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# *Impact of Population Structure Transformation on China's Economic Growth: A Research Review and Mechanism Exploration*

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***Abstract.*** Population structure is a key determinant of economic growth potential of a country. This paper will analyze the economic effects, modes of transmission, and policy response of population structure to the current demographic transition of China by synthesizing domestic and international literature on nexus of population structure and economic growth, in various perspectives. The population structure of China is found to have experienced a decisive change since 2010, with the main characteristics of increasing population aging, a significant decline in birth rate, a gradual reduction in the working-age population, and significant regional inequalities. The change in population structure has structural effects on the economic development of China in three main ways, namely labor supply, consumption and savings, and social security. On the one hand, the shift has driven the transformation and modernization of traditional labor-intensive industries; on the other hand, it has provided colossal development opportunities to new industries like old age care, healthcare, and the digital economy. The current body of research can be further developed in several areas such as the verification of causal relationships, analysis of heterogeneity, and the interactive processes of demographic structure and technological advances. Further studies are required to extend the demographic quality dividend theory, in order to offer theoretical foundation to develop policy frameworks that are tailored to the demographic structural transition.

***Keywords:*** Demographic transition, Economic growth, Demographic quality dividend, Population aging, Transmission pathway.

## 1. Introduction

A basic factor that affects economic growth is the evolution of population structure. Since the 1980s, China has been capitalizing on its high population and the advantages of the age structure to generate the effect of a demographic dividend which has been vital in supporting the long-term economic growth. Bloom and Williamson based their study on the East Asian economic miracle on the argument that in the period between 1965 and 1990, the growth rate of the working age population in East Asia was higher than the growth rate of the dependent population, which contributed one-third to half of the economic growth in the region [1]. The historical course of the

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Chinese post-reform and opening-up development exactly supports this conclusion-there was plenty of labor, great savings, and the dependency ratio was low-all these factors constituted the demographic base of Chinese economic takeoff.

In the present case, the demographic dividend window of China is slowly shutting down. With a long-lasting decline in fertility rates, a long life expectancy and altered marriage and fertility attitudes have collectively led to a steady reduction in the total number and share of the working-age population, faster aging, and a reversal of positive to negative rates of natural population growth, since 2020. In their research, Kotschy and Bloom revealed that the declining demographic dividend and the growing aging severely limits the possible economic growth [2]. This observation is very much in line with the reality in China today: the lack of low-skilled labor has increased the cost of employment, which has led to some of the labor intensive industries moving to the Southeast Asian region. In the view of long-term drivers of growth, declining the size of the labor force does not invariably connote a smaller growth potential, the talent dividend created by enhanced labor quality is slowly counteracting the consequences of alterations in the age framework [3]. China is in a critical period of change between traditional demographic dividends and second generation demographic dividends, and the change in the drivers of growth will directly affect its medium and long-term economic development trajectory [4].

The demographic transition in China has a lot of regional differences. There is a shift towards quality dividends in Eastern regions that are more urbanized and those that have accumulated more human capital. Conversely, Northeast China is experiencing several strains including negative population growth, aging, and labor outflow which are forming a vicious circle where demographic imbalance, and economic stagnation strengthen each other. It is against this background that a systematic analysis of the present state, trends of development, and economic effects of the demographic transition in China, and in-depth research on the processes of transmitting the transition of the demographic dividend period to the era of the demographic burden is of great strategic importance in facilitating the change in the momentum of economic growth.

The following research objectives will be fulfilled in this study based on systematic literature review: summarizing the existing studies on the fundamental nature, evolutionary process and regional heterogeneity of the Chinese demographic change; examining how the demographic transition will affect the economic development of China; clarifying gaps in the existing research and offering future research directions; discussing the pathways to the policy in order to address the demographic change, which can be of theoretical value to the related policy.

## 2. Characteristics, trends, and measurement indicators of the transformation of China's population structure

### 2.1. Core measurement indicators

Researchers in the literature have conceptualized population structure in various ways, including age structure, labor force structure, labor force structure, urban-rural distribution and human capital. Age structure is the most important evaluation criterion among these and labor force structure is one of the important intermediary variables between age structure and economic growth.

Age structure is the important variable that is used to measure demographic dividends and aging. According to the analysis of cross-country data, Maestas et al. found that the growing share of the aging population is a major contributor to the reduction in long-term labor productivity and economic growth [5]. Academia has reached a wide agreement that a dependency ratio that is less

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than half of the total population is an indicator of the window period of demographic dividend whereas a population with an age of 65 and above, over ten percent, indicates an aging society.

One of the indicators that can be used to measure the transformation of demographic dividend to economic growth efficiency is labor force structure. Three dimensions, namely, labor force participation rate, industrial distribution structure of the labor force, and skill composition, mainly define the effect of changes in the age structure of the population on the economic growth. According to Zhang and Wang, the growth impact of demographic structural transformation can be significantly increased with the level of human capital accumulation [6]. The main expression of the shift towards a "quantity dividend" to a quality dividend is labor force structure indicators, which is of paramount importance to interpret the current demographic transition in China. In some of the studies, the rate of urbanization and years of education are included in the framework of analysis, and thus the multidimensional effects of demographic structural change are thoroughly examined.

### 2.2. Main characteristics and regional differences

The year 2010 marked a critical turning point in China's demographic transition. Cai Fang pointed out that the proportion of the working-age population reached its peak that year, after which the dependency ratio shifted from decline to increase, and the traditional quantity dividend effect gradually faded [7]. Currently, China's demographic changes exhibit three major characteristics.

First, the fertility rate has long been below the replacement level, and the population has entered a phase of negative growth. With economic and social development and changes in fertility concepts, China's total fertility rate has been steadily declining since 1990, falling below the replacement level of 2.1. The natural population growth rate turned negative for the first time in 2022, and the total population entered a phase of negative growth after reaching its peak [8].

Second, the aging process is accelerating, and China has entered a deeply aging society. According to data from the United Nations Department of Economic and Social Affairs, Population Division, in 2022, the proportion of China's population aged 65 and above has exceeded 14%, with the speed of aging far surpassing that of countries at a similar level of development [9]. Unlike developed countries, which experience 'getting rich before getting old,' China faces the awkward situation of 'getting old before getting rich,' with a relatively weak economic foundation to cope with population aging.

Third, both the total number and the proportion of the working-age population continue to decline, shifting the labor market from a structural shortage to an absolute shortage. The working-age population aged 15–64 has been decreasing continuously since peaking in 2013, leading to a general rise in labor costs and compelling enterprises to accelerate automation transformation and industrial upgrading.

China's demographic transition exhibits significant regional heterogeneity. In the eastern region, where urbanization rates and human capital levels are high, aging mainly manifests as 'urban-type aging.' However, the labor agglomeration effect remains effective, and the demographic dividend from population quality is gradually replacing that from population quantity. In the western region, the natural population growth rate is relatively high, so the traditional demographic dividend has not completely disappeared, but low levels of human capital reduce the efficiency of dividend conversion. In the northeastern region, multiple pressures from population decline, deep aging, and labor outflow exacerbate a vicious cycle of demographic imbalance and lagging economic development. Zhang Tongbin indicates that the efficiency of releasing the demographic dividend highly depends on the quality of the labor force; the eastern region, relying on a well-established education and industrial foundation, is the first to transition toward quality-driven growth, while

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regions experiencing continuous labor outflow are constrained by population aging [10]. Du Yang and Feng Yonggang, based on inter-provincial data analysis, also confirm that the inhibitory effect of aging on economic growth is more significant in regions with labor outflow [11].

### 2.3. Future development trends

The United Nations Population Division was projecting that population aging in China will only accelerate [9]. It is projected that approximately 2035 the percentage of the population that will be 60 years and older will be over 30 percent, and the population will enter a severe aging phase. It is improbable that the declining fertility rates will turn around in the near future, the proportion of minority population will keep on decreasing, and the working-age population will continue to decrease. This renders the shift towards quantity dividend to quality dividend a necessary option.

## 3. The multidimensional impact of population structure transformation on China's economy

Population structure change affects the economic growth on three dimensions, the production side, the demand side, and the institutional side. The three dimensions are interconnected and reinforcing to each other, and they are all combined to determine the rate and form of economic growth.

### 3.1. Impact on the labor market and industrial structure

The falling working-age population has directly led to an increase in labor costs and lack of low-skilled labor has been a contributor to industrial change. Ma Chao and Liu Xiangbo have indicated that the shortage of labor forces drives business enterprises to use automation and intelligent technologies to substitute human labor, thus facilitating the creation of new quality productivity [12]. The present increment in low-skill labor expenses has undermined the price competitiveness of Chinese labor-intensive industries in the global market, compelling traditional industries like textile and electronics assembly to move to southeast Asia and South Asia. It is also due to the backdrop of the ever-growing reduction of labor supply that enterprises are tending to implement automation and intelligent technology strategies faster and faster, capital and technology to replace human labor are becoming an increasingly popular option when it comes to industrial upgrading and transformation. This would not only enable the transformation and modernization of the old industries but would also give the impetus to create new quality productivity. According to a study by Du Yang and Feng Yonggang, shrinking labor market size and skill mismatch have become a bottleneck limiting the upgrading of the industrial structure in China [11]. The industrial structure has a twofold influence of squeezing out and upgrading. Increased labor expenses narrow the profit margins of low-end manufacturing, making inefficient capacity either to leave or to move; simultaneously, it compels the enterprises to upgrade their level of technology and to turn into capital- and technology-intensive production. Zhang Tongbin highlights that shifting of labor in the low-efficiency sectors to the high-efficiency sectors is significant in maintaining the growth momentum [10].

The existing human capital model is very much misaligned with labor market needs. There is low skilled labor oversupply and a shortage of highly skilled professionals, which is a significant bottleneck in terms of the upgrading of industries. Regarding the regional development aspect, eastern China proves to have definite benefits in terms of attracting skilled talent due to the excellence of educational facilities and strong industrial bases. Conversely, the central, western and northeastern areas have two-fold problems; labor drain and low-skill labor retention. The net effect of these has enhanced further disparities of regions in terms of industrial growth.

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### 3.2. The effect on household consumption, savings, and economic growth

According to the life-cycle hypothesis, the age composition of the population influences directly the general trends of both social savings and consumption. Working-age population, which is the main group of social savings and consumption, is characterized by a strong propensity to save, a high savings rate and a fairly eminent consumption capacity; the elderly population is characterized by a low willingness to consume and the expenditures are concentrated in the rigid demand sector such as medical care and health; children are reliant on family support, and the growth of household expenditures to raise children can crowd out other consumption and savings. The deepening of population aging and the decline in the number of children have brought about two relatively obvious changes. On the one hand, the overall social savings rate shows a gradual downward trend. As the proportion of elderly people rises, more individuals enter a stage of consumption without saving, slowing down the accumulation of savings in society as a whole. Over the past few decades, a high savings rate has been an important driver supporting investment growth and promoting rapid economic development in China. A decline in the savings rate will undoubtedly affect the long-term momentum of economic growth [13]. On the other hand, residents' consumption patterns have undergone fundamental changes. Expenditures by the elderly in areas such as healthcare, elderly care, and health services continue to increase, while younger people tend to favor digital consumption and personalized, exclusive consumption. In contrast, demand in traditional consumption areas such as real estate and large household items has clearly cooled.

The transformation of consumption structure directly drives the adjustment of industrial structure. The elderly care industry, health industry, and digital consumption industry, supported by continuously growing market demand, are gradually becoming new points of economic growth; traditional industries, on the other hand, face immense development pressure due to shrinking market demand. This 'consumption–industry' linkage effect is reshaping the driving structure of China's economic growth. Focusing on the actual impact on the demand side, the expansion of industries related to elderly care and health has, to a certain extent, alleviated the demand contraction pressure caused by population aging, forming a positive cycle in which the upgrading of demand structure promotes industrial transformation [14].

### 3.3. Impact on the social security and public service system

With the continuous acceleration of population aging, China's social security system is facing pressure. Research by Sha Yong et al. found that rapid aging significantly increases pension and medical expenditures, exacerbating the disparities in social security fund revenues and expenditures across regions [15]. As the proportion of the elderly population continues to rise, the gap in pension insurance fund revenues and expenditures will continue to widen, and some provinces have already experienced increased pressure on pension fund payments. Meanwhile, the scale of medical insurance fund expenditures is also growing rapidly with the increase in the elderly population, further intensifying the burden on public finances.

The issue of imbalance between the supply and demand of public services is prominent. In the field of elderly public services, the total supply in areas such as elder care services, elderly education, and long-term care is insufficient, and the quality does not meet expectations; in early childhood care and preschool education, resources are scarce and the quality is uneven, which to some extent also suppresses the willingness to have children. Furthermore, the imbalance between public service supply and demand is compounded by uneven regional development. The eastern regions, relying on strong economic foundations and well-established public service systems, have

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significantly higher public service quality and supply levels compared to the central, western, and northeastern regions. Differences in the demographic transformation across regions further widen the development gap in public services between regions.

## 4. Driving factors and transmission paths of population structure transformation

### 4.1. Core driving factors

The transformation of China's population structure is the result of the combined effects of policy, economic, and social factors.

Policy factors are an important institutional driver of changes in population structure. The long-term implementation of the family planning policy has directly reduced the fertility rate, which is the fundamental reason for the shift in the proportion of the working-age population from rising to declining; meanwhile, the relaxation of population mobility policies has enabled the interregional and inter-industry flow of labor, resulting in a pattern of concentration in the eastern regions and outflow from the northeast.

Economic factors are the core drivers of the current population structure transformation. While rapid economic development has improved living standards, it has also increased the rigid costs of raising children, such as education, housing, and healthcare, fundamentally changing the fertility concepts of the childbearing population; moreover, in the process of accelerated urbanization, rural populations concentrate in cities, where high-pressure, fast-paced lifestyles and relatively high living costs further reduce the willingness of the childbearing population to have children.

Social factors provide critical support for the transformation of the population structure. With the popularization of compulsory education, the general educational level of residents has improved, the female labor force participation rate has risen year by year, and the age at marriage and childbearing has continuously been delayed. Traditional beliefs of "more children, more blessings" are gradually being replaced by "fewer births, higher quality raising"; at the same time, improvements in healthcare and living standards have extended average life expectancy, leading to a continuously increasing proportion of the elderly population.

### 4.2. Intrinsic conduction mechanism

The aforementioned three types of driving factors are transmitted to population behavior through different channels, forming a complete path of "drivers—population structure—economic effects."

The direct transmission path is manifested in the direct constraints or incentives imposed on population behavior by policies and economic factors. For example, family planning policies directly control the number of births; population mobility policies affect the regional distribution of labor; rising child-rearing costs suppress fertility intentions. These factors collectively contribute to a decline in fertility rates and changes in population mobility patterns.

The indirect transmission path produces potential impacts on population structure by altering residents' behavioral habits and social environment. For instance, higher educational attainment leads to delayed marriage and childbearing, improvements in healthcare extend average life expectancy, and increased female labor force participation changes traditional fertility patterns. The overlay of multiple factors forms the currently diversified transmission mechanism.

The transformation of population structure affects economic growth mainly through three channels. Changes in the number and composition of the working-age population directly influence labor market supply and demand and labor productivity; life-cycle behaviors influenced by age

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structure changes affect total savings rates and consumption patterns; and population aging increases fiscal expenditure pressure, forcing the government to maintain balance through taxation and transfer payments, which in turn reduces resource allocation efficiency.

## 5. Economic strategies for responding to the transformation of population structure

### 5.1. Macroeconomic policy level: top-level design and institutional improvement

The core of macro policy formulation lies in addressing the negative impacts of the declining demographic dividend and providing institutional conditions for the release of the demographic quality dividend. By improving the fertility support policy system, reducing the costs of child-rearing (education, housing, childcare), enhancing fertility benefits, and extending maternity leave, the trend of low birth rates can be mitigated; by promoting nationwide coordination of pension insurance and improving a multi-level pension insurance system (basic pension insurance, corporate annuities, and individual pensions), the pressure on fund revenues and expenditures can be alleviated; by deepening household registration system reforms, institutional barriers to interregional labor mobility can be removed, optimizing the allocation of labor resources; and by increasing investment in basic and vocational education, the transition from a demographic quantity dividend to a quality dividend can be promoted.

### 5.2. Meso-level industry perspective: industrial upgrading and structural optimization

At the industry level, it is necessary to align with the trend of population structure transformation and cultivate new drivers of economic growth. Traditional labor-intensive industries should advance automation and intelligent upgrades to enhance industrial added value and reduce dependence on low-skilled labor; vigorously develop the elderly care industry, health industry, biopharmaceutical industry, and other 'silver economy' sectors to meet the changing consumption demands brought by an aging population; nurture technology-intensive industries such as the digital economy, high-end manufacturing, and artificial intelligence, fully leveraging the advantages of improved human capital to create new engines of economic growth; and optimize the supply structure of the service sector by improving public service-related industries such as elderly care, childcare, and healthcare to alleviate supply-demand imbalances.

### 5.3. Micro-level actors: behavioral adjustments of enterprises and households

Individuals and enterprises are deeply affected by changes in population structure, but they are also important forces in responding to these changes. At the enterprise level, it is necessary to adjust existing employment models, increase investment in employee skills training, optimize production steps and processes, and replace manual labor with machinery and equipment; and adapt to changes in social consumption habits by optimizing and adjusting their products and services. At the household level, consumption and savings structures need to be adjusted, with an increase in rigid reserves required for pension and health security; attention should be paid to children's education and the improvement of one's own work skills to adapt to changes in the job market; and fertility issues should be addressed rationally, balancing the relationship between childbearing, work, and life.

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## 6. Conclusion

There have already been relatively systematic achievements both domestically and internationally in the study of the relationship between population structure and economic growth. The theory has evolved from the traditional demographic dividend theory to the second demographic dividend theory, incorporating factors such as human capital, savings rates, and pension security into the analytical framework. On the empirical level, research methods are diverse, with provincial panel data, cross-country comparative analysis, and dynamic panel models being widely used. In terms of research perspective, the focus has gradually expanded from solely macroeconomic growth to include subfields such as industrial structure, consumption and savings, social security, and the labor market, with increasing academic attention paid to regional heterogeneity across different areas and industries.

Despite the abundance of existing research achievements, there are still three main shortcomings. First, causal identification issues need to be further addressed. Population structure and economic growth interact with each other—changes in population structure can influence economic growth, while economic growth may alter population behavior patterns, though existing research has not fully explored this relationship. Secondly, the analysis of heterogeneity is not sufficient. The majority of existing research uses holistic analytical approaches, and few studies put an emphasis on regions of the country or an industry, which means that they do not offer a lot of guidance to local governments and businesses. Thirdly, the relationship between population structure change and technological advancement is not well-researched. The altering nature of artificial intelligence, automation technologies, and the digital economy on demographic dividends, the compensating effects of new technologies in counteracting the adverse effects of aging have not been adequately studied, without extensive and careful research. Given the current trends in China's population structure, future research could focus on the following directions: First, employ empirical research methods such as quasi-natural experiments, instrumental variables, and difference-in-differences to effectively control endogeneity issues and explore causal relationships; Second, strengthen heterogeneity analysis by examining the differentiated impacts and mechanisms of population structure transformation across regions and industries; Third, integrate the application of the digital economy and artificial intelligence into analytical frameworks to expand research content and investigate the dual impact mechanisms of technological progress and population structure transformation; Fourth, utilize dynamic simulation models to predict the long-term effects of fertility support policies and pension security policies, enhancing policy evaluation capabilities and providing scientific theoretical foundations for subsequent policy optimization; Fifth, conduct cross-country comparative studies to draw lessons from other countries' experiences in managing population structure transitions, offering reference for China's policy formulation.

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