

The Political Foundations of China's Growth and Welfare

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Abstract

This paper develops a political economy model to study the relationship between the mechanism of political selection and its implications on growth and welfare under China authoritarian regime. It shows that the perceived political promotion system induces local officials to maximize growth by allocating more public fund to growth and less for welfare support. Our model well explains the facts of extraordinary growth in China in the past decades, and the mechanism of less resources invested for poverty alleviation, equality and pollution reduction.

Keywords: China, Growth, Political selection, Local Developmentalism

JEL Classification: E61; H30; H75;

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1 Introduction

Political institutions and politicians' incentives have significant impact on economic growth and business cycles, in both democracies (e.g. Alesina *et al.* 1997; Glaeser and Shleifer, 2005) and in authoritarians (e.g. Li and Zhou 2005; Xu 2011; Su *et al.* 2012). Many argues that China's remarkable growth was partly due to the highly active local governments and their local developmentalism (e.g Bai *et al.* 2015, Chen *et al.* 2005; Knight 2015). This paper develops a model where the perceived political promotion system offers incentives to local government officials to promote economic growth, and even encourages them to compete with predecessors and/or neighboring regions. This growth-focused local developmentalism have implications to people's welfare. It may have caused lower public spending on poverty alleviation and environment protection, thus may be sub-optimal in terms of welfare.

The election process and outcomes under democracy are better understood than the political selection mechanisms and their implications to economic growth and welfare under the non-democratic system, such as the authoritarian regime in China. It is assumed in the political economy literature that, in most democracies, policies and government officials are usually decided by majority voting. Politicians and political parties respond to the demand of the electorate, mostly the median voter or a variation of median voter (see, for example, Persson and Tabellini, 2000). Government official's behavior responds to the demand of the electorates.

Whilst in authoritarian regimes such as China, central government leaders are decided by the leaders of the previous generations (the elites or the so called "elders" in some countries). Local government officials are appointed by the higher level officials, and ultimately by the central government. As a result, in an authoritarian regime, local government officials are not responsible to people (electorates), but to the upper level officials, who determine their career advancement and political fulfillment. (see, for example, Maskin *et al.* 2000)

As a result of the electorate mechanism, local officials in the West care more about people's utility. They tend to allocate more resources on welfare expenditure, as it directly

affect electorate's wellbeing and thus their voting behaviors. However, in an authoritarian regime, local government officials care relatively less about the need of people, but more about what their boss (i.e. upper level government) likes and dislikes.

Chinese local officials have devoted tremendous attention and energy to enhancing regional economic growth, which is rarely observed in other transition and developing countries (Blanchard and Shleifer, 2001, Chen *et al.* 2005). Local governments have played a crucial role in China's economic growth and these officials' incentives need to be understood from a political economy perspective. (Li and Zhou 2005; Su *et al.* 2012; Su *et al.* forthcoming)

The objectives of local officials are political gains and financial benefit. Because local officials are not elected, but appointed and promoted by the higher level officials, according to the economic performance of the regions they are in charge. i.e. China is perceived to be following a performance-based promotion scheme. It is evident that the political status of a Chinese province (measured by the number of Central Committee members) is positively correlated with the provincial economic ranking (Maskin *et al.* 2000). Empirical evidence shows a link between political turnover of top provincial leaders and provincial economic performance. (Li and Zhou, 2005; Chen *et al.* 2005; Caldeira, 2012; Jia *et al.*, 2015). Although the line was disputed by Su *et al.* (2012), we argue that when local government official perceived the positive link between growth and promotion, local government officials would have incentives to aid in economic development.

The perceived political promotion system induces local officials to maximize growth for the political fulfillment. This is often done by allocating more public fund to growth and less for welfare support, often leading to biases against agent's welfare in favor of economic growth. As a result, the average welfare support is much lower than it should be. For example, the minimum living standard assistance in many Chinese regions is much lower compared to the average standard of living in the same areas. (Zhang *et al.* 2016)

In this paper, we build a political economy model that mimics the patterns of local government behaviors in terms of the public spending on productive spending (such as

infrastructure building) and welfare support (such as minimum living guarantee program, Dibao in Chinese), and the implications of these actions on economic growth and people's welfare.

Our model provide a new mechanism in explaining why China is able to achieve remarkable growth in the past 35 years, but at the same time, still have large number of people living under poverty, still have one of the highest inequality in the world, still have one of the worst environmental pollution in the world, and why the Chinese local governments are not willing to increase the very low welfare support, such as minimum living guarantee program for those who lives under poverty.

This paper contributes to the literature in the following ways: first, by building a dynamic general equilibrium model, this paper enables readers to better understand the growth and welfare implications of political selection under authoritarian regime like China. We are able to exam the complex behaviors of local governments and the strategic interaction behaviors of them with each other. We show that different incentive structures for local governments will induce different outcomes, in terms of both economic growth, infrastructure building and welfare spending.

Second, we are able to show that the Chinese political system is more growth-enhancing but not necessarily utility-maximizing. Thus it is able to generate an average of more 9 percent annual growth rate in the last 35 years, but at the same time still having large number of people living under extreme poverty, being one of the countries having highest inequalities, and being one of the most polluted country in the world.

Lastly, by explaining why varies levels of governments are all very keen in infrastructure buildings, this paper shows the political force driving the high investment rate in productive public goods in China. We show that the economic growth promoted by the political system that encourages higher investment, may be at the expense of the welfare of the poor.

This paper is organized as follows: Section 2 shows some stylized facts on China's growth and reviews the system of political selection. Section 3 introduces the basic model of the behaviors of Chinese officials. Section 4 extends the basic model to further

analyses their behaviors in a dynamic equilibrium model. Section 5 presents a model with stability concerns and regional competition. Section 6 concludes.

2 Stylized Facts and Political Selection in China

2.1 Some Salient Facts in the Chinese Economy

It is often argued in the literature that weak institution would lead to poor economic performances (for example, Xu, 2011; Bai *et al.*, 2016). According to the World Bank Doing Business Indicators, China ranked 78 among 190 economies in terms of “Ease of Doing Business” and 127 among 190 economies in terms of “Starting a business” in 2016. According to Transparency International, corruption level in China is often high, and China ranked 83 in the world in 2015. These indicators did not change much in the past decades.

Despite the weak institutions and high levels of corruption over the years, China has achieved remarkable economic performance with average more than 9 percent of annual GDP growth rate in the past 35 years. One feature of the economy growth in China is the massive investment on productive public goods such as infrastructure. Empirical studies show that the fiscal interactions among local areas would lead to a “race to the top” in terms of the expenditure on infrastructure, where a province tends to invests more on infrastructure if the investment on infrastructure of its neighboring provinces increases (Zheng *et al.*, 2015).

While China experienced high economic growth, income inequality in China is still among the highest in the world (Sicular *et al.*, 2007; Li and Sicular, 2014). In 2013, there are still 25 million people live in poverty (headcount ratio at \$1.90 a day 2011 PPP) according to World Bank. Government spending on welfare support is relatively low especially in the Minimum Living Standard Guarantee program (or Dibao in Chinese), which is one of the most important component of the social assistance system in China (Zhang *et al.*, 2016; Zhang and Tang, 2005).

The level of pollution has also been high in China. For example PM2.5 air pollutants

has been constantly many times higher than official guidelines, and has caused more deaths and all sorts of health problems.¹ However, the environmental problems are not improving despite the fact that it is claimed that more attention has now been paid to environmental conditions. Many argues that governments do not have incentives to tackle this problem as it may potentially hurt growth.

Welfare support such as Dibao program, pension and environmental protection has played an important role in poverty eradication, inequality reduction and the maintenance of social stability. However, Chinese governments still invest much less to support welfare and put much sources into productive public goods to support local economy.

2.2 The Minimum Living Standard Guarantee Program in China

The minimum living standard guarantee program (Dibao) is an important component of the social assistance program in China. It was launched in the 1990s by the more developed urban regions in China to assist some urban workers during the period of economic reform and structural change and has been expanded nationwide since then. The success of the Dibao program in the urban areas also promoted the experiment of Dibao program in the rural areas. The urban Dibao program and rural Dibao program are similar in design. The only difference lies in the minimum living standard in the local area. The Dibao program aims to provide cash support to help those whose income is lower than a certain level and has played an important role in poverty reduction and social stability improvement in China.

The program is funded by both the central government and local governments. Central government allocate funds for a province based on an estimation of the number of people in poverty and the extent of their poverty. Provincial governments then give the funds to its subdominant, until it get into the hands of those in need.

For a household to get the Dibao in the local area, a household registration (Hukou) is required. In principle, an household is eligible to apply for the Dibao assistance as

¹For example, there are many cancer villages across China, where the occurrence of cancer has been extraordinarily high, due to water pollution. (Lora-Wainwright, 2010) There are heavy smogs in Northern China, especially during the winter, due to air pollution.

long as her/his income is lower than the threshold level in the local area without having to satisfy any other conditions. The amount of cash transfer received is usually the difference between the specific income threshold level and the household's own income, so as to close the gap between them.

Implementation remains decentralized: eligibility thresholds, beneficiary selection, and transfer payment amounts are determined locally. The income threshold level is set by the local governments and usually depends on the economic conditions of local areas such as the consumption level, capacity and funding of the local areas. Due to the fiscal interactions among regions, local governments tend to reduce the level of minimum living standard guarantee in its jurisdiction if there is a decrease in the minimum living standard in its neighbors, which means regions race to the bottom in terms of the expenditure on these welfare spending (Zhang *et al.*, 2016).

The income threshold level varies across regions and is different between urban and rural areas. It is generally higher in the urban areas than that in the rural areas. Regions with better economic conditions tend to have a higher income threshold level than those with worse economic conditions. Poor counties tend to have lower Dibao thresholds and transfer amounts than do rich counties.²

The Dibao program has been an important policy instrument to reduce poverty and level of inequality in China. Both the income threshold level and the total spending on the Dibao program have been increasing over time. However, they are still relative low (Zhang *et al.*, 2016; Zhang and Tang, 2005).

2.3 Political Selection in China

In China, local fiscal policy is often made by the local governments. Central government can intervene but the mobility of local officials is controlled by the central governments (Maskin *et al.*, 2000; Xu, 2011; Knight, 2015). Xu (2011) describe the system in China as an regional decentralization authorization (RDA) which is featured by political centralization and economy decentralization. The sub-national governments have the authority

²See Golan *et al* (2017) for a comprehensive empirical review of the program.

to manage the economy to some extent, but the central government can intervene and the career path of the sub-national government officials is decided by the central government. Knight (2015) describes the situation of China as a principal-agent problem where the central government provides incentives to the local governments to achieve its own objectives which focus mainly on economic growth.

Chinese local governments have strong capacity to support local business and they have the incentives to do so as local official's promotion is thought to be positively related to the economic performance in their jurisdictions. (Bai *et al.*, 2016; Li and Zhou, 2005; Chen *et al.*, 2005; Su *et al.*, 2012).

Many empirical literature show that one of the most significant promotion criteria for Chinese government officials is regional economic performance, which gives incentives for local officials to promote growth. Maskin *et al.* (2000) investigate the relationship between organization form and economic performance and compare two organization forms, and show that the political position of a province is positively related to its relative economic performance ranking.

Li and Zhou (2005) present an empirical study concerning the relationship between the career mobility of local officials in China and their economic performance using the data from 1979 to 1995. The results show that provincial officials are more likely to be promoted and their careers are less likely to be terminated if their economic performance is better. Chen *et al.* (2005) show that the career path of Chinese officials is also related to their relative economic performance and provide evidence to the performance-based promotion for Chinese officials. Caldeira (2012) tests the strategic interactions among provinces and observes that the expenditures on items that are related to the evaluation criteria of the central government tend to be high.

The rapid economic growth gave rise to some problems such as an increased social instability and more pollution (Knight, 2015). The dramatic socioeconomic changes—including rising inequality and economic insecurity, environmental degradation, mass migration, rent seeking and corruption – which accompanied economic growth and posed new challenges. These changes can explain the rise in indicators of social instability (Knight,

2015).

It is evident and argued by many, that Chinese local officials care too much about growth, and less about people's welfare. One of the evidence of this is that they try to pay as less Dibao as possible to those who desperately need them (Zhang *et al.*, 2016). Another example is that many officials tend to not implement or loosen the labor law, which protects the rights of workers but may increase the cost for firms, thus may slow down economic growth. Similar scenarios happened to environment protection.

The central government realized the problem and is changing the GDP-only policy. Now other things are given more weight in the promotion criteria and these changes have influenced the behaviors of local officials (Cai *et al.*, 2016; Kahn *et al.*, 2015).

The central government has included social stability (the so-called "harmonious society") in the promotion criteria of local officials. Knight (2015) argues that China's leadership has often publicly expressed its concern to maintain social stability, as the number of 'mass incidents' (cases of civil unrest, officially recorded) rose from under 8,000 in 1993 to 180,000 in 2010.

As a result, the local officials have non-growth related incentives as well as growth incentives which will drive the behavior of the local officials and will change the dynamics of growth and welfare spending. Knight (2015) argues these include rewarding city officials who achieve re-distributive objectives such as the introduction and raising of city minimum wages, rewarding local officials who achieve targets for reducing environmental pollution, and punishing officials held responsible for causing local social discontent. Another form of harmonious society policies was to provide support and subsidies for the poor, especially in rural areas.

3 A Basic Model with Regional Competition

This section presents a simple model that illustrates the basic mechanism at work. The central government is exogenous to our model but controls the promotion of the officials in local governments. Local governments decide how to spend public money in the local

jurisdiction. Specifically, there are two types of public spending: productive public goods such as infrastructure that contribute to the productivity of the jurisdiction and thus its economic development, and non-productive spending such as welfare support and environmental protection that enhance the utility of local households and thus enhance the stability in the jurisdiction.

In response to the perceived promotion criteria, local officials will compete against each other on economic performances of their regions. In order to maximize their chance of being promoted, they will try to achieve maximum growth by allocating more public fund to growth-enhancing public goods and less to welfare support. As a result of this regional competition, the amount of welfare spending in different regions will tend to converge to a lowest possible level.

Consider two jurisdictions, $J = 1, 2$ with identical economic conditions. For a representative firm in jurisdiction J , its production function is supposed to be

$$y^J = F(G_p^J, k) \quad (1)$$

where G_p^J is the provision of productive public goods in jurisdiction J .

The higher the G_p^J , the higher the return to capital in jurisdiction J . Hence, the firm will choose to locate in jurisdiction with a higher level of G_p^J . The aggregate output in jurisdiction J will be ny^J where n is the number of firms in jurisdiction J . More provision of productive public goods contributes to higher output level as it would attract more firms with higher G_p^J .

These two jurisdictions consist of heterogeneous households and have same income distribution. Assume that there are no savings and households spend all their income on consumption.

Let \bar{c}^J be the social acceptable minimum level of consumption in jurisdiction J .³ An household derives utility from consumption c . If $c < \bar{c}^J$, the household will be very dissatisfied, and even rebellious which will bring instability to the society. However, local

³ \bar{c} can be understood as “the subsistence level of consumption” but this “subsistence” is not necessarily absolute. It has some similarities with the poverty lines in different countries, under which people’s life are dismal but it does not necessarily mean they would be staving to death.

government can influence the social norm \bar{c}^J by assigning different target welfare support measures. For example, \bar{c}^J can be understood as the local poverty line which is usually decided by the local governments.

In order to maintain stability in the jurisdiction, the local government will provide welfare support such as transfers to households, especially those whose income level is lower than the social acceptable minimum level of consumption in the jurisdiction. Let G_N^J be the non-productive welfare spending which could be used as welfare support and investment on environment protection. The amount of G_N^J depends on \bar{c}^J and assume that $G_N^J = H(\bar{c}^J)$.

The provision of productive public goods, G_P^J , and the non-productive welfare spending G_N^J , are usually decided by the local officials. As the perceived promotion criteria is local economic performance, a local official is more likely to be promoted with better economic performance in his/her jurisdiction. However, her/his promotion will be eliminated if there exists instability in her/his jurisdiction. Therefore, given an exogenous government revenue G , the local officials will allocate public spending on the two types of public goods in the way that her/his chances of being promoted is maximized.

A lower social norm \bar{c}^J would reduce the local government's non-productive welfare spending but increase the spending on the provision of productive public goods and thus attract more firms. Therefore, in order to achieve a better economic performance, the social acceptable minimum level of consumption in the two jurisdictions, \bar{c}^1 and \bar{c}^2 , will both converge to \underline{c} , the lowest possible level of consumption to maintain the lowest level of stability in the jurisdiction.⁴ The competitions among local areas lead to a race to the bottom in \bar{c} and thus the spending on welfare support.

That is, in equilibrium, officials in the two jurisdictions 1 and 2, will allocate their public expenditure in the follow way.

$$G_N^1 = G_N^2 = \bar{G}_N \quad (2)$$

⁴If \bar{c}^1 and \bar{c}^2 are the poverty line, they will be set at the lowest level by the local governments depending on the level of economic development in the local areas.

$$G_P^1 = G_P^2 = G - \overline{G_N} \quad (3)$$

where $\overline{G_N}$ is the necessary non-productive welfare spending to maintain the stability in the jurisdiction.

The amount of $\overline{G_N}$ depends on \underline{c} . At \underline{c} , the amount of welfare support required to maintain the level of stability reaches the bottom and thus the local governments can invest the most on the provision of productive public goods.

As the two local areas spend the same government revenue in the same way, the two bureaucrats will achieve same economic output level. The final promotion decision will be decided by a draw (each with 50% or other exogenous factors such as connections with upper-tier officials).

4 An Extended Model with Stability Concerns

This section present a full flesh model with local officials having non-growth related incentives such as maintain stability as well as growth incentives. We show how the equilibrium levels is reached and how it drives the behavior of the local officials and how it will change the dynamics of growth and welfare spending.

This section considers only one region. The economy has four players: the growth-oriented central government, local governments controlled by officials want to be promoted, profit-maximizing firms and utility-maximizing households. The role of the central government and the behavior of local government are similar to those in the previous section. Firms are homogeneous and produce final product with given technology, local productive public goods, capital and labor. Each household is endowed with an heterogeneous amount of capital, one unit of labor and obtains the wage and interest from firms, and transfer from the local government.

This section describes a simple two periods overlapping generations model. In this economy, individuals live for two periods. When they are young, they work, consume and save. When they grow old, they do not work and rely on their savings to live. Each

time period, central government put an official in charge of a region at the beginning of the period. Simultaneously, the local official allocate fund into productive public goods and welfare support with an given budget provided by the central government; household make a consumption-savings decision, and firms employ capital to produce. Central government observe the economic performance (in terms of aggregate output) of the region and decide whether to promote the local official at the end of the period. In local officials' perception, the higher the growth rate, the higher the probability that they will be promoted. The official will not be promoted if there is social unrest regardless of the economic performance.

4.1 Preferences

In every period t , L_t individuals are born. Individuals are identical within as well as across time, except that they are born with different levels of endowment $E_{1,t}^i$, where the initial distribution Λ_0 is log-normally distributed, specifically, $N_0 = \ln \Lambda_0(\mu_0, \sigma_0^2)$ is normally distributed with mean μ_0 and variance σ_0^2 .

Individuals live two periods. In the first period, they work and earn the competitive market wage w_t , and in the second period, they are retired. For individual i who is born at period t with endowment $E_{1,t}^i$, she works in period t and saves for the next period. In the second period, she does not work and simply consume. Households derive utility from consumption and their utility depends also on a certain level of consumption. If their consumption is lower than this level, they will be very dissatisfied, and even rebellious which will bring instability to the society.

Individuals born at time t are characterized by their inter-temporal utility function $u(c_{1,t}, c_{2,t+1})$ defined over non-negative consumption during the first and second periods of their lives. The inter-temporal utility function is twice continuously differentiable and strictly quasi-concave on the interior of the consumption set R_+^2 . The utility function is assumed to be increasing in both variables.⁵ At period t , assume her utility takes the

⁵The basic structure of our model builds on the Overlapping Generation Models in Diamond (1965) and Galor and Ryder (1989).

logarithmic utility form,

$$U(c_{1,t}^i, c_{2,t+1}^i) = \ln(c_{1,t}^i) - \ln\bar{c} + \rho[\ln(c_{2,t+1}^i) - \ln\bar{c}] \quad (4)$$

where $c_{1,t}^i$ is her consumption at period t , $c_{2,t+1}^i$ is her consumption in her second period which is period $t + 1$, ρ is the discount factor and \bar{c} measures the minimum consumption.

During the first periods of their lifetimes, individuals supply their unit labor inelastically, earn wage, w_t , from firms. They allocate the resulting income, w_t , and their initial endowment $E_{1,t}^i$, between first period consumption, $c_{1,t}$, and savings $s_{1,t}$. In the first period when they are young, they may receive transfer from the local government if qualifies the criteria. In the second period, each household receives \bar{c} from the central government.⁶ For individual i , her savings $s_{1,t}^i$ is

$$s_{1,t}^i = w_t + E_{1,t}^i - c_{1,t}^i \quad (5)$$

Savings earn the return r_{t+1} , in the following period and enable individuals to consume during retirement. Second period consumption $c_{2,t+1}$ is therefore

$$c_{2,t+1}^i = (1 + r_{t+1} - \delta) s_{1,t}^i \quad (6)$$

Assume the rate of capital depreciation δ is 1, and individuals have perfect foresight of the returns to capital, r_{t+1} , in the second period, $t + 1$. The choices made during the first period are intended to maximize the inter-temporal utility function,

$$s_t = s(w_t, r_{t+1}) = \arg \max u [w_t + E_{1,t}^i - s_t, r_{t+1}s_t] \quad (7)$$

Thus the optimal saving, $s(w_t, r_{t+1})$, and the consumption choice, exist and are uniquely determined.

An individual's capital in the second period (when she is old) is the savings in the first period (when she was young),

⁶This can be understood as universal pension by the state, that guarantee a minimum level of living for old aged population.

$$s_{1,t}^i = k_{2,t+1}^i \quad (8)$$

Thus for household i ,

$$c_{1,t}^i + k_{2,t+1}^i = I_{1,t}^i \quad (9)$$

$$\dot{c}_{2,t+1}^i = r_{t+1} k_{2,t+1}^i + \bar{c} \quad (10)$$

where $I_{1,t}^i$ denotes her/his total income in period 1, at time t , which is

$$I_t^i = w_t + E_{1,t}^i + g_{n,t}^i \quad (11)$$

where $g_{n,t}^i$ denotes the amount of transfer received, which depends on her income level.

7

4.2 Local Governments

A local government official allocates public fund into the provision of productive public goods and welfare transfers. More productive public goods such as infrastructure increase the productivity of the firms in the jurisdiction and thus attracts more firms resulting in higher output growth of the local economy. When an household's income is below a certain level \bar{c} , she will be rebellious and thus threats local stability. Welfare transfer increases households utility and thus help to maintain stability in the jurisdiction. For simplicity, we assume that central government will provide a basic pension when agents are old. The local government pays transfers to qualified agents when they are young.

The principle of the transfer payment mechanism is designed in a way that it has

⁷As a single household cannot affect the amount of transfer, she takes the amount of transfer as given when making decisions.

to satisfy the Fairness Axiom, and follows one of the following two principles. For two households h and m at period t ,

Axiom 1. Fairness Axiom: For an household with less endowment, after government welfare transfers, her total income should not be more than the one who originally has more endowment before the transfer payment.

$$I_t^h \geq I_t^m \quad \text{if } E_{1,t}^h \geq E_{1,t}^m \quad (12)$$

Principle 1. Universal Welfare: Regardless of the household's endowment/wealth, everyone receives same amount of transfer.

$$g_{Nt}^h = g_{Nt}^m \quad \text{if } E_{1,t}^h \geq E_{1,t}^m \quad (13)$$

Principle 2. More for the Poor: The richer individual should not get more transfer than the one that is poorer.

$$g_{Nt}^h < g_{Nt}^m \quad \text{if } E_{1,t}^h \geq E_{1,t}^m \quad (14)$$

The above two principles describe two cases in which the transfer payments could be made without loss of fairness. In the first case (Equation (13)), each household obtains same amount of transfers. Let $g_{N,t}$ be the amount of transfers paid to each household. The local government's total spending on welfare support is $G_{N,t} = L_t g_{N,t}$.

Figure 1 illustrates the income distribution before and after the payment of transfer in the first case. Suppose that $g_{N,t} + w_t = D$ which thus measures the extent of welfare support. The total spending on welfare support is

$$G_{Nt} = L_t(D - w_t) \quad (15)$$

In the second case (Equation (14)), an household with less endowment obtains more transfers than others with more endowment. The total spending on welfare support is

Figure 1: income distribution with universal transfers

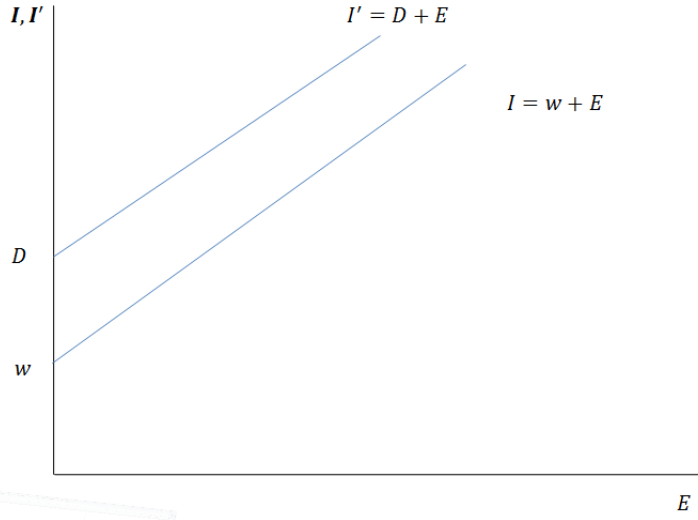
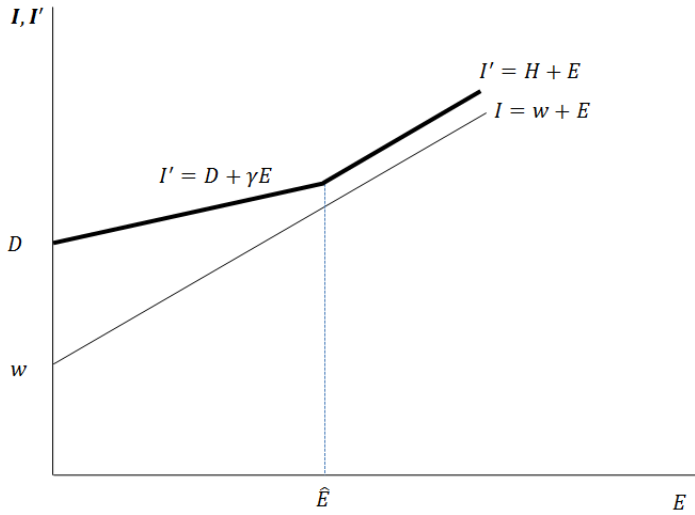


Figure 2: Income distribution with different transfer



$$G_{Nt} = \sum_{i=1}^I L_t g_{N,t}^i \quad (16)$$

Figure 2 shows the income distribution in the second case where the poorer gets more transfers. According to the diagram, there will be one kink on the new income curves. Let \hat{E} be the endowment of the household at the kink and $\hat{E} = \frac{D-H}{1-\gamma}$.

Different transfer policy will be applied to households with different level of income. Each household whose endowment is higher than \hat{E} will receive the same amount of

transfer $H - w$. The amount of transfers paid to households whose endowment is lower than \hat{E} is positively related to their endowment.⁸ The income for household i with $E_{1,t}^i$ after transfer, $(I_{1,t}^i)'$ will be

$$\begin{cases} (I_{1,t}^i)' = D + \gamma E_{1,t}^i & \text{if } E_{1,t}^i \leq \hat{E} \\ (I_{1,t}^i)' = H + E_{1,t}^i & \text{if } E_{1,t}^i > \hat{E} \end{cases} \quad (17)$$

where $D \geq \bar{c}$, $w_t \leq H \leq D$ and $0 \leq \gamma < 1$ are parameters that measure the extent of welfare support.

The total non-productive welfare spending is thus

$$G_{N,t} = \frac{(D + H - 2w_t)(D - H)}{2(1 - \gamma)} + \hat{n}(H - w_t) \quad (18)$$

where \hat{n} is the number of households whose endowment is above \hat{E} .

The amount of $G_{N,t}$ depends on both the wage rate and extent of welfare support which is measured by D , γ and H .

From equation (18),

$$\frac{dG_{N,t}}{dw_t} = \frac{-(D - H)}{(1 - \gamma)} - \hat{n} < 0 \quad (19)$$

$$\frac{dG_{N,t}}{dD} = \frac{(D - w_t)}{(1 - \gamma)} > 0 \quad (20)$$

$$\frac{dG_{N,t}}{d\gamma} = \frac{(D + H - 2w_t)(D - H)}{2(1 - \gamma)^2} > 0 \quad (21)$$

$$\frac{dG_{N,t}}{dH} = \frac{w_t - H}{(1 - \gamma)} + \hat{n} > 0 \quad (22)$$

Equation (19) shows that given the extent of welfare support, the required amount

⁸It is possible that government welfare program is multi-denominational, they may provide many different kinds of welfare support depends on different criteria, such as state pension, housing benefit, pension credit, job seeker's allowance, income support. When these are summarized to one dimension of income and capital amount, it would be observed as many kinks on the line. However, in our model, we only focus on one policy, lump sum transfers and hence there will be one kink.

of welfare support is negatively related to the wage. When the wage increases, the transfer needed for each household will decrease resulting in a lower requirement of welfare support. Within certain range, a higher G_P will cause higher wage level. There is a complementary relationship between G_N and G_P . <<This is the indirect effect of G_P on G_N .>>

Equation (20), (21) and (22) indicate that given the wage rate, if the local government sets higher D , γ and H , the required welfare support will be higher. When $D = \bar{c}$, $\gamma = 0$ and $H = w_t$, the amount of welfare support reaches its bottom $\underline{G_{N,t}}$, which is $\frac{(\bar{c}-w_t)^2}{2}$. And the maximum provision of productive public good is thus $\overline{G_{P,t}} = G - \underline{G_{N,t}}$. Larger D , γ and H reflect self-sustainable development. For the economy to be able to escape from poverty trap, larger amount of transfers is required.

4.3 Firms

Firms are homogeneous and produce a final product using capital and labour. The aggregate production function of firms is assumed to be $Y_t = F(G_{P,t}, K_t, L_t)$ at period t . Following Barro (1990) and Alesina and Rodrik (1994), the production function is formulated as follows

$$Y_t = A(G_{P,t})^{1-\alpha} K_t^\alpha L_t^{1-\alpha} \quad (23)$$

where Y_t is the aggregate output at period t , A is the TFP, $G_{P,t}$ is the productive public goods provided by the local jurisdiction, K_t and L_t are the aggregate stock of capital and labour at period t respectively.

In terms of the per capita form, the production is expressed as

$$y_t = A(G_{P,t})^{1-\alpha} k_t^\alpha \quad (24)$$

where $k_t = K_t/L_t$ denotes the capital per capita.

At optimal,

$$w_t = A(G_{P,t})^{1-\alpha} k_t^\alpha (1 - \alpha) \quad (25)$$

$$r_t = A(G_{P,t})^{1-\alpha} \alpha k_t^{\alpha-1} \quad (26)$$

4.4 Economic growth

For household i , her problem is

$$\underset{c_{1,t}^i, c_{2,t+1}^i}{Max} U(c_{1,t}^i, c_{2,t+1}^i) = \ln(c_{1,t}^i) - \ln \bar{c} + \rho[\ln(c_{2,t+1}^i) - \ln \bar{c}] \quad (27)$$

subject to

$$c_{1,t}^i + k_{2,t+1}^i = I_{1,t}^i \quad (28)$$

$$c_{2,t+1}^i = r_{t+1} k_{2,t+1}^i + \bar{c} \quad (29)$$

The Euler equation is

$$\frac{c_{2,t+1}^i}{c_{1,t}^i} = \rho r_{t+1} \quad (30)$$

Substituting equation (30) into the budget constraints,

$$c_{1,t}^i = \frac{r_{t+1} I_{1,t}^i + \rho \bar{c}}{1 + \rho} \quad (31)$$

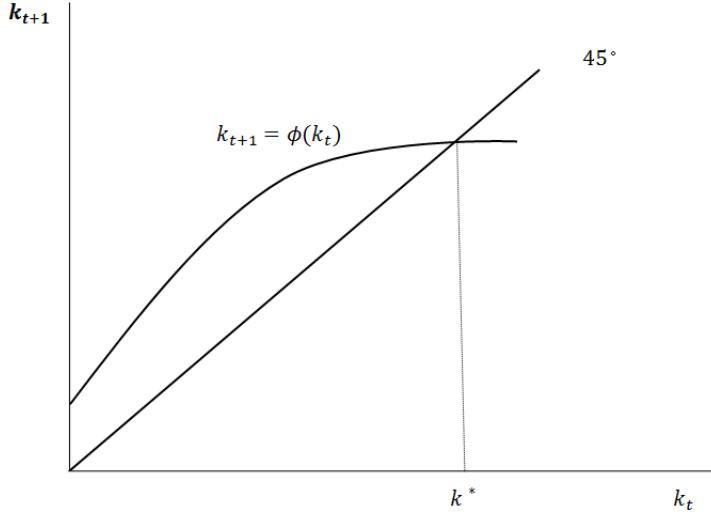
Let the total capital stock in period $t + 1$ be K_{t+1} (the savings of the current old generation is borrowed to the current young generation to produce) and the capital stock per capita be k_{t+1} .

$$K_{t+1} = \sum_{i=1}^L L_t (I_{1,t}^i - c_{1,t}^i) \quad (32)$$

$$k_{t+1} = \frac{K_{t+1}}{L_{t+1}} \quad (33)$$

where $I_t^i = w_t + E_{1,t}^i + g_{n,t}^i$

Figure 3: Dynamics of capital



Substituting $I_{1,t}^i$ into equation (32) and (33),

$$K_{t+1} = \frac{\rho r_{t+1} (L_t w_t + \sum_{i=1}^{\lfloor 1 \rfloor} L_t E_{1,t}^i + \sum_{i=1}^{\lfloor 1 \rfloor} L_t g_{N,t}^i) - L_t \bar{c}}{(1 + \rho) r_{t+1}} \quad (34)$$

$$\hat{k}_{t+1} = \frac{K_{t+1}}{L_{t+1}} = \frac{\rho r_{t+1} [A(G_{P,t})^{1-\alpha} k_t^\alpha (1 - \alpha) + E_t + g_{N,t}] - \rho \bar{c}}{(1 + n)(1 + \rho) r_{t+1}} \quad (35)$$

where E_t is the capital endowment per capita and $g_{N,t}$ is the transfer per capita for households born at period t .

From equation (35), it should be noted here that $g_{N,t}$ also contributes to the capital stock in the next period because the transfer enables some households to be pulled out of the poverty trap and start accumulate capital.

4.5 Political Equilibrium

From the above section, the total income of each household is determined taking the provision of public goods and welfare support from her local government as given. This section will show how the provision of public goods and welfare support are determined in the political economy equilibrium.

In the case of China, the decision on the allocation of public spending is made by

the local officials whose objective is to maximize her/his likelihood of being promoted. As discussed above, an local official will allocate the public spending to maximize the economic performance in her/his jurisdiction which is measured by the output level in the model subject to two constraints. The economic performance of the official will be assessed with the output in the next period. In steady state, the local government solves the following problem

$$\underset{G_{P,t}, G_{N,t}}{Max} \quad y_{t+1} = A(G_{P,t})^{1-\alpha}(k_{t+1})^\beta \quad (36)$$

where k_{t+1} satisfies $k_{t+1} = \frac{\rho r_{t+1}[A(G_{P,t})^{1-\alpha}k_t^\alpha(1-\alpha) + E_t + g_{N,t}] - \rho \bar{c}}{(1+n)(1+\rho)r_{t+1}}$.

<<<commitment of government policy, i.e. $G_{P,t} = G_{P,t+1}$?>>>

subject to the following two constraints

$$G_P + G_N = G \quad (37)$$

where G is the exogeneously given total revenue provided to the local government. Equation (37) is the balanced budget constraint.

The second constraint, equation (38), is the stability constraint given D , H and γ which are the parameters that measure the extent of welfare support.

$$G_{N,t} = \frac{(D + H - 2w_t)(D - H)}{2(1 - \gamma)} + \hat{n}(H - w_t) \quad (38)$$

where w_t is the wage rate in period t and $w_t = A(G_{P,t})^{1-\alpha}(k_t)^\alpha(1-\alpha)$. The right hand side of equation (38) describes the required provision of $G_{N,t}$ to maintain the stability level given the extent of welfare support.

4.6 Policy/ Welfare Analysis (Formal proof to be completed)

Proposition 1 When stability is not taken into consideration, for given government revenue G and initial economic conditions E and k_t , the optimal welfare support provided by the local official at period t satisfies $G_{N,t}^* = \alpha G - L(1+\beta)A(1-\alpha)^2(G -$

$$G_{N,t}^*)^{1-\alpha} k_t^\alpha - LE(1-\alpha)$$

Proof: As $y_{t+1} = A(G_{P,t})^{1-\alpha}(k_t)^\alpha$ and $k_{t+1} = \frac{\rho r_{t+1}[A(G_{P,t})^{1-\alpha} k_t^\alpha (1-\alpha) + E_t + g_{N,t}] - \rho \bar{c}}{(1+n)(1+\rho)r_{t+1}}$, there are two channels/mechanisms/effects at work. First, given the government budget G , there is a competitive relationship between $G_{P,t}$ and $G_{N,t}$. A higher level of $G_{N,t}$ leads to a lower level of $G_{P,t}$ and the higher the $G_{N,t}$, the worse economic performance measured by y_{t+1} . Second, a higher level of $g_{N,t}$ contributes to k_{t+1} and thus better economic performance.

According to equation (36) and (37),

$$\frac{\partial y_{t+1}}{\partial G_{P,t}} = \frac{A\rho(G_{P,t})^{-\alpha}(k_{t+1})^\alpha}{(1+\rho)k_{t+1}\alpha - \rho I_t(\alpha-1)} \left[(1+\alpha)A(1-\alpha)^2 G_{P,t}^{1-\alpha} k_t^\alpha + E(1-\alpha) + \frac{G(1-\alpha)}{L} - \frac{G_{P,t}}{L} \right] \quad (39)$$

The sign of equation (39) depends on the sign of $(1+\alpha)A(1-\alpha)^2 G_{P,t}^{1-\alpha} k_t^\alpha + E(1-\alpha) + \frac{G(1-\alpha)}{L} - \frac{G_{P,t}}{L}$.

Let $\widetilde{G}_{P,t}$ be the level of productive public spending that $(1+\alpha)A(1-\alpha)^2 G_{P,t}^{1-\alpha} k_t^\alpha + E(1-\alpha) + \frac{G(1-\alpha)}{L} - \frac{G_{P,t}}{L} = 0$. For $G_{P,t} \in (0, \widetilde{G}_{P,t})$, $\frac{\partial y_{t+1}}{\partial G_P} > 0$; For $G_{P,t} \in (\widetilde{G}_{P,t}, G)$, $\frac{\partial y_{t+1}}{\partial G_{P,t}} < 0$. y_{t+1} will be maximized at $\widetilde{G}_{P,t}$.

And the welfare support paid will be $G - \widetilde{G}_{P,t}$.

Therefore, even without stability concerns, the optimal welfare transfer is not zero from the economic growth perspective. Local officials should provide certain amount of welfare support which helps to achieve higher economic growth. The welfare support plays two roles in the economy. Firstly, it could enhance the growth of the local economy. It will enable people in the low income group to accumulate more capital, which at individual level will improve their utility when they are old and at society level, will induce higher economic growth as a result of higher level of capital accumulation. Due to this effect, the optimal level of welfare support should be positive even without stability or social welfare concerns. In the real economy, social welfare support will also reduce the transmission of poverty cross generations, and will reduce the need for transfer/social welfare support in the future, although it is not shown in this model. Secondly, it not only increases households' utility but also improve equality in the economy from the social perspective.

Proposition 2 When there is stability concern, for given government revenue G and initial economic conditions E and k_t , the welfare support chosen by the local government depends on the initial economic conditions and government revenue of the local economy and it is

$$\begin{cases} G_{N,t}^* = \alpha G - L(1 + \beta)A(1 - \alpha)^2(G - G_{N,t}^*)^{1-\alpha}k_t^\alpha - LE(1 - \alpha) & \text{if } \overline{G_{N,t}} < \widetilde{G_{N,t}} \\ G_{N,t}^* = \frac{[\bar{c} - A(1-\alpha)(G - G_{N,t}^*)^{1-\alpha}(k_t)^\alpha]^2}{2} & \text{if } \overline{G_{N,t}} > \widetilde{G_{N,t}} \end{cases}$$

Proof: From proposition 1, the output-maximising provision of productive public good will be $\widetilde{G_{P,t}}$. When stability is taken into consideration, the local government will provide both the productive public good but also welfare support. As discussed above, the minimum welfare support to be considered for promotion is $\overline{G_{N,t}}$ which satisfies $\overline{G_{N,t}} = \frac{[\bar{c} - A(1-\alpha)(G - \overline{G_{N,t}})^{1-\alpha}(k_t)^\alpha]^2}{2}$. There exists an upper bound for $G_{P,t}$ which is $\overline{G_{P,t}}$.

Therefore, if $\widetilde{G_{P,t}}$ is smaller than the upper bound, the optimal $G_{P,t}^* = \widetilde{G_{P,t}}$ and $G_{N,t}^* = G - \widetilde{G_{P,t}}$. In this case, $G_{N,t}^*$ is larger than the minimum welfare support. $G_{N,t}^*$ is the aggregate amount of welfare support. The parameters measuring the extent of welfare support satisfy that $\frac{(D+H-2w_t)(D-H)}{2(1-\gamma)} + \hat{n}(H - w_t) = G_{N,t}^*$ where $w_t = A(G_{P,t}^*)^{1-\alpha}(k_{t+1})^\alpha(1 - \alpha)$ and how the transfer is paid to households will be discussed in the social welfare section.

If $\widetilde{G_{P,t}}$ exceeds the upper bound, $\frac{\partial y^*}{\partial G_P} > 0$ and the optimal $G_{P,t}^* = \overline{G_{P,t}}$ and $G_{N,t}^* = G - \overline{G_{P,t}}$. In this case, $G_{N,t}^*$ equals the minimum welfare support. The local official will provide the least level of welfare support and invest the rest on productive public goods in order to increase her probability to be promoted.

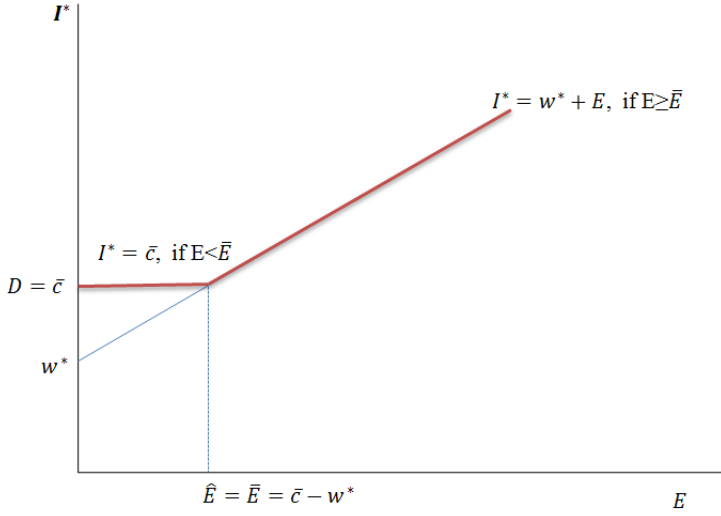
$$D = \bar{c} \tag{40}$$

$$\gamma = 0 \tag{41}$$

$$H = w_t \tag{42}$$

$$\widehat{E} = \bar{c} - w_t \tag{43}$$

Figure 4: Income distribution in equilibrium



$$G_{N,t}^* = \frac{(\bar{c} - w^*)^2}{2} = \frac{[\bar{c} - A(G_{P,t}^*)^{1-\alpha}(k_t)^\alpha(1-\alpha)]^2}{2} \quad (44)$$

$$G_{P,t}^* = G - G_{N,t}^* \quad (45)$$

Households whose endowment is lower than the social norm \bar{c} will receive the minimum transfer, the amount of which equals to the difference between the social norm and their private income. Households with higher level of endowment receive no transfers. The after-transfer income of households whose endowment are lower than \hat{E} will maintain at \bar{c} and will not be able to accumulate capital. Other households will receive zero transfers which reflect the payment mechanism of Dibao Program in China.

An increase in the welfare support has the following two opposite effects on the local economy. The positive effect comes from the fact that higher transfers enable households to accumulate capital which contributes to better economic performance. The negative effect is caused by the fact that more welfare support decreases the provision of productive public goods and thus decrease the output. The optimal allocation of public spending thus depends on which effect dominates. If $\bar{G}_P < \widetilde{G}_p$, the local government pays welfare support at the lowest level and invests the rest on productive public goods. If $\bar{G}_P > \widetilde{G}_p$, the local government provides a higher level of welfare support.

Proposition 3 When there is stability concern, the effect of an increase in the government revenue G on welfare support chosen by the local government depends on the initial economic conditions. For $(E, k_t, G) \in \{(E, k_t, G) \in R^3 | L(1 + \alpha)A(1 - \alpha)^2(\widetilde{G}_{P,t})^{1-\alpha}k_t^\alpha + EL(1 - \alpha) + G(1 - \alpha) < G - \frac{[\bar{c} - A(\overline{G}_{P,t})^{1-\alpha}(k_t)^\alpha(1-\alpha)]^2}{2}\}$, the increase in government revenue leads to the increase in both the provision of productive public good and welfare support.; If $(E, k_t, G) \in \{(E, k_t, G) \in R^3 | L(1 + \alpha)A(1 - \alpha)^2(\widetilde{G}_{P,t})^{1-\alpha}k_t^\alpha + EL(1 - \alpha) + G(1 - \alpha) > G - \frac{[\bar{c} - A(\overline{G}_{P,t})^{1-\alpha}(k_t)^\alpha(1-\alpha)]^2}{2}\}$, the increase in government revenue results in an increase in the provision of productive public good but a decrease in the welfare support.

Proof From the proposition 1 and 2 , if $(E, k_t, G) \in \{(E, k_t, G) \in R^3 | L(1 + \alpha)A(1 - \alpha)^2(\widetilde{G}_{P,t})^{1-\alpha}k_t^\alpha + EL(1 - \alpha) + G(1 - \alpha) < G - \frac{[\bar{c} - A(\overline{G}_{P,t})^{1-\alpha}(k_t)^\alpha(1-\alpha)]^2}{2}\}$, the optimal provision of productive public good and welfare support satisfy

$$G_{P,t}^* = L(1 + \alpha)A(1 - \alpha)^2(G_{P,t}^*)^{1-\alpha}k_t^\alpha + EL(1 - \alpha) + G(1 - \alpha) \quad (46)$$

$$G_{N,t}^* = \alpha G - L(1 + \beta)A(1 - \alpha)^2(G - G_{N,t}^*)^{1-\alpha}k_t^\alpha - LE(1 - \alpha) \quad (47)$$

From equation (46) and (47),

$$\frac{dG_{P,t}^*}{dG} = \frac{1 - \alpha}{1 - L(1 + \alpha)A(1 - \alpha)^3(G_{P,t}^*)^{-\alpha}k_t^\alpha} > 0 \quad (48)$$

$$\frac{dG_{N,t}^*}{dG} = \frac{\alpha}{1 - L(1 + \alpha)A(1 - \alpha)^3G - G_{N,t}^*)^{-\alpha}k_t^\alpha} > 0 \quad (49)$$

Equation (48) and (49) indicate that the government revenue is positively related to the public spending allocation.

If $(E, k_t, G) \in \{(E, k_t, G) \in R^3 | L(1 + \alpha)A(1 - \alpha)^2(\widetilde{G}_{P,t})^{1-\alpha}k_t^\alpha + EL(1 - \alpha) + G(1 - \alpha) > G - \frac{[\bar{c} - A(\overline{G}_{P,t})^{1-\alpha}(k_t)^\alpha(1-\alpha)]^2}{2}\}$, the optimal provision of productive public good and welfare support satisfy

$$G_{P,t}^* = G - \frac{[\bar{c} - A(G_{P,t}^*)^{1-\alpha}(k_t)^\alpha(1-\alpha)]^2}{2} \quad \text{and} \quad G_{N,t}^* = \frac{[\bar{c} - A(G - G_{N,t}^*)^{1-\alpha}(k_t)^\alpha(1-\alpha)]^2}{2}.$$

And

$$\frac{dG_{P,t}^*}{dG} = \frac{1}{1 - A(1 - \alpha)^2 G_{P,t}^{-\alpha} k_t^\alpha [\bar{c} - A(G_{P,t}^*)^{1-\alpha} (k_t)^\alpha (1 - \alpha)]} > 0 \quad (50)$$

$$\frac{dG_{N,t}^*}{dG} = -\frac{A(1 - \alpha)^2 (G - G_{N,t}^*)^{-\alpha} k_t^\alpha [\bar{c} - A(G_{P,t}^*)^{1-\alpha} (k_t)^\alpha (1 - \alpha)]}{1 - A(1 - \alpha)^2 G_{P,t}^{-\alpha} k_t^\alpha [\bar{c} - A(G_{P,t}^*)^{1-\alpha} (k_t)^\alpha (1 - \alpha)]} < 0 \quad (51)$$

Equation (50) and (51) indicate that the government revenue is positively related to the optimal provision of public good but negatively related to the welfare support.

Therefore, for $(E, k_t, G) \in \{(E, k_t, G) \in R^3 | L(1 + \alpha)A(1 - \alpha)^2 (\widetilde{G}_{P,t})^{1-\alpha} k_t^\alpha + EL(1 - \alpha) + G(1 - \alpha) < G - \frac{[\bar{c} - A(\widetilde{G}_{P,t})^{1-\alpha} (k_t)^\alpha (1 - \alpha)]^2}{2}\}$, an increase in the government revenue results in an increase in both the provision of productive public good and welfare support. For $(E, k_t, G) \in \{(E, k_t, G) \in R^3 | L(1 + \alpha)A(1 - \alpha)^2 (\widetilde{G}_{P,t})^{1-\alpha} k_t^\alpha + EL(1 - \alpha) + G(1 - \alpha) > G - \frac{[\bar{c} - A(\widetilde{G}_{P,t})^{1-\alpha} (k_t)^\alpha (1 - \alpha)]^2}{2}\}$, local government provides the lowest level of welfare support. An increase in the government revenue will lead to an increase in the provision of productive public good. However, the increase in the government revenue decreases the welfare support. The increase in the $G_{P,t}$ rises the wage rate and thus decrease the minimum welfare support.

For the local government in China, more government revenue from the central government do not necessarily contribute to higher welfare support. In a local region, where $(E, k_t, G) \in \{(E, k_t, G) \in R^3 | L(1 + \alpha)A(1 - \alpha)^2 (\widetilde{G}_{P,t})^{1-\alpha} k_t^\alpha + EL(1 - \alpha) + G(1 - \alpha) < G - \frac{[\bar{c} - A(\widetilde{G}_{P,t})^{1-\alpha} (k_t)^\alpha (1 - \alpha)]^2}{2}\}$, more transfers from the central government will improve the welfare of households whose private income is higher than the social norm as more productive public good will be provided. However, the total income of households whose private income is lower than the social norm remains unchanged.

Proposition 4 When there is stability concern, an increase in the initial capital stock k_t results in an increase in the provision of productive public good but a decrease in the welfare support chosen by the local government.

Proof From the proposition 1 and 2, if $(E, k_t, G) \in \{(E, k_t, G) \in R^3 | L(1 + \alpha)A(1 - \alpha)^2 (\widetilde{G}_{P,t})^{1-\alpha} k_t^\alpha + EL(1 - \alpha) + G(1 - \alpha) < G - \frac{[\bar{c} - A(\widetilde{G}_{P,t})^{1-\alpha} (k_t)^\alpha (1 - \alpha)]^2}{2}\}$, the optimal

provision of productive public good and welfare support satisfy

$$G_{P,t}^* = L(1 + \alpha)A(1 - \alpha)^2(G_{P,t}^*)^{1-\alpha}k_t^\alpha + EL(1 - \alpha) + G(1 - \alpha) \quad (52)$$

$$G_{N,t}^* = \alpha G - L(1 + \beta)A(1 - \alpha)^2(G - G_{N,t}^*)^{1-\alpha}k_t^\alpha - LE(1 - \alpha) \quad (53)$$

From equation (52) and (53),

$$\frac{dG_{P,t}^*}{dk_t} = \frac{L(1 + \alpha)A\alpha(1 - \alpha)^2(G_{P,t}^*)^{-\alpha}k_t^{\alpha-1}}{1 - L(1 + \alpha)A(1 - \alpha)^3(G_{P,t}^*)^{-\alpha}k_t^\alpha} > 0 \quad (54)$$

$$\frac{dG_{N,t}^*}{dk_t} = -\frac{L(1 + \alpha)A(1 - \alpha)^2\alpha(G - G_{N,t}^*)^{-\alpha}k_t^\alpha}{1 - L(1 + \alpha)A(1 - \alpha)^3G - G_{N,t}^*)^{-\alpha}k_t^\alpha} < 0 \quad (55)$$

If $(E, k_t, G) \in \{(E, k_t, G) \in R^3 \mid L(1 + \alpha)A(1 - \alpha)^2(\widetilde{G}_{P,t})^{1-\alpha}k_t^\alpha + E\alpha + G\alpha > G - \frac{[\bar{c} - A(\widetilde{G}_{P,t})^{1-\alpha}(k_t)^\alpha(1 - \alpha)]^2}{2}\}$,

the optimal provision of productive public good and welfare support satisfy

$$G_{P,t}^* = G - \frac{[\bar{c} - A(G_{P,t}^*)^{1-\alpha}(k_t)^\alpha(1 - \alpha)]^2}{2} \quad \text{and} \quad G_{N,t}^* = \frac{[\bar{c} - A(1 - \alpha)(G - G_{N,t}^*)^{1-\alpha}(k_t)^\alpha]^2}{2}.$$

And

$$\frac{dG_{P,t}^*}{dk_t} = \frac{A(1 - \alpha)\alpha G_{P,t}^{1-\alpha}k_t^{\alpha-1}[\bar{c} - A(G_{P,t}^*)^{1-\alpha}(k_t)^\alpha(1 - \alpha)]}{1 - A(1 - \alpha)^2G_{P,t}^{-\alpha}k_t^\alpha[\bar{c} - A(G_{P,t}^*)^{1-\alpha}(k_t)^\alpha(1 - \alpha)]} < 0 \quad (56)$$

$$\frac{dG_{N,t}^*}{dk_t} = -\frac{A(1 - \alpha)\alpha(G - G_{N,t}^*)^{1-\alpha}k_t^{\alpha-1}[\bar{c} - A(G - G_{N,t}^*)^{1-\alpha}(k_t)^\alpha(1 - \alpha)]}{1 - A(1 - \alpha)^2G_{P,t}^{-\alpha}k_t^\alpha[\bar{c} - A(G - G_{N,t}^*)^{1-\alpha}(k_t)^\alpha(1 - \alpha)]} > 0 \quad (57)$$

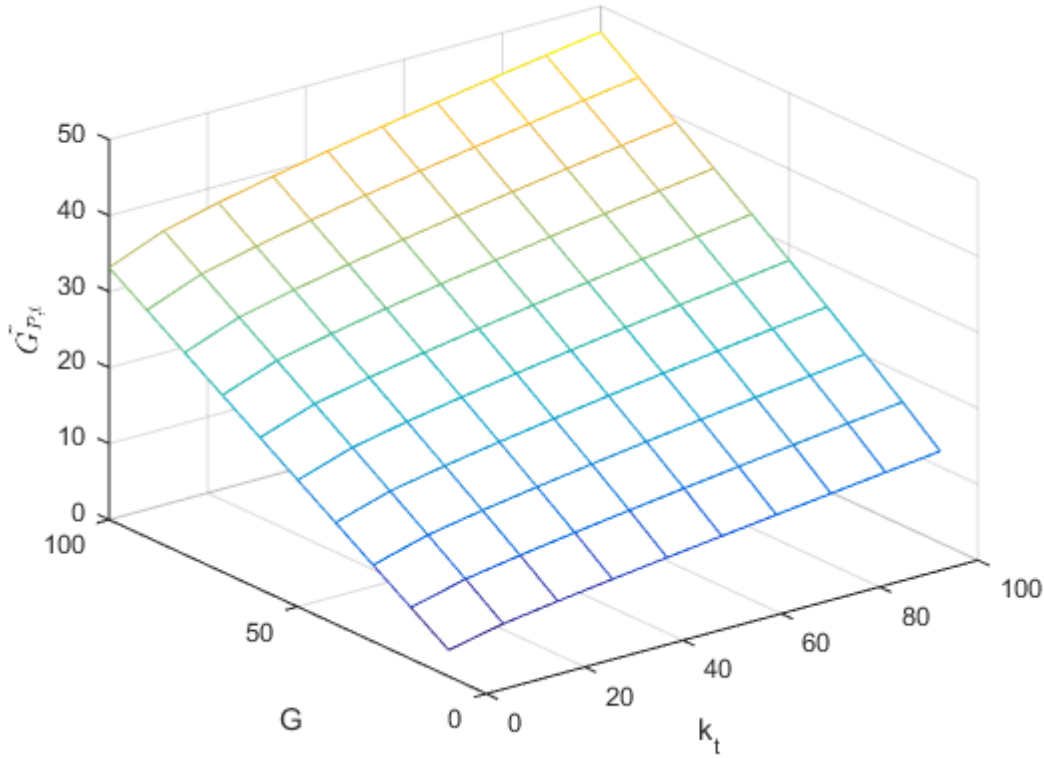
Equations (54), (55), (56) and (57) indicate that in both case, an increase in k_t has opposite effect on the provision of productive public good and welfare support.

4.7 Simulation results (INCOMPLETE)

From the above propositions, the optimal allocation of public expenditure depends on the initial economic conditions and government revenue. As it is difficult to obtain the analytical solutions, we conduct the simulations to find out the conditions for optimal allocation. For simplicity, we assume that the labour is constant and set to be 1. We set $\alpha = 0.35$ and examine the optimal allocation when the average endowment is 0.5.

Figure 5 shows the optimal provision of productive public good when there is no

Figure 5: Optimal $G_{P,t}^*$ with the change of G and k_t when there is no stability concern

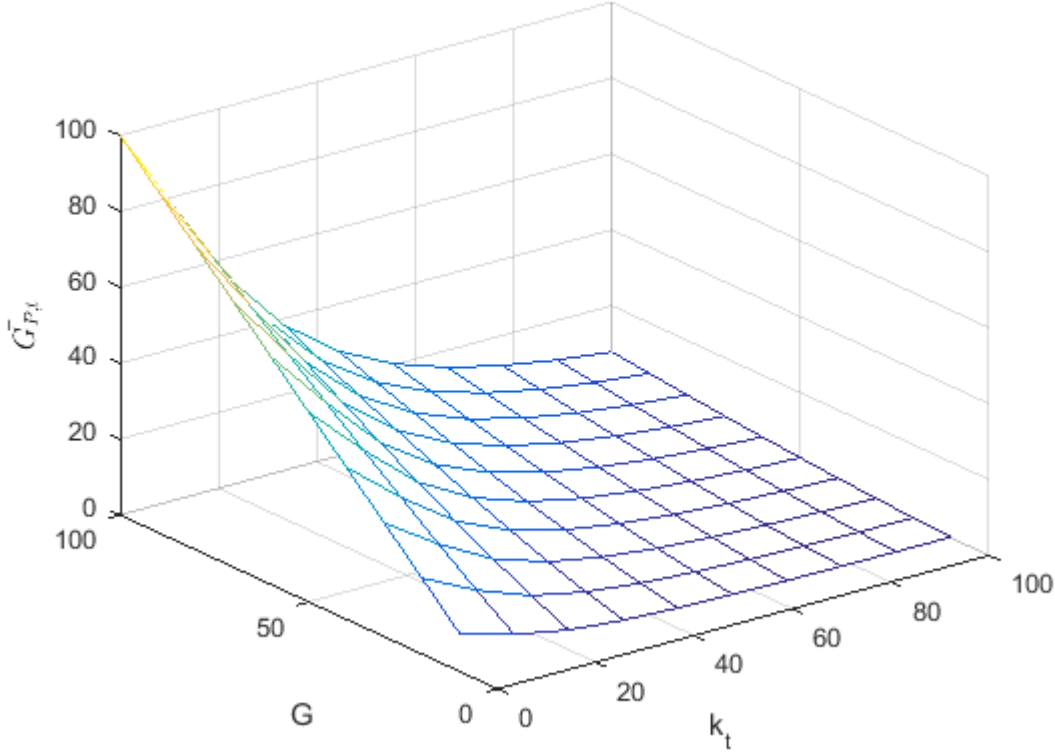


stability concern. The z axis describes the optimal $G_{P,t}$ and x axis and y axis are the government revenue G and initial capital stock per capita k_t respectively. The optimal provision of productive public good increases with the government revenue and the initial capital stock per capita k_t .

Figure 6 describes the change of $\overline{G_{P,t}}$ with change of G and k_t . The z axis is $\overline{G_{P,t}}$ and x axis and y axis are the government revenue G and initial capital stock per capita k_t respectively. When stability is taken into consideration, there is a positive relationship between the upper bound of the provision of productive public good $\overline{G_{P,t}}$ and the government revenue. However, the upper bound decreases with the initial capital stock k_t .

As discussed above, when stability is taken into consideration, the optimal provision of productive public good depends on the level of $\widetilde{G_{P,t}}$ and $\overline{G_{P,t}}$. The vertical axis in figure 7 measures the difference between $\widetilde{G_{P,t}} - \overline{G_{P,t}}$. The x axis and y axis are the government revenue G and initial capital stock per capita k_t respectively. It shows the

Figure 6: The upper bound of $\overline{G_{P,t}}$ when stability is taken into consideration



optimal provision of productive public good will satisfy $G_{P,t}^* = G - \frac{[\bar{c} - A(G_{P,t}^*)^{1-\alpha}(k_t)^\alpha(1-\alpha)]^2}{2}$ when the initial capital stock per capita is high. The optimal welfare support satisfies $G_{N,t}^* = \frac{[\bar{c} - A(1-\alpha)(G - G_{N,t}^*)^{1-\alpha}(k_t)^\alpha]^2}{2}$. The local government will provide welfare support at the lowest level. In this case, even though the local government revenue increases, those whose private income is lower than the social norms will not be better off.

When the government revenue is high, $\widetilde{G_{P,t}} < \overline{G_{P,t}}$ and the optimal provision of productive public good satisfies $G_{P,t}^* = L(1+\alpha)A(1-\alpha)^2(G_{P,t}^*)^{1-\alpha}k_t^\alpha + EL(1-\alpha) + G(1-\alpha)$. The optimal welfare support satisfies $G_{N,t}^* = \alpha G - L(1+\beta)A(1-\alpha)^2(G - G_{N,t}^*)^{1-\alpha}k_t^\alpha - LE(1-\alpha)$. In this case, the welfare support paid is higher than the lowest level which enables household to save. In this case, more government revenue contributes to more provision of productive public goods and more welfare support and thus a higher level of total income for each household.

The share of productive public goods in the government revenue $\frac{G_{P,t}}{G}$.

<<Figure 8 shows the change of $\frac{G_{P,t}}{G}$.

Figure 7: Optimal policy with stability concern

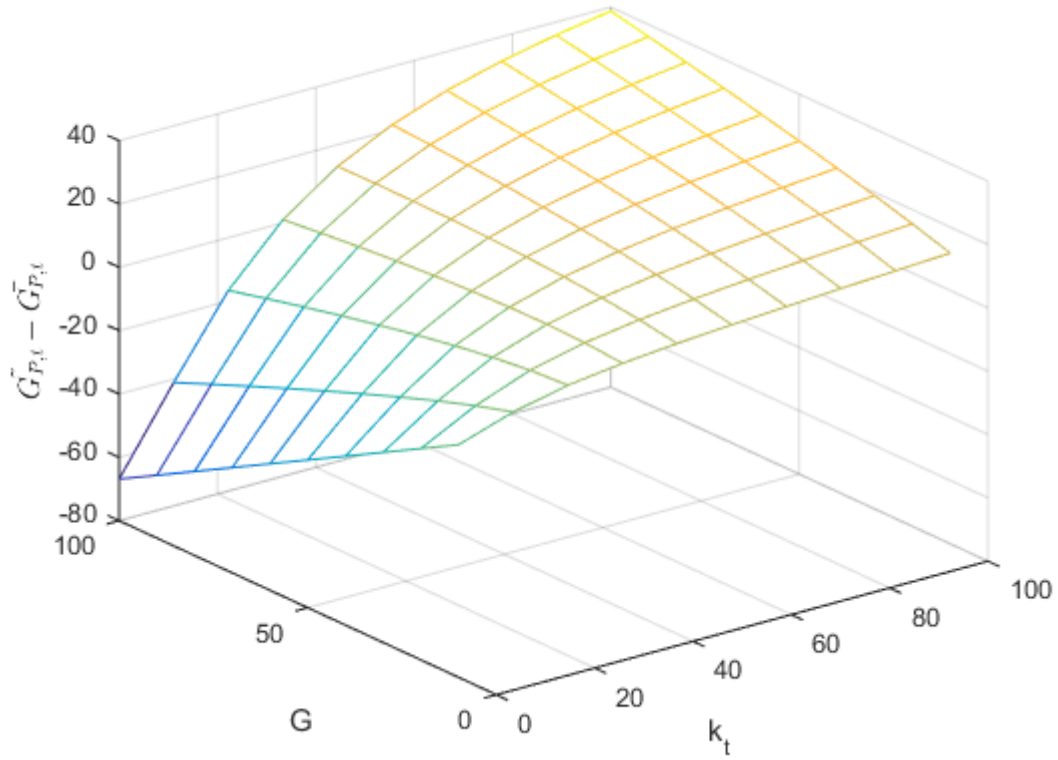
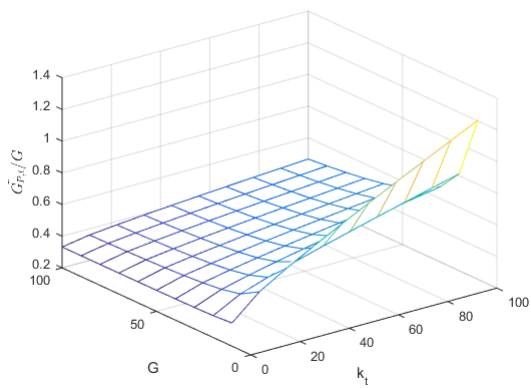


Figure 8: $\frac{G_{P,t}}{G}$ with the change of G and k_t



It is negatively related to G but positively related to k_t . >>

5 A Model with Stability Concerns and Regional Competition

The above section shows how a local government allocates public spending given the level of social norm \bar{c} . This section will show the allocation of public spending when the local government influence the social norm \bar{c} at the same time.

When the local officials choose to influence \bar{c} and also the allocation of public spending, the problem for the local official is

$$\underset{G_{P,t}, G_{N,t}, \bar{c}}{\text{Max}} y_{t+1} = A(G_{P,t})^{1-\alpha}(k_{t+1})^\alpha \quad (58)$$

subject to the following two constraints

$$G_{P,t} + G_{N,t} = G \quad (59)$$

$$G_{N,t} = \frac{(D + H - 2w_t)(D - H)}{2(1 - \gamma)} + \hat{n}(H - w_t) \quad (60)$$

In the second case in proposition 2, when $\overline{G_{P,t}} < \widetilde{G_{P,t}}$, $\frac{\partial y_{t+1}}{\partial \overline{G_{P,t}}} > 0$ and the local government could be achieved a higher output level by increasing $\overline{G_{P,t}}$. As a lower level of \bar{c} requires a lower $\underline{G_{N,t}}$ and thus result in a higher $\overline{G_{P,t}}$, the local government tend to decrease \bar{c} to increase the upper bound of G_P to achieve a higher level of y_{t+1} . Solving the problem of the local government, we have proposition 3.

Proposition 5 If local officials are able to lower \bar{c} , regional competition will push \bar{c}

to a lower level \underline{c}^* and $\underline{c}^* = \sqrt{2G - 2G_{P,t}} + A(1 - \alpha)G_{P,t}^{1-\alpha}k_t^\alpha$ where $G_{P,t}$ satisfies $(1 + \alpha)A(1 - \alpha)^2G_{P,t}^{1-\alpha}k_t^\alpha + E\alpha + \frac{G\alpha}{L} - \frac{G_{P,t}}{L} = 0$.

Proof As a lower \bar{c} contributes to a higher output level, local officials are motivated to

adjust the social norm \bar{c} to the level where $\overline{G_{P,t}} = \widetilde{G_{P,t}}$.

Assume there exist \underline{c}^* that $\overline{G_{P,t}} = \widetilde{G_{P,t}}$

When $\overline{G_{P,t}} = \widetilde{G_{P,t}}$,

$$\widetilde{G_{P,t}} = G - \frac{[\bar{c} - A(\widetilde{G_{P,t}})^{1-\alpha}(k_t)^\alpha(1-\alpha)]^2}{2} \quad (61)$$

and

$$(1+\alpha)A(1-\alpha)^2\widetilde{G_{P,t}}^{1-\alpha}k_t^\alpha + E(1-\alpha) + \frac{G(1-\alpha)}{L} - \frac{\widetilde{G_P}}{L} = 0 \quad (62)$$

Equation (61) and (62) indicate

$$\underline{c}^* = \sqrt{2G - 2\widetilde{G_{P,t}} + A(\widetilde{G_{P,t}})^{1-\alpha}(k_t)^\alpha(1-\alpha)} \quad (63)$$

At \underline{c}^* , local output is maximized and the amount of welfare support ensures that the consumption of every household is not less than the social norm \underline{c}^* . For an households whose private income is lower than the social norm, the amount of transfer received equals the difference between the social norm and her private income. Other households receive no transfers.

6 Conclusions

<<<these are only early outlines, has to be completed and revised>>>

This paper develops a political economy model to show why Chinese local governments focused narrowly on growth and almost growth alone, and often at the cost of people's welfare, health, environment etc.

Existing literature and empirical data on institutions and the Chinese economy suggest the following stylized facts: The institution of China is not good but China has experienced high economic growth. China builds large amount of infrastructure at significant speed and local governments are keen in public investment in industrial capacity by building infrastructure and industrial parks to facilitate business. They also make

policies to support local firms, or foreign firms setup subsidiaries in local, providing special treatment, tax relief, capital arrangement, etc. At the same time, they provide low welfare support which contributes to poverty eradication, inequality reduction and social stability improvement.

Corruption is one of the factor that motivates their decision, but many are not. They make public investment decisions purely for economic growth as their promotion is linked with local economic performance. This paper builds a general equilibrium model to examine the complex behaviors of local governments in China and the interactions among them. The results demonstrate that the optimal allocation of public spending depends on the ratio between productive public goods and private capital stock. When the ratio is relatively low, the local government will provide a level of welfare support at the lowest possible level only to those whose income is lower than the social acceptable minimum level of consumption. When the ratio is relatively large, more welfare support should be provided. When there is regional competition and the local official is able to influence the social acceptable minimum level of consumption, the local official will set the social acceptable minimum level of consumption at a relatively lower level and pay transfers only to those whose income is lower than this level. The level of welfare support will be just above the lowest possible level and the rest of government revenue will be invested in the provision of productive public goods due to the perception that their promotion is positively related to the economic performance in their jurisdiction. The huge investment on productive public goods contribute to the high economic growth in China.

China still have more than 20/50 million people living under extreme poverty, that is under \$1.25 a day (RMB 2000 per annual), and they are relying on as minimum living guarantee program. The target of the Chinese government is to eradicate poverty by 2020, mainly by providing welfare support including cash transfers. Understanding the underlining mechanism of the causes of the low welfare support is crucial in achieving this goal, and introducing more effective policy tools. China is among countries that have the highest inequality, worst environment pollution. The mechanism studies in this paper will help us understand their root cause better and in solving these problems from their

root.

Further research will try to incorporate different tax policy and heterogeneous local economic conditions to analyze the behaviors of local officials and their impacts on economic growth and welfare spending. Also, different promotion criteria will be included to further examine the incentive structure and political selection mechanism in China.

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