 51job and Boss Zhipin, the number of new jobs has increased rapidly since the fourth quarter of 2022. Jobs in manufacturing, energy, and green and low-carbon industries grew faster (Graph 3).

³ The Baidu migration index is calculated and analysed based on the geographic location service, Baidu Map Open Platform. The project adopts an innovative visual presentation method by Baidu Map, which can track and show the characteristics of population migration before and after the epidemic in China in a holistic, dynamic, real-time and intuitive way.

New jobs added

Graph 3

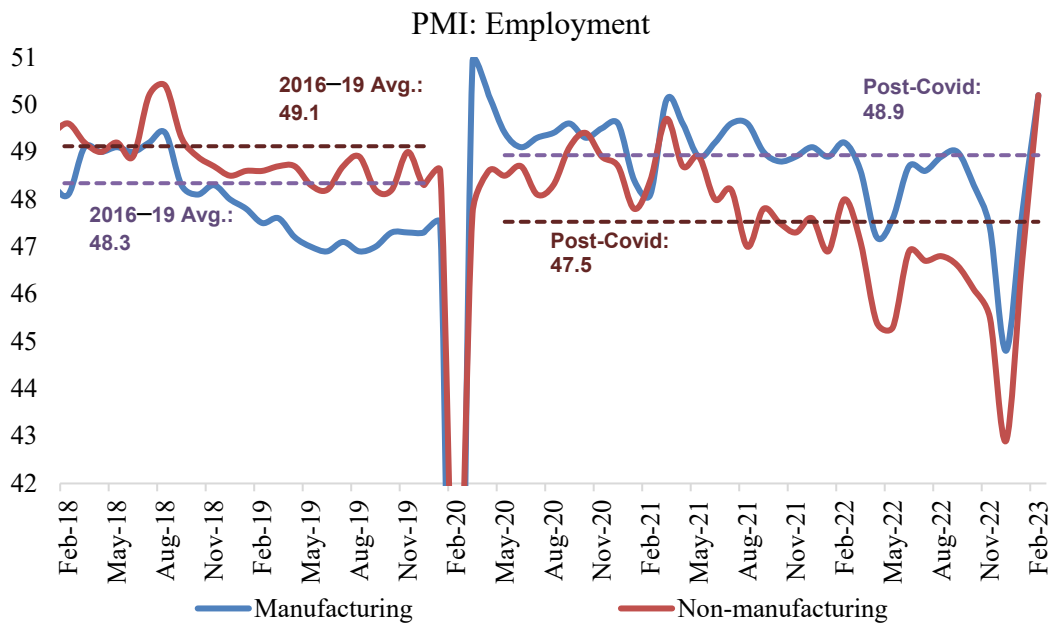


Sources: Boss Zhipin; 51job; Zhaopin; Liepin; Morgan Stanley research.

According to the purchasing managers' index (PMI) of the National Bureau of Statistics, employment levels in Chinese enterprises has increased rapidly since the beginning of the year and the employment level of manufacturing enterprises recovered earlier and faster (Graph 4).

Manufacturing and non-manufacturing PMI

Graph 4



Sources: CEIC; NBS; Morgan Stanley research.

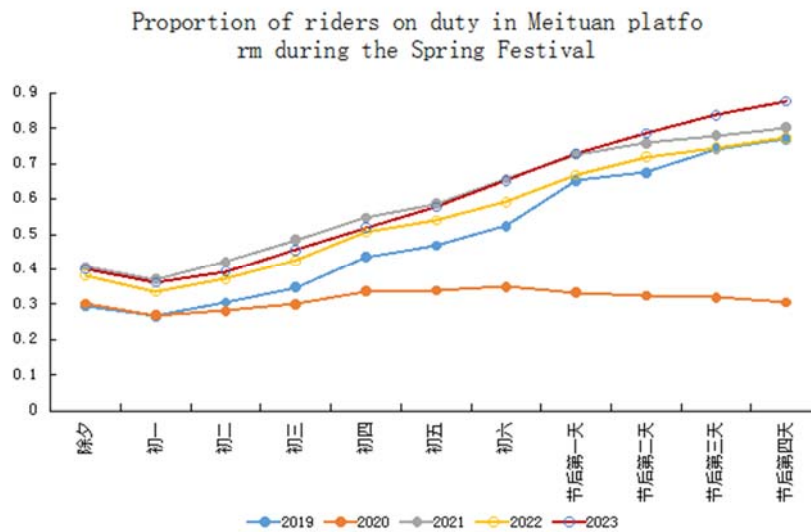
2.3 Labour-intensive employment such as logistics and catering grow steadily

Taking Meituan Delivery⁴ data as an example, in the Spring Festival of 2023, the proportion of daily on-duty riders on Meituan’s platform was approximately 48%, which was on a par with that in 2021, and much higher than the same period in 2019, 2020 and 2022. Four days after the Spring Festival, the proportion of on-duty riders recovered to 87.7% of the last day of 2022, higher than in previous years (Graph 5). During the 2023 Spring Festival, the number of newly registered riders in Meituan increased by 31.6% year on year, 60.2% higher than the same period in 2019.

Overall, labour mobility, increasing recruitment demand and new job openings suggest that the pandemic has not had a significant structural impact on China’s labour market. Employment patterns and labour flow have not changed significantly, and labour market supply and demand have not become the main factor affecting inflation.

Proportion of riders on duty on the Meituan platform during the Spring Festival

Graph 5



Source: Meituan platform data.

⁴ Meituan Delivery is the instant logistics platform of Meituan, which has a powerful real-time distribution network to meet various needs of merchants and consumers. At present, Meituan has completed more than 40 million orders in a single day, and the average delivery time of each order is only 30 minutes. It has connected 6.3 million merchants, 460 million consumers, nearly four million riders and various ecological partners. Meituan Delivery gradually established the highest coverage density and the most extensive real-time distribution network. Meituan Delivery has covered 2,800 cities and counties across the country, with more than 10,000 distribution sites. It can provide customised logistics solutions and all-round efficient distribution services for merchants of different sizes and formats according to different scenarios.

3. Labour markets, economic growth and inflation: lessons from China

In terms of theory, the relationship between inflation and employment was first proposed by Phillips (1958). After Lipsey (1960), Samuelson and Solow (1960), Friedman (1968), Phelps (1968), Lucas (1973) and other extensions and criticisms, a Phillips curve with expectations was gradually formed. That is:

$$\pi_t - \pi_t^e = -\alpha(u_t - u_n), \quad \alpha > 0 \quad (1)$$

where π_t is the current inflation rate, π_t^e is inflation expectations, u_t is the real unemployment rate and u_n is the natural rate of unemployment. Output growth is commonly used to replace the unemployment rate to determine the Phillips curve in mainstream models, which is mainly based on Okun's law⁵ to describe the relationship between economic growth and employment. That is:

$$u_t - u_n = -\beta(g_t - g_n), \quad \beta > 0 \quad (2)$$

where g_t is real growth, g_n is potential output growth, u_t is the real unemployment rate and u_n is the natural rate of unemployment.

Okun's law can be combined with the Phillips curve to explain the relationship between output fluctuations, inflation changes and labour market changes, and is widely used by central banks in macro policy analysis. However, both the Phillips curve and Okun's law are empirical rules based on countries with a mature market economy. The experience of emerging markets is quite different from that of Europe and the United States, and other developed economies. Especially in China, there are disparities between regions and industries. There is a labour surplus in the agricultural sector and underdeveloped areas, and workers have migrated in large numbers between regions, sectors and industries. Agenor and Aizenman (1999) demonstrated that, in a general equilibrium framework, due to spillover effects between sectors, such as the situation in which unemployed workers in the formal sector can seek employment opportunities in the informal sector, the stable relationship between changes in output and changes in unemployment (the usual Okun's law) would not exist.

Studies by Riveros (1990), Turnham (1993), Horton et al (1994) and Agenor (1996)⁶ show that such a spillover effect is indeed widespread in developing countries. Although there are few studies on the Phillips curve in a dual economy, the spillover effect should be understandable. If the expansion of formal sector demand causes formal sector wages to rise, it may not cause urban unemployment to fall by attracting more workers into the urban or formal sector (Harris and Todaro (1970)), so the Phillips curve may not apply.

⁵ American economist Okun (1962) conducted empirical research on the relationship between economic growth and employment, and obtained the famous Okun's law in macroeconomics.

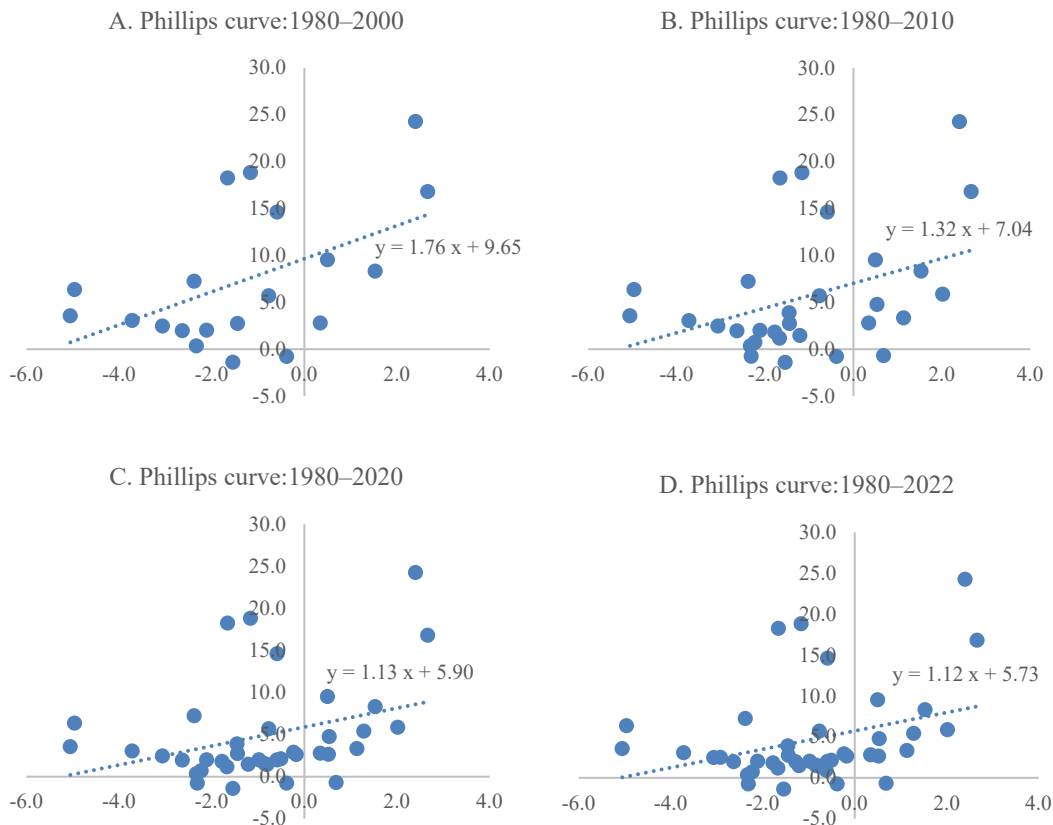
⁶ Riveros, L. "Recession, adjustment and the Performance of Urban Labor Markets in Latin America." Canadian Journal of Development Studies 11, 1990, pp.34 – 59.

3.1 China's inflation, growth and employment

Chinese scholars have conducted a lot of research on whether the Phillips curve and Okun's law apply in China.⁷ The results show that China's inflation and economic growth have a significant positive correlation, but labour market indicators such as unemployment or employment rate have a weak relationship with growth.

Relationship between China's inflation and growth

Graph 6



Sources: CEIC; China Statistical Yearbook; China National Bureau of Statistics.

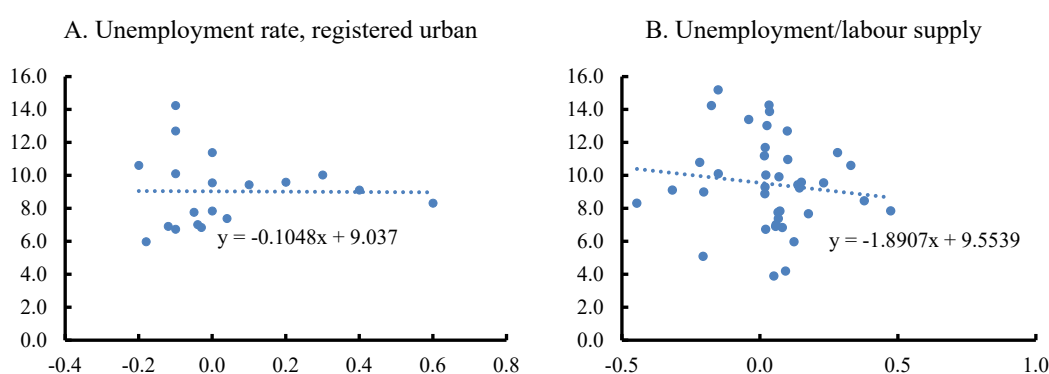
Graphs 6.A–6.D describe, respectively, the relationship between inflation and growth in China. The horizontal axis is the output gap and the vertical axis is the inflation rate. Taking each decade as a sample interval, we show the relationship between inflation and growth from 1980 to 2000, 2010 and 2020, respectively. To reflect the impact of the Covid-19 pandemic, we also present the period from 1980 to 2022. It can be seen that there is a significant positive correlation between the change in China's output growth rate and inflation, indicating that China's inflation is significantly affected by economic growth, and that the Phillips curve holds. It is worth noting that the slope of the Phillips curve decreases as the time interval lengthens.

⁷ Such as Li (2005, 2009), Lu (2015), Liu (1997) and Fan (2000).

Similarly, we can use output and unemployment data to describe the relationship between growth and employment in China, as shown in Figures 7.A and 7.B. The horizontal axis is the change in the unemployment rate and the vertical axis is the growth rate of GDP. Since China began to publish the registered urban unemployment rate around 2000, and the data fluctuated less, we have made small adjustments to the registered unemployment rate based on the reported economically active population and employment data. The results show that the relationship between China's GDP growth rate and the unemployment rate under different calibres is weak.

Okun's law

Graph 7

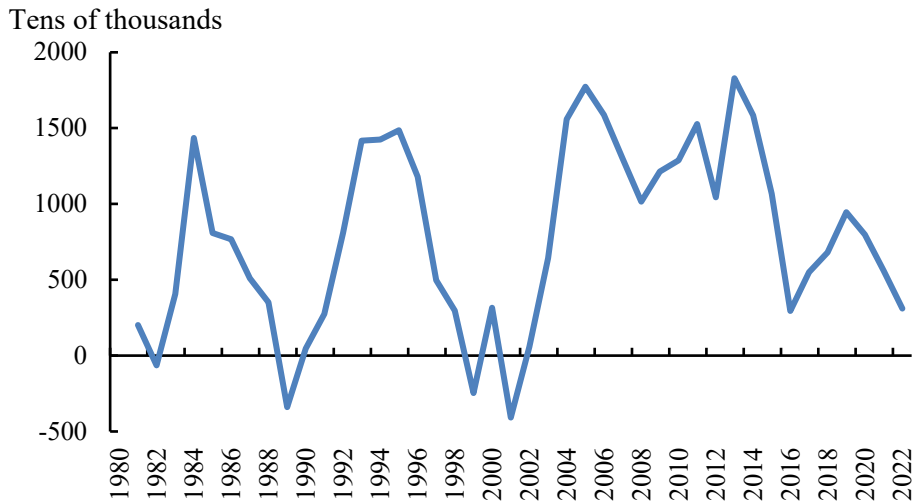


Sources: China Statistical Yearbook; China National Bureau of Statistics.

Based on the empirical observation of the correlation between China's labour market and macroeconomic cycle fluctuations, we propose a discussion of Okun's relationship based on China's experience. As an economy undergoing rapid transformation of economic and growth patterns, China has seen a large-scale and sustained labour force transfer from the agricultural sector to non-agricultural sectors and across regions, so fluctuations in the macroeconomic cycle are closely related to the speed of agricultural labour force transfer. The transfer of the agricultural labour force to the non-agricultural sector and the transfer of the labour force from underdeveloped to developed regions affects economic growth through changes in the non-agricultural sector and increased employment in developed areas. Conversely, the fluctuations of economic growth will restrict the scale and pace of labour transfer in agriculture and underdeveloped areas through changes in labour demand in non-agricultural and developed areas.

3.2 Agricultural labour force migration

Consistent with international experiences, the proportion of the agricultural labour force in a country tends to decline as the economy develops. Based on the estimation method of Lu and Yang (2012), we estimate the annual increase and transfer of the agricultural labour force in China, and the results are shown in the graph below.



Sources: China Statistical Yearbook; Lu and Yang (2012).

3.3 Okun's law with labour transfer

We derive a more general Okun's law with labour transfer and derive a generalised Okun model including labour transfer and change of unemployment rate. That is:

$$g_t = \beta_0 + \beta_1 m_t + \beta_2 (u_t - u_n) \quad (3)$$

where g_t is real growth, m_t is the share of new labour force transfers in total employment, u_t is the real unemployment rate, u_n is the natural rate of unemployment. β_0 can be interpreted as economic growth in the absence of labour transfer and changes in unemployment. Equation (3) can be expressed in the form of gaps:

$$g_t - g_n = \beta_1 (m_t - m_n) + \beta_2 (u_t - u_n) \quad (4)$$

The above Okun's law indicates that labour transfer should be included in the description of the relationship between the macroeconomic cycle of the economy and the labour market, that is, the labour transfer rate and the change in the unemployment rate should be introduced and would jointly affect the economic growth rate.

As the largest developing country, China's economy is in a special situation. In the medium term, due to a large number of labour transfers between urban and rural areas, between industries, and between regions, the trend and short-term changes in labour transfer in China are significantly related to the fluctuations of the macroeconomic cycle, and the relationship between China's inflation, economic growth and urban unemployment rate is unstable, resulting in a small impact of labour market changes on the transmission of inflation in the short run.

4. Long-run analysis of demographic changes and inflation

In the long run, as the process of labour transfer continues, the proportion of the agricultural labour force in China will gradually decline to the level of developed economies. At the same time, with the advancement of reforms in related fields, structural factors such as labour market segmentation will gradually disappear, and the link between changes in China's unemployment rate and macroeconomic fluctuations will become closer. China's Okun relationship should ultimately follow the normal form namely, long-run trends and structural changes in the population will then matter more for inflation.

4.1 Theoretically, demography has an important effect on inflation

The Phillips curve with population shows that population is an important factor in inflation. We consider population and build a dynamic stochastic general model based on the new Keynesian general equilibrium theory. Phillips curve with population can be obtained through theoretical derivation as follows:

$$\hat{\pi}_t = a_1 \hat{\pi}_{t-1} + a_2 E_t \hat{\pi}_{t+1} + a_r [(1 - e) \hat{w}_t + e r_t^k - (1 - e) \hat{a}_t] - a_y \hat{n}_t^y$$

According to the Phillips curve, in addition to the impact of historical inflation ($\hat{\pi}_{t-1}$) and inflation expectations ($E_t \hat{\pi}_{t+1}$), current inflation ($\hat{\pi}_t$) is also affected by the total population (affecting wage levels \hat{w}_t and return on capital r_t^k), population structure (\hat{n}_t^y) and labour productivity (\hat{a}_t).

The quantity, structure and quality of the population have varying degrees of influence on inflation. Through the analysis of the theoretical model, it is found that the quantity, structure and quality of the population could impact inflation through multiple channels. In terms of aggregate demand, a shrinking labour force will increase the demand for labour and raise wages, thus raising prices. The aging population leads to a decrease in household utility, an increase in marginal costs and an increase in prices. At the same time, higher labour productivity will reduce marginal costs, easing inflationary pressures from a shrinking workforce and an aging population. In terms of aggregate supply, both a declining labour force and an aging population will reduce aggregate output, thereby reducing the return on capital and lowering the price level. At the same time, higher labour productivity will raise output and the return on capital, easing market downturns and lowering inflation caused by the labour force shrinking and the aging population.

The low inflation caused by demographic factors has attracted wide attention from scholars. In recent years, the global economy has entered a new normal of low growth, low inflation and low interest rates. In the context of sustained low inflation in the world, the decline in the labour force and the aging population may bring about low inflation, which has attracted wide attention from scholars. For example, using the IMF's GIMF model, Anderson et al (2014) found that aging may reduce inflation. Yoon et al (2014), based on data from 30 OECD economies from 1960 to 2013, found that an increase in the share of senior people (over 65 years of age) was highly correlated with low inflation. Some scholars also believe that the influence of age structure on inflation is complex. For example, Aksoy et al (2015), Goodhart and Pradhan (2017), and Juselius and Takáts (2018) concluded that an

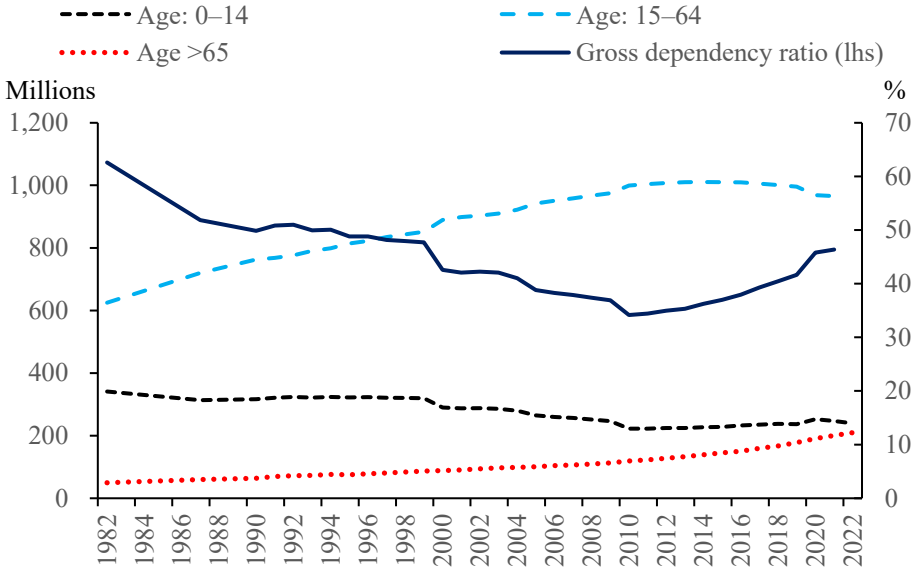
increase in the number of young and old people will raise the level of inflation, while a decrease in the working age population will lower the level of inflation. Accordingly, an aging population alone cannot explain low inflation, which is also influenced by a shrinking working age population.

4.2 China case: population affects inflation via output

Since 2010, China has gradually moved from the “demographic dividend” to a period of aging and negative population growth. In the early period of reform and opening up, the “demographic dividend” is one of the important driving forces of China’s rapid economic growth. It is found (Graph 9) that during the period 1982–2010, China’s working age population aged 15–64 grew at an average annual rate of 1.7%, while the growth rate of the non-working age population was –0.5%, which resulted in a significant decrease in the population dependency ratio (the ratio of the non-working age population to the working age population), and China was in the period of “demographic dividend”. The population dependency ratio entered an inflection point in 2010, and the demographic dividend gradually disappeared. On the one hand, the growth rate of the working age population (aged 15–64) declined, reached its peak in 2013, and turned negative, with an average growth rate of –0.3 during the period 2010–22. On the other hand, there is a significant aging trend, with the population aged 65 and above increasing rapidly, with an average growth rate of 4.8% from 2010 to 2022. In 2022, China’s total population recorded negative growth for the first time in 61 years.

Demographic changes in China

Graph 9



Source: China National Bureau of Statistics.

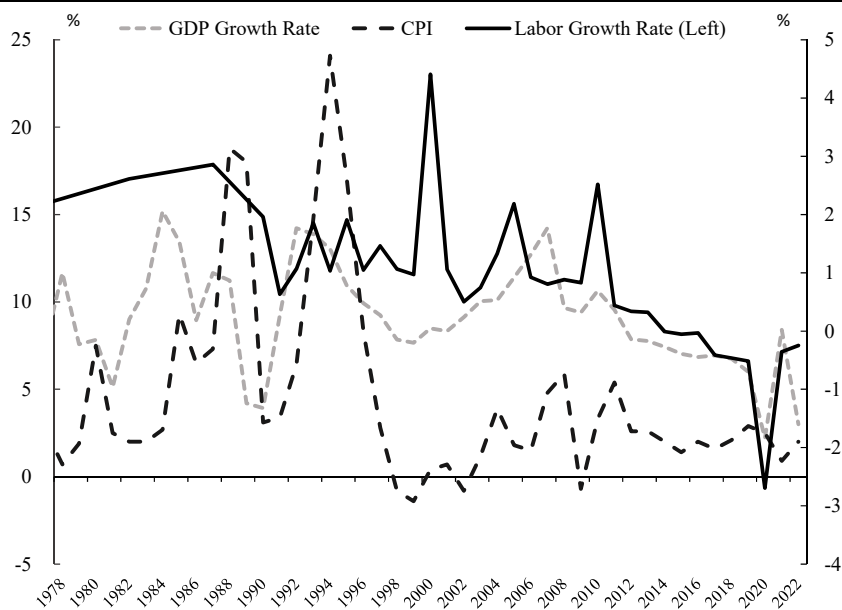
The population has some effect on inflation but the relationship is not significant, it is more closely related to output. Observing the changes in labour growth, output growth and inflation after 1990 (Graph 10), it is found that there is a

significant correlation between labour growth and output (correlation coefficient is 0.494, p-value = 0.004), while there is no significant correlation between labour growth and inflation (correlation coefficient is 0.174, p-value = 0.332). There is a significant relationship between inflation and output (correlation coefficient is 0.472, p-value = 0.006). Especially after 2010, the growth rate of the labour force has a closer relationship with output (correlation coefficient is 0.813, p-value = 0.001), while the growth rate of the labour force is still not close to inflation (correlation coefficient is 0.298, p-value = 0.323).

Controlling for output, there is no correlation between population and inflation. If output is controlled for, the partial correlation coefficient between labour growth and inflation is close to zero (partial correlation coefficient = -0.077 , p-value = 0.677). This shows that inflation is mainly influenced by output, and the population influences inflation by affecting the output. This result is different from the empirical studies in developed economies, partly because the economic system and structure in China have changed significantly in the process of reform and opening up. The standard economic model is not necessarily applicable to our situation, so analysing and predicting the inflation level of China with the traditional empirical method may be inaccurate. For example, the shape of China's Phillips curve is not robust (Zheng (2010)), and the assumption of constant returns to scale of the production function is difficult to establish in China (Li et al (2021)).

Demographics, inflation and growth in China

Graph 10



Source: China National Bureau of Statistics. UN World Population Prospects 2022

4.3 The negative impact of a shrinking labour force on China's economy is limited

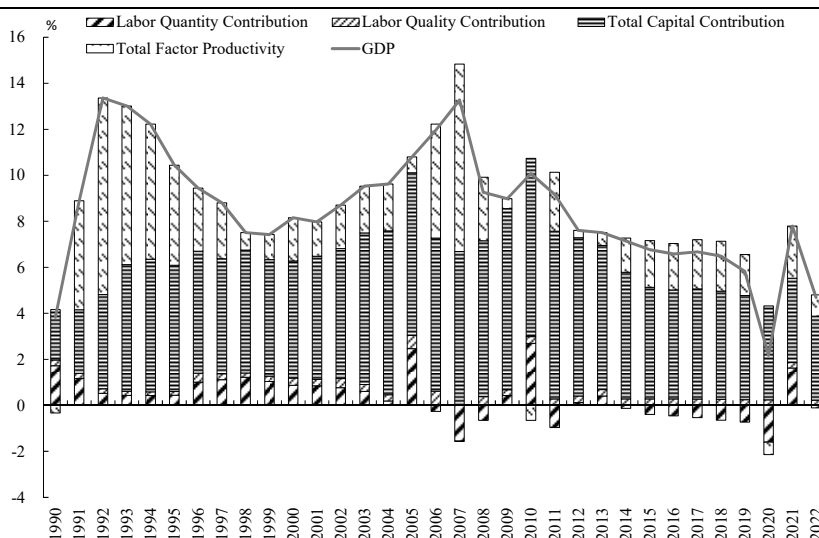
In the early stage of reform and opening up, the “demographic dividend” promoted economic growth. After the reform and opening up, China's economy has developed rapidly in terms of size and quality, and the “demographic dividend” is one of the important driving forces for rapid economic growth (Wang and Mason (2008)). Calculations show that the contribution rate of a “demographic dividend” to China's economic growth from 1982 to 2000 was 26.8% (Cai and Wang (2005)). According to the growth accounting results of the Conference Board's Total Economy Database⁸ (abbreviated as TED), from 1990 to 2000, the total labour force contributed 12.5% to economic growth, driving up output by 0.9 percentage points. From 2001 to 2010, the contribution of the total labour force to economic growth had dropped to 6.1%, driving up output by 0.6% (Graph 11).

With the disappearance of the “demographic dividend”, China's economy has shifted to medium-high growth. With the gradual disappearance of the “demographic dividend” around 2010, China's economic growth has shown a trend decline. Since 2012, China's economy has gradually shifted to a stage of high-quality development characterised by medium-high growth. Population size and age structure are the key variables affecting the output (Lu and Cai (2014); Bai and Zhang (2017)). According to TED's calculation, the total labour force contributed –8.6% to economic growth from 2011 to 2022, driving down output by 0.3%.

The negative impact of a shrinking labour force on China's economy is limited. According to the endogenous growth theory, the output can be decomposed into four factors: quantity of labour force, quality of labour force, capital and technological progress. The quantity of the labour force has a limited impact on the economy. On the one hand, the contribution of labour quality to the economy has gradually increased in recent years. While the labour force is shrinking, labour force quality, such as education level, has gradually improved in recent years. According to TED's estimates, the contribution rate of labour quality to economic growth was 2.8% from 1990 to 2000, 3.4% from 2001 to 2010 and 4.5% from 2011 to 2022. China's economy, on the other hand, is more influenced by capital factors.

According to TED's calculation, since 1990, China's average economic growth rate has been 8.5%, in which the contribution rate of labour (including quantity and quality) factors is 7.5%, the capital factor is 63.9% and technological progress is 28.6%. It can be seen that compared with the labour factor, the capital factor has a greater impact on China's economy. In 2022, China entered a period of negative population growth. However, it is necessary to see that the improvement in labour quality and the increase of capital input support economic growth to a large extent, and the negative impact of labour force reduction on the economy is limited.

⁸ Available at <https://www.conference-board.org/data/economy%20database/>



Source: China National Bureau of Statistics. UN World Population Prospects 2022

5. Conclusion

Changes in China's labour market have a limited short-run impact on inflation, but an obvious long-run effect. In the short run, China's economy is expected to pick up in 2023 and inflation will remain moderate. The high-frequency data show that the epidemic has not exerted a structural impact on China's labour market, the employment pattern has not changed greatly, and wages and employment have not become the main factors affecting the change of inflation. In the medium term, the trend and short-run changes in labour transfer in China are significantly related to the fluctuations of macroeconomic cycles. Due to a large number of labour transfers between urban and rural areas, among industries, and among regions, the relationship between China's inflation, economic growth and the urban unemployment rate is not stable, which directly results in a small impact of the labour market on inflation. In the long run, the impact of changes in the labour market on inflation will gradually increase as both the total population and the working age population experience negative growth and urbanisation slows.

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