

Chinese macroeconomics needs to change its underlying logic

Authors: Wang Kaiming, Wang Kaiming

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Abstract

In the late 1970s, New China implemented the reform and opening-up policy, gradually establishing a socialist market economy system with Chinese characteristics. Chinese economics comprehensively introduced Western economic theories, including macroeconomics. Western economics is built upon the foundation of capitalist private ownership of means of production, does not consider state-owned means of production, and assumes the government merely plays a night watchman role. Directly applying Western macroeconomic theories to study China's economic phenomena fails to address issues of government-owned means of production and government investment, leading to numerous problems in current macroeconomic research, particularly in the field of fiscal policy. To resolve these issues, it is essential to consider China's socialist characteristics and reposition the dual role played by the Chinese government in economic management: providing optimal public goods and acting as a social planner to maximize overall social welfare. In this way, many existing problems in current Chinese macroeconomic research can be readily solved.

Full Text

Chinese Macroeconomics Needs to Change its Underlying Logic

Tianfu College of Southwestern University of Finance and Economics

Abstract

At the end of the 1970s, New China implemented the reform and opening-up policy and gradually established a socialist market economic system with Chinese characteristics. Chinese economics comprehensively introduced Western economic theories, including macroeconomics. Western economics is built upon

the foundation of capitalist private ownership of the means of production, without considering state-owned means of production, and assumes the government merely plays the role of a night watchman. Directly applying Western macroeconomic theory to study China's economic phenomena cannot adequately address issues related to government-owned means of production and government investment, leading to numerous problems in contemporary macroeconomic research, particularly in the field of fiscal policy. To solve these problems, we must consider China's socialist characteristics and reposition the dual role played by the Chinese government in economic management: providing optimal public goods and acting as a social planner to maximize overall social welfare. Once this is done, many existing problems in current Chinese macroeconomic research can be readily resolved.

Keywords: Chinese Macroeconomics, Optimal Public Goods, Social Planner, Optimal Social Welfare

I. Introduction

More than seventy years have passed since the founding of New China. Under the leadership of the Communist Party of China, the Chinese people have achieved tremendous accomplishments, particularly in the economy. China's total economic output has become the second largest in the world, with GDP reaching 124 trillion yuan in 2022. In terms of purchasing power parity, China surpassed the United States as early as 2014 to become the world's largest economy. In the early days of New China, the country was a typical agricultural nation with an extremely weak industrial foundation. In 1949, China's steel production was less than 160,000 tons—insufficient for every citizen to purchase a kitchen knife. Through the efforts of the entire nation, China has now become the world's largest industrial country. In 2022, China's industrial output value reached \$5.8 trillion, exceeding the combined total of the United States, Japan, and Germany. China has become the only country in the world that possesses all industrial categories as classified by the United Nations, and has achieved comprehensive leadership in new energy and new energy vehicles.

What explains these remarkable economic achievements? Numerous domestic scholars have conducted research from different perspectives, particularly from the standpoint of macroeconomics, reaching various conclusions. However, their research examines China's economy from the perspective of Western macroeconomics, rarely considering China's specific national conditions as a socialist country. After all, Western macroeconomics is built upon the foundation of the capitalist system, which is fundamentally different from socialism. In capitalist countries, the means of production are privately owned, whereas in our socialist country, they are state-owned, and the returns from state-owned assets belong to the government. Of course, China is still in the primary stage of socialism, implementing an economic system with public ownership as the mainstay and multiple forms of ownership developing together. This determines that the underlying logic of Chinese macroeconomics is completely different from that of

Western macroeconomics, particularly regarding the role of government in the macroeconomy. Chinese macroeconomics needs thorough reform to adapt to the needs of studying the Chinese economy.

II. Literature Review

After the founding of New China, the country learned from the Soviet Union, carried out socialist transformation, implemented socialist ownership of the means of production, and practiced a planned economy. The guiding economic theory was Soviet planned economy theory, with certain modifications to adapt to China's national conditions. The core guiding principle was the central planning solution in macroeconomics, similar to the Ramsey problem. New China's planned economy achieved tremendous success, laying the industrial foundation for rapid development after reform and opening up. However, planned economy also had inherent shortcomings. For instance, Hayek (1948) from the Austrian School of Economics fiercely criticized socialism and planned economy, pointing out that the deficiency of planned economy lies in the difficulty of obtaining sufficient information needed for economic decision-making, and secondly, the inability to use prices as a signal transmission function for economic operation. From the late 1970s to the early 1980s, China implemented the reform and opening-up policy, introduced private capital and market economy, and gradually established a market economic system with Chinese characteristics.

With the establishment of this system, China's economic system also underwent a major transformation, shifting from planned economy economics to a market economy-based economic system. Market economy was a new phenomenon at the time of reform and opening up, and Chinese economics introduced Western economic theoretical systems, including Western macroeconomic theory. Western macroeconomics was founded by Keynes (1936). Due to the 1929 economic crisis that devastated the global economy, Keynes discovered that Western economies faced insufficient effective demand, Say's Law did not hold, and required active government intervention to provide more demand and stimulate the economy. Keynes' theory received a response in the United States, which first implemented the New Deal, gradually pulling the American economy out of the quagmire, although this view remains controversial. After World War II, Keynesianism became the mainstream macroeconomic theory. In the 1970s, Western economies fell into stagflation, Keynesianism fell out of favor, and neoliberal economics gradually occupied the mainstream position.

In the 1950s, Samuelson (1958) theoretically synthesized neoclassical economics and Keynesianism, forming the neoclassical synthesis school with stronger micro-foundations. Friedman proposed monetary theory, arguing that money supply is the factor determining the benchmark of production value, and that inflation fundamentally originates from money supply. Subsequently, Lucas (1972) proposed rational expectations theory, arguing that people in economic activities make price expectations before entering the market based on past price change data. Under Lucas' leadership, business cycle issues re-entered researchers' per-

spective, and economists began to pay attention to the role of real factors in economic life. Kydland and Prescott (1982) and Long and Plosser (1983) proposed real business cycle (RBC) theory, which holds that external disturbances are the root cause of business cycles—the cause lies not within the economic system but from external factors.

Addressing these shortcomings, New Keynesianism abandoned the view of wage and price rigidity, proposing wage stickiness and price theory, arguing that nominal wages and prices adjust slowly over long periods. New Keynesism borrowed the DSGE modeling method from neoclassical economics, forming the New Keynesian dynamic stochastic general equilibrium model (NK-DSGE). This model introduces more stochastic shocks based on RBC and considers price and wage stickiness. Closed economy models mainly include Christiano et al. (2005) using traditional econometric methods to estimate models, and Smets and Wouters (2003, 2007) using Bayesian estimation to study the EU and US economies. DSGE models have become tools for Western central banks to conduct monetary policy management. Adolfson et al. (2007) built an open economy DSGE model by introducing nominal and real frictions to study the EU economy. DSGE models have now become the mainstream method in macroeconomic research, with Lawrence et al. (2018) providing a good review of DSGE development and recent advances.

Besides being used to study national economic operations, many scholars have applied them to macro-financial policy and fiscal policy research. Bernanke et al. (1999) established a financial accelerator model within a quantitative business cycle framework. Cúrdia and Woodford (2016) used a New Keynesian model to study credit frictions and optimal monetary policy. Michael Woodford (2016) similarly used a New Keynesian model to study US quantitative easing and financial stability. Aiyagari and McGrattan (1998) constructed a social welfare function to study optimal debt in the US using a dynamic general equilibrium model. Floden (2001) modified the model from infinitely-lived households to a two-period overlapping generations model to study optimal government debt. Vogel (2014) used a multi-period overlapping generations model to handle optimal government debt models. Farhi et al. (2012) considered information asymmetry between government and individuals, using dynamic game methods to apply overlapping generations models to optimal capital taxation research. Saez and Stantcheva (2016) conducted in-depth research on optimal tax theory, proposing the use of generalized marginal social welfare weights to evaluate tax reforms. Fleurbaey and Maniquet (2018) studied optimal tax theory from the perspective of fairness.

Chinese scholars have also used Western-established theories to study Chinese macroeconomics. Due to the success of RBC and DSGE models abroad, these models have been introduced by numerous domestic scholars to study China's economy. Chen Kunting, Gong Liutang, and Zou Hengfu (2004) examined the impact of supply and demand on China's economy. Huang Zelin (2005) built a three-sector RBC model based on households, enterprises, and government

to study China's economy. Lü Chaofeng and Huang Meibo (2012) introduced consumption habits and borrowing constraints to build a new RBC model. Liu Bin (2008) built a Chinese open-economy DSGE model with a "financial accelerator," using Bayesian techniques to estimate the model and conduct Chinese financial policy analysis. Li Xuesong and Wang Xiuli (2011) introduced wage stickiness into the BGG model and simulated and compared the effects of different monetary policies in China. Liu Yaocheng and Xu Xiaoping (2010) introduced external demand shocks into their two-country DSGE model to analyze China's external economic imbalance. Lin Renwen and Yang Yi (2014) introduced state-owned enterprises into a DSGE model to examine the effectiveness of monetary policy during China's marketization process from the perspective of factor allocation marketization and gradual relaxation of industry access restrictions. Chen Shiyi and Wang Xiang (2016) built a multi-sector DSGE model with a real estate market, introducing a banking sector with financial frictions to study the transmission mechanism of monetary policy affecting real estate prices.

Some scholars have also applied these models to Chinese fiscal policy research. Guo Changlin (2016) introduced productive government expenditure into a dynamic stochastic general equilibrium model, arguing that China's fiscal policy is not the main cause of inflation. Zhao Fuyang, Wang Chan, and Gong Liutang (2017) built a DSGE model reflecting Chinese local governments' land finance behavior, theoretically and quantitatively analyzing the dynamic accelerator mechanism of land finance and finding that this mechanism can well explain the characteristic facts of China's economic fluctuations. Zhu Jun and Xu Zhiwei (2018) introduced central and local government structures into mainstream dynamic general equilibrium models to examine the dynamic impact of local fiscal policies on China's macroeconomy under fiscal decentralization. Tian Guoqiang and Zhao Xuxia (2019) studied the joint impact of financial system efficiency and local government debt. Dai Ling and Zhang Zuomin (2021) studied China's expansionary fiscal policy.

Through research on Chinese and foreign macroeconomic literature, we find that Western macroeconomic theory is built upon the capitalist economic system, reflecting the characteristics of private ownership of capitalist means of production. China, however, is a socialist country implementing a socialist economic system. Directly introducing Western macroeconomic theory to study China's economy creates problems. For example, the United States has no state-owned enterprises, so Western macroeconomics does not need to consider state-owned enterprise modeling. Early literature studying China's macroeconomics did not consider state-owned enterprises or the issue of state ownership of means of production. Some recent literature has begun to consider state-owned enterprises and state-owned assets, but without clearly positioning the role of the Chinese government in economic management, this leads to various problems when handling state-owned enterprises and assets, especially in fiscal policy research. For instance, some literature models state-owned enterprises pursuing the maximum consumption utility of SOE managers, completely ignoring that state-owned en-

terprises are state-owned and managers have no right to consume SOE profits. Some literature introduces public capital when handling government assets, but treats it as a free public good in enterprise optimization, ignoring that government investment in China forms state-owned means of production used for SOE operations, and treats government investment as a first-order autoregressive process. Similarly, when studying optimal fiscal policy, the unclear positioning of government fails to clarify that government borrowing aims to provide optimal public goods for society, making it impossible to solve the optimal government debt problem. Additionally, when studying optimal taxation, the literature does not distinguish between households without means of production and capitalists with means of production, homogenizing households and failing to reflect the difference between ordinary households' welfare and capitalist households' welfare, nor can it consider the inconsistency between public goods utility and residents' utility. When handling local government debt, some literature uses the Ramsey optimization method, ignoring that households and local governments are independent entities that need to make optimal decisions separately, equivalent to a two-party game.

In summary, numerous problems exist in current Chinese macroeconomic research, with the root cause being the mispositioning of the Chinese government. The Chinese government differs from Western capitalist governments—it has a dual role. One role is to provide optimal public goods to society. The other is as a social planner that needs to weigh the welfare of worker households, capitalist households, and public goods to pursue maximum overall social welfare. Once the Chinese government's positioning is clear, many problems in current Chinese macroeconomic research can be readily resolved.

III. Model

1. Western Macroeconomic Models

We first present the mainstream Western macroeconomic model here. Although other different models exist, they are essentially similar without fundamental differences. Generally, these models involve three main participants: households, firms, and government. If other factors need to be considered, relevant participants can be added, such as commercial banks and central banks when studying monetary policy.

1.1 Households Households provide labor to firms and receive wage income. Households need to make choices among consumption, work, asset holding, bond holding, and investment to maximize household utility (welfare). The household's constraint conditions involve several key variables: U_{jt} represents the utility of household j at time t , C_{jt} is the consumption of household at time t , L_{jt} is the labor provided by the household, l_s represents the Frisch elasticity of labor supply, subscript $t+s$ indicates the time $t+s$ after time t , W_t is the wage rate, B_{jt} is the household's bond holdings, K_{jt} is the asset held by the household, $u_t(Y)$ is the usage cost, u_t is the utilization rate of the household's asset,

I_{jt} is the household's investment, R_{kt} is the rental rate, R_t is the interest rate, P_t is the price level, T_{jt} is the tax paid by the household, which is a lump-sum tax, and E_t represents conditional expectation.

The household's asset evolution equation is where δ is the asset depreciation rate, and $\Phi(\cdot)$ is the investment cost function.

1.2 Firms Firms belong to all residents. Firms use assets held by households and employ residents, pursuing profit maximization. Firms are generally divided into two types: intermediate goods producers and final goods producers. Intermediate goods producers belong to monopolistic competition, while final goods producers belong to perfect competition.

The production function of intermediate goods firms is: The nominal profit of intermediate goods firms is: $P_{it}Y_{it} - W_{tL_{it}} - R_{kt}K_{it}$ where P_{it} is the price of intermediate goods, Y_{it} is the output of intermediate goods firm i , A_t is the total factor productivity coefficient, K_{it} is the asset rented by the firm from households, and F is the fixed cost.

When considering the profit of intermediate goods firms, economic profit is calculated. This statement is not very clear in Western macroeconomics. Rent refers to the firm renting assets from households and paying returns to households. However, since firms are owned by residents, there is no issue of renting assets from themselves. Marx explained this clearly in *Das Kapital*: the rent here refers to the interest-like income that residents receive by assuming ownership of means of production, similar to loan capital. Profit is the income obtained by households using means of production, and together they constitute the average profit enjoyed by households (playing the role of capitalists). Households using capital play the role of entrepreneurs. Some literature directly calls capitalists firms.

Final products are processed from intermediate products, denoted by Y_t , and their relationship satisfies the following equation: $Y_t = \left(\int_0^1 Y_{it}^{(\epsilon-1)/\epsilon} di \right)^{\epsilon/(\epsilon-1)}$ where ϵ is the price markup in production. The first-order condition for final goods producers pursuing profit maximization is:

1.3 Government The government mainly provides public goods, with revenue from taxes and bond issuance. G_t is consumption expenditure, B_t is government-issued bonds, and the budget constraint follows standard formulations. The central bank determines the interest rate according to the Taylor rule, where π^* , R^* , and Y^* represent the central bank's target inflation, target interest rate, and target output respectively, ρ_Y is the output smoothing parameter, and ρ_π is the inflation smoothing parameter.

From the mainstream Western macroeconomic model, we can see that the government only plays a passive role as a public goods provider in economic life, without pursuing the provision of optimal public goods. Logically, the current

mainstream Western macroeconomic model has certain problems. First, it assumes that means of production are owned by all residents, without considering the basic characteristic of capitalist countries where means of production are owned by capitalists—isn't this another form of socialism (public ownership of means of production by all citizens)? Second, there is the issue of the government's role. Government consumption is treated as an autoregressive process (see the appendix of Smets, Wouters (2007)). In practice, this is not the case. For example, when the economy is in recession, if government consumption is an autoregressive process, then for adverse external shocks, the government would need to reduce consumption, and the economy would fall into a death spiral. In practice, governments adopt counter-cyclical fiscal policies, which are clearly active government actions, not an autoregressive process.

Even in literature studying optimal tax systems, governments pursue optimal government consumption decisions, but without considering household heterogeneity—the distinction between ordinary households and capitalist households—using the central planning solution. If household heterogeneity is considered, then government-provided public goods must be considered, as this welfare is different from residents' welfare, and secondly, ordinary residents' welfare is different from capitalists' welfare. This necessarily requires considering the dual role of government mentioned earlier.

2. Chinese Macroeconomic Model

In China, the participants in the entire economy include: households, private enterprises, state-owned enterprises, and government. We divide households into two categories based on whether they own means of production: households that own means of production are called capitalist households, and those that do not are called ordinary households. China implements a socialist system with public ownership as the mainstay and multiple forms of ownership coexisting. Therefore, means of production are owned by capitalists and the state. We divide production enterprises into private enterprises and state-owned enterprises, where private enterprises are established by capitalists using capitalists' means of production, and state-owned enterprises are established by the government using government-owned means of production. Capitalist households own private enterprises, so private enterprise profits belong to capitalist households. State-owned enterprise ownership belongs to the state, and SOE profits belong to the government. In China, the government manages the entire society and provides public services to society and all residents.

2.1 Households Households are similar to those in Western macroeconomics, except they do not own means of production and have no income from means of production. Their utility function is: where C_{jt}^w is the consumption of worker households, L_{jt} represents the labor time provided by the household to production sectors (including private and state-owned enterprises), h represents the Frisch elasticity of labor supply, b represents the discount factor, superscript w

indicates worker households, and superscript j represents the j -th worker household, a continuum between 0 and 1. Worker household income comes from providing labor to enterprises and receiving wage income. Worker households can use income for current consumption or investment, purchasing government-issued financial bonds (for simplicity, assuming only one-period bonds are issued) to obtain returns for future consumption. Therefore, the household's constraint condition is where B_{jt}^w is the government bond purchased by worker households, B_{t-1} represents the household cashing in bonds purchased in the previous period, W_t is the wage rate, P_t is the price level, and T_{jt}^w is the tax paid by worker households, represented by a lump-sum tax.

Worker households need to balance current consumption, work, and investment (bond purchases) to maximize utility.

2.2 Capitalist Households Capitalists own means of production, establish enterprises, employ workers, and obtain profits. Capitalist households also maximize consumption utility, with the consumption utility function being:

where C_{ht}^c is the consumption of capitalist households, superscript c indicates capitalist households, and h represents the h -th capitalist household, a continuum.

Capitalist households need to balance consumption, asset holding, and investment to maximize household utility. The consumption constraint condition for capitalist households is:

$R_{kt}u_tKt^c$ is the means of production owned by capitalist households, also called private capital, R_{kt}^c is the cost (rate) paid by private enterprises for using capitalists' assets, u_t is the utilization rate of private capital, $\Phi(u_t)$ is the capital utilization adjustment cost function, P_{ht}^c is the profit obtained by capitalists from operating enterprises, I_{ht}^c is the investment made by capitalist households, and T_{ht}^c is the tax paid by capitalist households.

The capital owned by capitalist households depreciates during use, leading to continuous capital reduction, so households invest to achieve capital renewal and accumulation. Therefore, the dynamic evolution equation for capitalist households' capital is where δ^c is private capital depreciation, and $S(\cdot)$ is a positive investment cost function.

2.3 Enterprises China is a socialist country in the primary stage of socialism, with economic entities composed of state-owned and private enterprises. State-owned enterprises are funded and established by the government, using state-owned assets, while private enterprises are established by capitalists using capitalist households' assets. The treatment of enterprises is similar to Western macroeconomics, except we distinguish between private and state-owned enterprises.

2.3.1 Intermediate Goods Production State-owned enterprises are established with government investment, using state-owned assets, while private enterprises are established by capitalists using capitalist households' assets. To better describe enterprise production, we use the Cobb-Douglas production function. The production function for state-owned enterprises is:

$Y_t^G = A_t^G (v_{tK} t^G)^\alpha (L_t^G)^{1-\alpha} - F^G$ where Y_t^G represents the quantity of intermediate goods produced by state-owned enterprises, $v_{tK} t^G$ represents the state-owned assets provided by the government used by SOEs, L_t^G represents the labor provided by workers employed by SOEs in producing intermediate goods, α represents the share of state capital in SOE output, $1-\alpha$ represents the share of labor in SOE output, F^G is the fixed cost of SOEs, A_t^G is the SOE production technology factor, also called total factor productivity, and superscript G represents state-owned enterprises. As government-owned enterprises, SOEs pursue profit maximization:

where R_{kt}^G is the capital cost (rate) paid by state-owned enterprises for using state-owned assets. The treatment of private enterprises is similar to that of state-owned enterprises, except the superscript for SOE variables is replaced with H .

2.3.2 Final Goods Assume final goods are produced by a perfectly competitive firm using intermediate goods, with production technology: $Y_t = \left(\int_0^1 Y_{it}^{(\epsilon-1)/\epsilon} di \right)^{\epsilon/(\epsilon-1)}$ where ϵ is the price markup, ω_i is the weight of intermediate goods in total output in the steady state, for $i \in \{H, G\}$.

2.4 Government The positioning of government is the decisive factor in building Chinese macroeconomics. The Chinese government, led by the Communist Party of China, has a dual role in economic management. First, the government needs to provide public goods services to society. Second, the government also acts as a social planner, needing to balance the interests of all parties and pursue maximum social welfare.

The need for government to provide optimal public goods has a logical foundation. Before reform and opening up, China practiced a socialist planned economy, and the government's goal was naturally to provide optimal public goods to society. We cannot say that after implementing a socialist market economy, the Chinese government has abandoned the goal of providing optimal public goods to society.

China implements a socialist system with Chinese characteristics where public ownership of means of production is the mainstay with multiple forms of ownership coexisting. The government owns large amounts of state-owned assets and enterprises, which control important sectors of the national economy such as military industry, electricity, petroleum and energy, transportation, and finance, and can provide large amounts of public goods services to society. The government's ownership of large amounts of means of production ensures

its relative independence, free from control by private capital, enabling it to consider national policies from the perspective of national interests. A huge advantage of government ownership of state assets is that when the economy encounters difficulties and residents' investment willingness is weak, the government can increase investment in addition to using monetary and fiscal policies to drive economic development—this is precisely China's huge advantage over capitalist countries. For example, when encountering the global financial crisis in 2008, the government promptly introduced a four trillion yuan investment plan, pulling the sharply declining economy back on track and enabling China's economy to enter a new development stage. Although the four trillion yuan investment policy had shortcomings, its merits outweighed its flaws.

Private investment plays an increasingly important role in China, but private investment has a profit-chasing nature and rarely gets involved in high-risk, long-payback projects such as infrastructure and early-stage R&D for high-tech projects. These are precisely areas where state-owned enterprises can play their advantages—SOEs have sufficient financial security and can drive the development of new industries. The high-speed rail investment in the four trillion yuan investment plan is a typical example. Due to the government's substantial investment, China's high-speed rail operating mileage has exceeded 40,000 kilometers, forming a world-leading eight-vertical and eight-horizontal high-speed rail network that would be difficult to complete through private investment alone.

China implements a socialist system led by the Communist Party of China, a people's democratic dictatorship. The Communist Party of China represents the overall interests of the state and the interests of all Chinese people. The people's aspiration for a better life is the Party's goal. Therefore, the government needs to consider the utility of worker households and capitalist households—after all, the capitalist class is currently also part of socialist society—pursuing maximum household utility while also providing necessary public goods. Residents need not only their own consumption and investment but also public goods services provided by the government. The more and better public goods the government provides, the more satisfied the people are, and the higher the government's willingness to provide public goods. Moreover, the government actively improving the economy and raising people's living standards is also the foundation for the government's long-term governance, which is also one of the government's pursuit goals.

We still use a utility function to represent the government's role in providing optimal public services. Assume the government converts government expenditure into public goods through a linear technology—the higher the expenditure, the more services provided, the higher the people's satisfaction with the government, and the higher the government's utility. Government expenditure is constrained by many factors. Government revenue includes not only tax revenue but also huge state-owned assets that generate enormous returns annually. When considering expenditure on public goods, the government must also con-

sider investment, making choices between current expenditure and investment (delayed expenditure). Therefore, the government's budget constraint condition is:

$$G_t + I_t^G + B_{t-1} = R_{kt}^G v_t K_t^G + T_t + B_t / (1 + R_t) + \Phi(v_t)$$

where G_t is government expenditure, I_t^G represents government investment, B_t is government-issued bonds, R_{kt}^G represents the return rate the government obtains by providing its assets to state-owned enterprises, v_t is the utilization rate of state-owned assets, K_t^G represents the stock of assets owned by the government, $\Phi(v_t)$ is the adjustment cost function for the utilization rate of state-owned assets, and T_t represents government tax revenue, which is the sum of taxes paid by households and capitalist households. Additionally, the government's asset evolution equation is:

$$K_{t+1}^G = (1 - \delta^G) K_t^G + I_t^G$$

where δ^G is the depreciation rate of state-owned assets.

The government needs to provide public goods to society. We assume the government can linearly convert government expenditure into public services through a technology where higher expenditure yields more services. Government utility is the pursuit of providing optimal public goods to society. The government's decision variables are G_t , I_t^G , K_t^G , B_t , with constraint conditions (19) and (20). When making optimal public service decisions, tax revenue T_t is treated as a given variable, determined by the following overall social optimal welfare.

In addition to providing public goods services to society, the government must comprehensively balance the interests of worker households and capitalist households to achieve maximum social welfare:

$$\max J_1 U_t^w + J_2 U_t^c + J_3 V(G_t)$$

where J_1 , J_2 , J_3 represent the government's weight attached to the utility of worker households, capitalist households, and public service provision, respectively. These are weight indicators satisfying $J_1 + J_2 + J_3 = 1$. In New China's history, the value of J_i has been variable—for example, in the late 1950s when $J_2 = 0$, China eliminated the bourgeoisie. Changes in J_i are major political events requiring joint decision-making by the whole society.

Here, \tilde{X} represents the respective aggregation of optimal decision variables for worker households and capitalist households. C_t^w represents the optimal consumption decision for worker households, aggregated across all worker households. C_t^c represents the optimal consumption decision for capitalist households, aggregated across all capitalist households. The government's decision variables are tax revenue T_t , T_t^w , T_t^c . Theoretically, the government, as an asset holder, should also pay taxes. For convenience, we assume the government is not taxed, and the theoretical tax payment is treated as part of the returns from government-held assets used for public services. The government's constraint condition when making optimal decisions is government constraint

(19). The worker household constraint is (2), but all variables in the worker household constraint are optimal choices for worker households, with optimal variables removing superscripts j and h and aggregated. The capitalist household constraint is (4), with all variables being optimal choices for capitalist households and aggregated. The remaining problem is a simple mathematical question. In this way, we have reconstructed the underlying logic of Chinese macroeconomics, achieving logical consistency throughout the entire economy and fully conforming to China's actual conditions. Under this framework, studying China's macroeconomic problems becomes exceptionally easy.

IV. Conclusion

This paper examines the mainstream Western macroeconomic model, pointing out that Western macroeconomic models are built upon the Western capitalist economic system of private ownership of means of production and are not suitable for directly studying China's macroeconomy. The main reason is that capitalist countries position the government merely as a night watchman. China implements a socialist market economic system with public ownership as the mainstay and multiple forms of ownership developing together, fundamentally different from the Western economic system. Therefore, studying China's macroeconomy requires building a macroeconomic system that fits China's national conditions. This paper reconsiders the role played by the Chinese government in economic management: first, providing optimal public goods to society, and second, acting as a social planner that needs to balance the welfare of resident households, capitalist households, and public goods welfare to pursue optimal overall social welfare. Thus, we have constructed a macroeconomic model with Chinese characteristics that can be widely used in Chinese macroeconomic research.

[1] Hayek. Individualism and Economic Order[M]. 2003, SDX Joint Publishing Company. [2] Keynes. The General Theory of Employment, Interest and Money[M]. 1936, London: Macmillan. [3] Samuelson A. An exact consumption–loan model of interest with or without the social contrivance of money[J]. Journal of Political Economy, 1958, (66): 467–82. [4] Lucas R. Expectations and the Neutrality of Money[J]. Journal of Economic Theory, 1972, (4): 103~124. [5] Kydland E, Prescott C. Time to Build and Aggregate Fluctuation[J]. Econometrica, 1982, (50): 1345 -1370 [6] Long, John B. and Charles I. Plosser. Real Business Cycles [J]. Journal of political Economy, 1983, 91 (1): 39–69. [7] Christiano, L. J., M. Eichenbaum, and C. L. Evans. Nominal rigidities and the dynamic effects of a shock to monetary policy[J]. Journal of Political Economy, 2005, 113: 1–45. [8] Smets, F, and R Wouters. An estimated dynamic stochastic general equilibrium model of the euro area[J]. Journal of the European Economic Association, 2003,1: 1123–75. [9] Smets, F, and R Wouters. Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach[J]. American Economic Review, 2007, 97 (3): 586–606. [10] Adolfson M, Laséen S, Lindé J, Villani M. Bayesian Estimation of an Open Economy DSGE Model

with Incomplete Pass-Through[J]. *Journal of International Economics*, 2007,72:

[11] Christiano, Lawrence J, Martin S. Eichenbaum, and Mathias Trabandt. On DSGE Models[J]. *Journal of Economic Perspectives*, 2018, 32 (3): 113-40. [12] Bernanke, B.S., Gertler, M., Gilchrist, S. The financial accelerator in a quantitative business cycle framework[M]. In: Taylor, J.B., Woodford, M. (Eds.), *Handbook of Macroeconomics*. Vol. 1C. North-Holland, Amsterdam, 1999, Chapter 21: 1341–93. [13] Cúrdia V, Woodford M. Credit Frictions and Optimal Monetary Policy[J]. *Journal of Monetary Economics*, 2016, 84: 30-65. [14] Woodford M. Quantitative easing and financial stability[J]. *Social Science Electronic Publishing*, 2016. [15] Aiyagari R and E McGrattan. The optimum quantity of debt[J]. *Journal of Monetary Economics*, 1998, 42(3): 447–469. [16] Floden M. The effectiveness of government debt and transfers as insurance[J]. *Journal of Monetary Economics*, 2001,48(1): 81–108. [17] Vogel E. Optimal Level of government debt: matching wealth inequality and the fiscal sector[J]. *Social Science Electronic Publishing*, 2014. [18] Farhi, E., Sleet C., Werning I., Yeltekin S. Non-linear Capital Taxation Without Commitment[J]. *The Review of Economic Studies*, 2012,79(04): 1469-1493. [19] Saez E, S Statcheva. Generalized Social Marginal Welfare Weights for Optimal Tax Theory[J]. *American Economic Review*. 2016,106(1): 24-45. [20] Fleurbaey M, F Maniquet. Optimal Income Taxation Theory and Principles of Fairness[J]. *Journal of Economic Literature*, 2018,56(3):1029-79. [21] Chen Kunting, Gong Liutang, Zou Hengfu. What Causes Economic Growth Fluctuations, Supply or Demand: An RBC Analysis of China's Economy[J]. *World Economy*, 2004, (4)11: 3-11. [22] Huang Zelin. Characteristics of China's Economic Cycles and Fiscal Policy Effects—An Empirical Analysis Based on a Three-Sector RBC Model[J]. *Economic Research*, 2005, 6: 27-39. [23] Lü Chaofeng, Huang Meibo. Biased Technical Change, Habit Formation and Characteristics of China's Economic Cycles—An Empirical Analysis Based on RBC Model[J]. *Economic Review*, 2012, 3: 31-43. [24] Liu Bin. Development and Application of China's DSGE Model in Monetary Policy Analysis[J]. *Financial Research*, 2008, 10: [25] Li Xuesong, Wang Xiuli. Wage Stickiness, Economic Fluctuations and Monetary Policy Simulation—An Analysis Based on DSGE Model[J]. *Quantitative & Technical Economics*, 2011, 11: 22-33. [26] Liu Yaocheng, Xu Xiaoping. Supply and Demand Shocks and China's External Economic Imbalance—A Simulation Analysis Based on a Two-Country DSGE Model[J]. *Finance & Economics*, 2011, 3:102-112. [27] Lin Renwen, Yang Yi. China's Marketization Reform and the Evolution of Monetary Policy Effectiveness—An Analysis Based on DSGE Model[J]. *Management World*, 2014, 6: 39-52. [28] Chen Shiyi, Wang Xiang. Financing Costs, Real Estate Price Fluctuations and Monetary Policy Transmission[J]. *Financial Research*, 2016, 3: [29] Guo Changlin. Forgotten Aggregate Supply: Does Fiscal Policy Expansion Necessarily Lead to Inflation?[J]. *Economic Research*, 2016: 2: 30-41. [30] Zhao Fuyang, Wang Chan, Gong Liutang. Land Finance and China's Economic Fluctuations[J]. *Economic Research*, 2017, 12:46-61. [31] Zhu Jun, Xu Zhiwei. Fiscal Decentralization, Inter-regional Competition and China's Economic Fluctuations[J]. *Economic Research*, 2018, 1: 21-34. [32] Tian Guoqiang, Zhao Xuxia. Joint Impact of Financial System Efficiency and Local

Government Debt[J]. Economic Research, 2020, 8:4-20. [33] Dai Ling, Zhang Zuomin. Who Benefits from Expansionary Fiscal Policy[J]. China Economic Quarterly, 2021, 4: 1167-1188.

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