Sustainability of High Growth and State Capitalism in Oligarchy

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April 30, 2013

Abstract

We incorporate political economy into a growth model to study sustainability of high economic growth in oligarchies like China. Our focus is the dynamic interactions between the endogenous economic and political institutions. In oligarchy, the political elite need political support, so they keep state workers as supporters by providing high wage to them. This patronage strategy implies distortions to the economy: wage premium and over-investment in favor of the state sector. The distortions reduce efficiency but promote capital accumulation and economic growth in the short-run. On the contrary, in the long-run the distortions are detrimental to growth. An oligarchy goes through a three-stage politico-economic transition: (1) "rapid growth", (2) "state capitalism", and (3) "middle income trap" or "further growth" depending on the political transition. This model explains high growth, persistent labor market and financial frictions in current China, and also sheds lights on predicting future growth and political transition.

JEL: O42 P16

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1 Introduction

China has been growing at a spectacularly high speed for more than 3 decades. While most people agree that this is a great success in history, many strongly disagree with others on whether this success will continue. Some believe that China provides a new model for growth as an alternative to the liberal democracy growth model "Washington Consensus". For example, in *the Economist* and Musacchio and Lazzarini (2012), Musacchio writes that China's "state capitalism in the 21st century" has three huge advantages: "less pronounced recessions", "focus on long-term investing" and "producing world champions". So he is optimistic on China's future growth and recommends to adopt state capitalism in developing and even developed countries. In contrast, some others expect the growth rate to slow down, because China's extractive political institution is not compatible with innovation. For example, Acemoglu and Robinson (2012) argue "the growth process based on catch-up, import of foreign technology, and export of low-end manufacturing products is likely to continue for a while. Nevertheless, Chinese growth is also likely to come to an end, particularly once China reaches the standards of living level of a middle-income country".

If as Acemoglu and Robinson predict, China reaches the middle-income level and the growth slows down, then what change will happen to the political system? Will unsatisfied citizens oust the oligarchy and growth continues in democracy? Or alternatively, will many citizens live with low growth and the oligarchy still gain sufficient support, as we see in today's Venezuela? Modernization theory suggests that the first case will happen. Then it is right for China to adopt state capitalism to achieve economic growth in the catch-up stage, and when the state capitalism runs out of steam, there will be a transition from China model to the liberal democracy model. However, at that point of time, the political elite may not willingly give up state capitalism which guarantees their political power, as we see in countries like Kuwait and Venezuela. Then under which circumstances will the elite grasp the power firmly, and in which cases democratization occurs?

To answer the above questions about China's economic growth and its political implications, we need to first understand currently how the government promotes economic growth with state capitalism and

how it guarantees sufficient political support for oligarchy. Then we will be able to think about the future economic and political trend. The government is currently strongly supporting investment in the state firms by providing subsidy and cheap capital. This speeds up capital accumulation and economic growth significantly. In this process, many state jobs with high wage are created. Then those state workers getting high wage from the state are more supportive for the existing regime compared to the private sector workers. However, the subsidized investment in state firms is generally inefficient. Brandt and Zhu (2010) show that the capital return in the state sector is less than 5%, significantly lower than 50% in the private sector. Despite of the inefficiency, the economy can still grow and the high state sector wage can be maintained, as long as the state capital keeps growing. But it is unlikely that investment-driven growth model will last forever, after enough capital is accumulated in the economy. Then the growth speed in oligarchy will decline if the distortions still exist. The economy's efficiency will be lower than optimal because of too much capital in the state sector.

Will the slow down of economic growth automatically lead to wide-spread dissatisfaction and democratization? Not necessary. Even if the economy does not grow, the state workers can still earn high wage and they do not want to change the status quo. The private workers prefer democratization, which implies efficient capital reallocation to the private sector and higher wage. So whether democratization happens at the end of the economic growth depends on the relative size of supporters of oligarchy and supporters of democracy, i.e. state workers and private workers, respectively. If the state capitalism is strong enough at that point of time, there won't be democratization. The path-dependency of state power is crucial in determining the future political outcome. Once state capitalism is adopted, the state becomes relatively powerful and is likely to be powerful enough to prevent democratization. For this reason, the idea that the economic growth with state capitalism will automatically lead to democratization and the end of state capitalism should be carefully scrutinized. This idea usually argues that economic growth produces more middle class who are pro-democracy. But if the new middle class are the richer state workers who rely on the state for their jobs and income, they won't have higher demand for democracy, compared to the lower class private workers.

In this paper, in order to model the above interactions between endogenous political and economic

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systems in the oligarchic China, we incorporate political economy into a growth model. In our model, the political elite can avoid democratization if they maintain support from a sufficiently large share of citizens. So the elite turn state workers into supporters by providing them with high wage. The state sector high wage is maintained by over-investment and labor restrictions in the state sector. These distortions reduce the economic efficiency but boost capital accumulation and economic growth in the short-run, for two reasons: first, the state sector capital grows faster than in democracy due to the over-investment; second, the abundant labor and artificially low wage in the private sector increase the profit and the growth of private firms. This first stage - "rapid growth" - explains the high growth with persistent capital and labor distortions in current China. This also shows how the oligarchy maintains political support, and why state workers are more supportive for oligarchy.

In the second stage - "state capitalism", the private sector growth comes to an end, and the economic growth slows down, due to the following political reasons. The oligarchic regime relies on a sufficiently large state sector to maintain supporters, so a growing private sector gradually becomes a threat. To maintain the state sector employment share above the necessary level, the elite keep the state sector capital growing at the same pace of the private sector. When the race between the state and private capital becomes costly for the elite, they will restrict the private sector growth through tighter financial control on the bank loans to private firms. In the long-run, the elite may keep over-investment in the state sector and the restrictions on the private sector to sustain oligarchy, or they may decide to free the private sector and allow democratization if maintaining the large state sector is too costly. In the first case, the economy stops growing and the third stage is the "middle income trap". In the second case, the growth starts again and converges to the first-best level, and we see "further growth". So our answers to the questions above, i.e. the sustainability of economic growth and oligarchy, are interlinked: the economic growth, especially the private sector growth will slow down in the oligarchic regime, but will start again if democratization occurs; on the other hand, whether democratization occurs depends on whether the economic growth of the private sector is large enough.

Our theory is related to two strands of literature. The first one is on China's economic growth with resource re-allocation from the state sector to the private sector. Song et al. (2011) construct a two-sector

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growth model to study how the capital and labor reallocation from the state to the private sector leads to economic growth. ?Brandt and Zhu (2010) document the contribution of private firms to growth and show that the government tries to maintain the state sector employment share. The state sector employment share, in the previous work, are either determined by the pure economic force or assumed to be exogenously set by the government. Our theory analyzes the government's political constraint and provides the micro-foundation for the government's control on the state sector employment share. So in our framework, the state sector employment share changes with respect to the political and economic development endogenously, and the prediction on the future trend is different from a pure economic model.

Furthermore, studying the phenomena and future trend in China has general implications for many other developing oligarchic countries which may go through similar developing processes. So our work is also related to the second strand of literature on the relation between the political and economic institutions. Acemoglu and Robinson (2012) focus how the political institution affects economic performance. Their conclusion is that the *exclusive* political institution in non-democracy is detrimental to economic growth in the long run. Lipset (1959) and Fukuyama (1992) study how the economic development affect the political development. Their modernization theory argues that the economic development will ultimately leads to political modernization, i.e., liberal democracy. Besides how one determines the other, the interaction of the economic institution and the political institution is also very important and gives us a more complete picture. Acemoglu (2008) uses a stylized model to study how the elite in oligarchy affects the economic outcome driven by their economic benefit. We contribute to those researches in two aspects. First, we use a dynamic growth model to study the effect of political system on economic outcome and the feedback of the economic outcome on the political system. They are both endogenous and their interactions turn out to be very important in our model. Second, with the dynamic model, we can also separate the short-run impact of oligarchy, from the long-run impact which is the focus of the literature. They can be very different. For example, we see that oligarchy may lead to fast economic growth in the short-run but not necessarily in the long run.

The rest of the paper is organized as follows. Section 2 presents empirical facts in China that motivates

the theory. Section 3 uses a simple static model to illustrate the key interactions of the political and economic system in oligarchy. Section 4 presents the dynamic model that discusses the short-run and long-run interactions. Section 5 concludes.

2   Motivating Empirical Facts in China

In this section we discuss political and economic phenomena in China which motivate and support our theory as follows: (1) more political support for the current regime among state sector workers, compared to private sector workers; (2) persistent wage premium in the state sector; (3) inefficient capital allocation in favor of the state sector; (4) slow-down of the private sector growth, in terms of the employment share.

First of all, who support the current political regime instead of democratization? Chen and Lu (2011) documents that being employed in the state sector implies much less support for democratic values, and this effects is even stronger than being a party member. See the table below. The dependent variable is the probability of supporting for democratic values and institutions. They control for many observable characteristics. We are particularly interested in how the state sector employment is associated with the support for democracy. Their regression shows a significant negative correlation, i.e., the state workers are less supportive for democracy. This effect is even stronger than being a party member.

X	coefficient
Employment in state sector	$-.113^{***}$
Middle Class	$-.149^{***}$
Party membership	$-.019$

Table 1: Multivariate Regression of Support for Democratic Values and Institutions (**: $p < 0.01$)
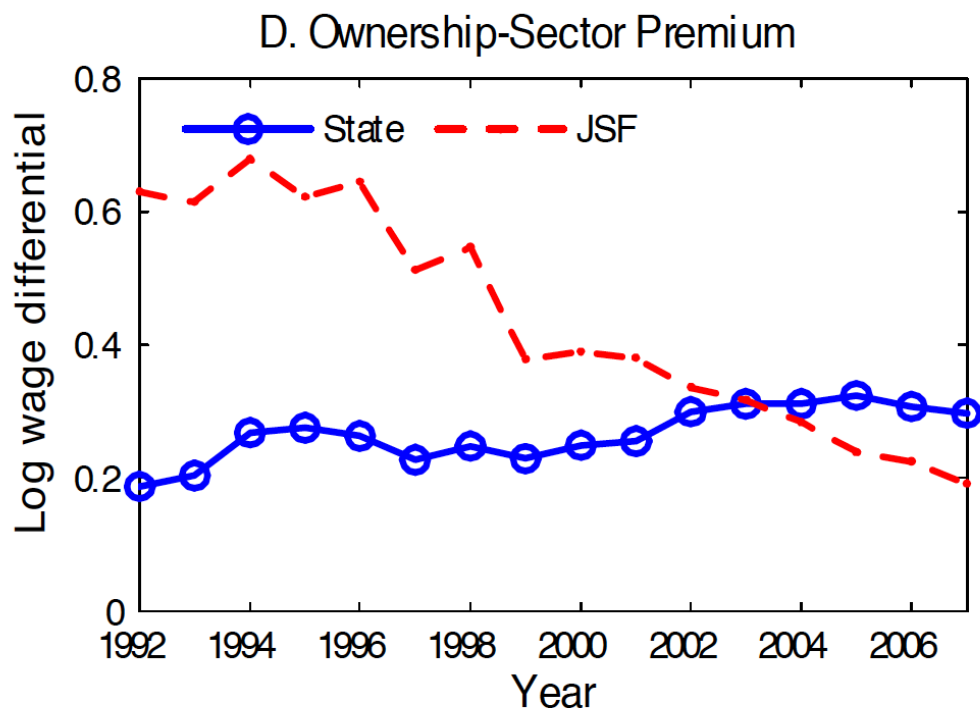
Figure 1: The state sector wage premium over the domestic private sector (blue line) and the foreign firms wage premium (red line). Source: Ge and Yang (2012).

Second, what is special about the state workers and what shapes their political preference? Economic benefits may play an important role. The state workers enjoy high wages, as in figure 1 taken from Ge and Yang (2012). The blue-line shows that the state sector wage premium, controlling for observables, e.g. education, age and so on, has been persistently larger than 20% since 1992. The labor wedge between the state and the private sector doesn't disappear over time, but increases to about 30% in 2007, compared to the dramatic decline of the labor wedge between the foreign and private firms. This figure suggests that though the labor market in other parts of the economy has been more efficient, the opposite is happening to the state sector.
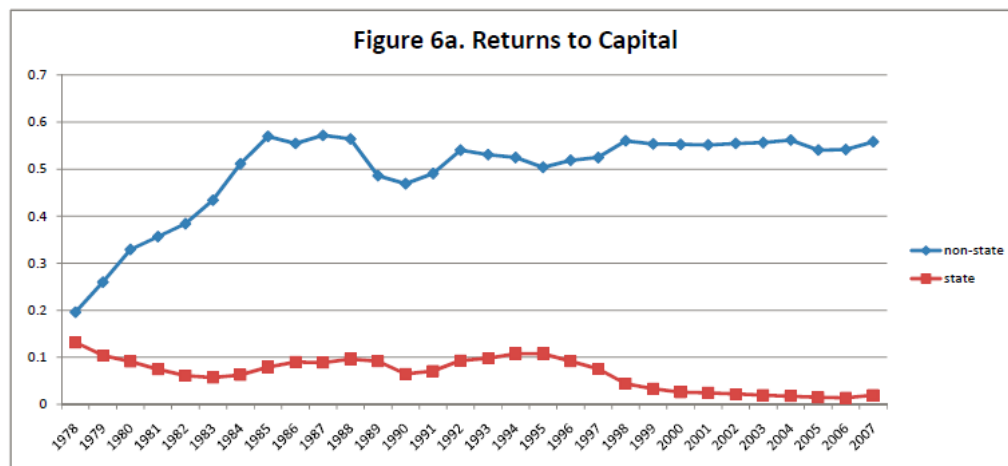
Figure 2: The return to capital in the state sector (red line) and the private sector (blue line). Source: Brandt and Zhu (2010).

Then what keeps the wage high in the state sector? The answer lies in the large misallocation of capital in favor of the state sector. Figure 2 is taken from Brandt and Zhu (2010). It shows that the state sector capital return has been significantly lower than the private sector. If the capital allocation is efficient, there should be more investment flowing into the private sector to close this gap in capital return. The opposite is happening. Huang (2008) documents that from the late 1990s on, the investment share in the state sector has been high, though the state sector output and employment share have been decreasing. Also, ? show that the capital mis-allocation between the state and the private lead to more than 10% TFP loss and has been increasing since 1998. However, the over-investment in the state sector, can push the state sector wage high.
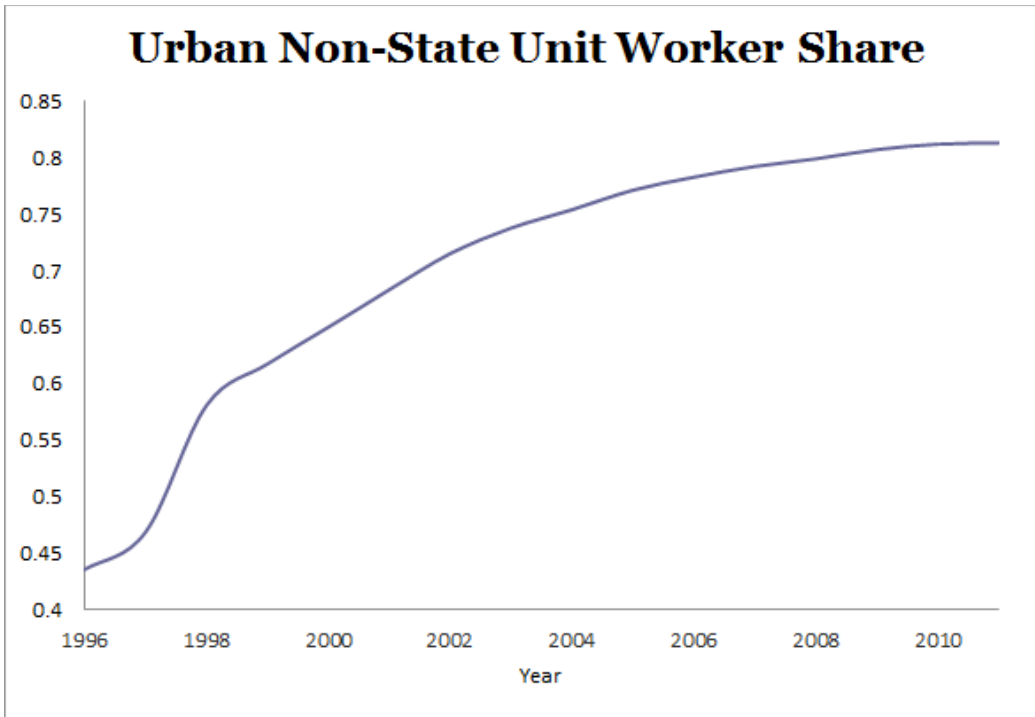
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Figure 3: The urban non-state unit worker share from 1996 to 2011. Source: National Bureau of Statistics of China.

Finally, though the labor reallocation to the private sector has been contributing to China's economic growth, the private sector employment share growth is slowing down dramatically, on the contrary to a pure economic model's prediction. In a competitive equilibrium with financial constraint, the more efficient private sector grows by accumulating more internal capital, so the size of the private sector, measured by the private sector labor, should grow exponentially and eventually take over the state firms. However, after 2004, the growth slows down as documented in Song et al. (2011). Also, figure 3 shows that urban non-state unit worker share follows the same pattern.

Putting these facts together into a big picture, our theory provides a framework to link the economic system with the political system. In our theory, the elite need support from a sufficiently large fraction of workers to sustain the oligarchy. They gain support from state sector workers (fact 1) by providing high wage in that sector (fact 2), which is achieved by distorting capital allocation in favor of the state

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sector (fact 3) to maintain a high capital-labor ratio there. The elite also try to keep enough workers in the state sector to guarantee sufficient support (fact 4).

3 The Static Model

In this section, we first present a one-period static model. This is in fact equivalent to what happens within one period in a dynamic model. We use this stylized static model to describe the static politico-economic interactions and match the current phenomena.

3.1 Model Settings

3.1.1 Environment

The environment and agents are summarized below.

1. Two political regimes: democracy, oligarchy.

2. Two sectors in the economy: S and P, referring to the state sector and the private sector, respectively.

3. Two types of firms: S firms and P firms, meaning state firms and private firms. Each firm is infinitely small and behaves competitively.

4. Three groups of agents

   (a) Workers (w) provide labor, and decide policies in democracy. Their size is normalized to $N_w = 1$.

   (b) Political elites (e) own capital in the S sector, and choose policies in oligarchy. Their population size is very small compared to the workers, $N_e \ll 1$.

   (c) Private entrepreneurs (p) own capital in P sector. The size is $N_p \ll 1$.

3.1.2   Timing

1. In the beginning, capital in sector S and P are already given, as K_S, K_P.

2. If the political institution is democracy D, the representative worker decides the government's policies. And the timing afterwards is:

   (a) The representative worker sets the tax rate τ^D on elites and entrepreneurs' income.

   (b) S and P firms hire workers in the frictionless competitive labor market.

   (c) S and P firms produce and pre-tax incomes are distributed. Elites gain capital income from S firms, while private entrepreneurs gain capital income from P firms. Workers in both S and P firms gain the same market wage.

   (d) Tax payers, i.e., elites and entrepreneurs decide whether to pay the tax at the rate τ^D, or to hide income at the cost of $\bar{\tau}$ share of the income.

   (e) The government collects tax, and transfers it to workers.

3. if the political system is oligarchy O, the representative elite first chooses to stay in oligarchy or to democratize. If democratization D is chosen, democracy is established immediately and the events afterwards are the same as in step 2. Otherwise the events are the following:

   (a) The representative elite sets the tax rate τ^S on private entrepreneurs and private workers.[1]

   (b) the government sets quota on labor in sector S, i.e., L_S randomly chosen workers are allowed to work in sector S.[2]

   (c) S firms hire from L_S workers competitively. Then P firms compete for the rest of labor.

   (d) The workers in S and P sectors decide to support the current regime or revolt sequentially.

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[1]We assume that elites only tax private entrepreneurs and private sector workers, but not the state workers. In fact, this assumption is justified by the elite's optimal choice: no matter what tax rate is, in order to gain support from state sector workers, elites need to guarantee the state workers' final income equivalent to what they can get in democracy. Taxing at a positive rate on the state sector doesn't decrease what they get in the end but only requires larger distortion and reduces the elite's profits. So tax on the SOE workers should be 0.

[2]This is equivalent to setting a minimal wage in the state sector and let S firms decide L_S.

i. If less than $\underline{L}$ workers support the oligarchic regime, the revolt will succeed and will lead to democracy.[3] The economy becomes the same as in step 2.

ii. If more than $\underline{L}$ workers support the regime, there won't be successfully revolt and oligarchy is sustained.

(e) If oligarchy is sustained, pre-tax incomes are distributed as follows. S and P firms produce. Elites gain capital income from S firms, and private entrepreneurs gain capital income from P firms, and the workers in S and P firms gain their wage income w_S and w_P respectively.

(f) Tax payers, i.e., the entrepreneurs and the private workers decide whether to pay the tax or to hide the income at the cost rate $\bar{\tau}$.

(g) The government collects the tax and make the transfer to the elites.

3.1.3 Production

Production function:

$$
\begin{aligned}
Y_S &= (zK_S)^\alpha L_S^{1-\alpha}, \\
Y_P &= K_P^\alpha L_P^{1-\alpha},
\end{aligned}
$$

where $z < 1$ means the state sector is less efficient than the private sector.

3.1.4 The Market Clearing

Market Clearing:

$$
L_S + L_P = 1.
$$

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[3]This assumption can be understood using the logic from Acemoglu et.al. 2012: Suppose that each worker has political power ω_w, and each elite and entrepreneur have ω_e and ω_p. The political power of entrepreneurs $\omega_p N_p \ll \omega_w$ is small and ignored, because of the small population $N_p \ll 1$. The political power of elite, can not be ignored, though their population is small. Now that the elite choose oligarchy, the workers can change the status of the society to democracy if and only if they form a coalition of size L_w and $\frac{\omega_w L_w}{\omega_w(1-L_w)+\omega_e N_e} > \alpha$. In other words, if and only if rebel $L_w > \frac{\alpha(\omega_w+\omega_e N_e)}{(1+\alpha)\omega_w}$ or the supporters $1 - L_w < \underline{L} = 1 - \frac{\alpha(\omega_w+\omega_e N_e)}{(1+\alpha)\omega_e}$, successful revolution and democratization occurs.

3.2 Democracy

We solve the model using backward induction. In step 2d, the tax payers decide to hide the income if $\tau > \bar{\tau}$ and pay the tax if $\tau < \bar{\tau}$. They are indifferent between paying the tax or hide the income when $\tau = \bar{\tau}$. Without loss of generality, here we assume that they pay the tax when $\tau = \bar{\tau}$.

One step upwards, the competitive market for labor implies workers' wage:

$$w^D = (1-\alpha)\left(zK_S^D\right)^\alpha (L_S)^{-\alpha} = (1-\alpha)\left(K_P^D\right)^\alpha (L_P)^{-\alpha}.$$

Denote $k = \frac{zK_S}{K_P}$, as the ratio of the efficient capital in sector S over the capital in sector P, then

$$L_S^D = \frac{k}{1+k},$$
$$L_P^D = \frac{1}{1+k}.$$

where L_S^D, L_P^D are labor in sector S, P, in democracy.

Since in the static model, there is no tax distortion, the government sets the tax rate as high as possible:$\tau^D = \bar{\tau}$. The final incomes (the aggregate income of the workers, the elites and the entrepreneurs) are:

$$y_w^D = w^D + \tau^D\left(\pi_S^D + \pi_P^D\right)$$
$$= \left(1 + \tau^D \frac{\alpha}{1-\alpha}\right)w^D,$$
$$y_e^D = (1-\tau^D)\pi_S^D$$
$$y_p^D = \left(1-\tau^D\right)\pi_P^D,$$

where π_S^D, π_P^D are the capital income in sector S and P, and their expressions are in the appendix.

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3.3 Oligarchy

The tax setting and tax payment decisions are the same as in democracy because the tax is not distortive. So the government chooses $\tau^O = \bar{\tau}$ and tax payers pay the tax. Given this, we can simplify the game in oligarchy into the following game tree:

Game in Oligarchy

e starnds for elites; w for workers. w in S and w in P mean workers in the state sector and in the private sector, respectively.
(yeO,ywS,ywP) are the (after-tax and -transfer) income of elites, workers in state sector, and workers in private sector under oligarchy.
(yeD,ywD,ywD) are the income in democracy, and (yeR,ywR,ywR) are income after revolt, respectively.
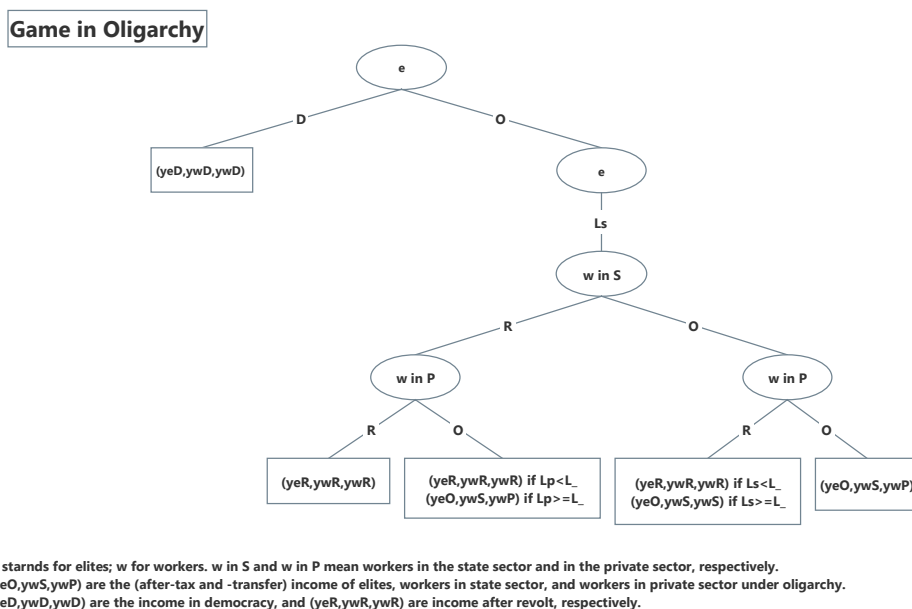
In the following, we still use the backward induction to solve the game. We first look at workers' problem in step 3d. Then given the workers' response, the representative elite's decision will be solved.

3.3.1 The Workers' Problem

The workers' political choices in step 3d is driven by the economic benefits: if a worker expects to get higher income than in democracy, she chooses to support the regime, otherwise she prefers revolution. The state and private workers' incomes are determined by their wages, which are decided by the firms'

production given the labor allocation L_S and $L_P = 1 - L_S$. We ignore the superscript O for variables in oligarchy when it doesn't creates confusion. Because each S or P firm is small and competitive in the labor market, the wages are determined as follows:

$$
\begin{aligned}
w_S\left(L_S\right) &= (1-\alpha)\left(zK_S\right)^\alpha L_S^{-\alpha}, \\
w_P\left(L_S\right) &= (1-\alpha)K_P^\alpha L_P^{-\alpha}.
\end{aligned}
$$

One can see that $w_S \geq w^D \geq w_P$ if $L_S \leq L_S^D$.

The labor allocation is affected by the state sector worker quota L_S^{quota}. There are two cases. First, the labor quota is loose: $L_S^{quota} \geq L_S^D$. In this case, the quota is greater or equal to efficient level, so state sector labor is at the efficient level without quota $L_S = L_S^D$. This is in fact equivalent to setting $L_S^{quota} = L_S^D$. Second, if the labor quota is tight, $L_S^{quota} < L_S^D$, then the state sector labor will be at the level of the quota, $L_S = L_S^{quota}$. The wage is higher in the state sector, and an efficient allocation implies more labor in the state sector but it is not possible because of the quota. Given the analysis above, the two cases can be combined into the following: $L_S^{quota} \leq L_S^D$, and this leads to $L_S = L_S^{quota}$. In other words, the quota is either at the efficient level or binding, and the state sector labor allocation is always the same as the quota. Essentially, setting L_S^{quota} is equivalent to directly setting L_S, and they are both smaller or equal to L_S^D. Hereafter we use $L_S \leq L_S^D$ to represent both the state sector labor and the state sector quota.

The state workers choose to support oligarchy if $y_{wS} = w_S\left(L_S\right) \geq y_w^D > w^D$, while the private sector workers never support oligarchy because $y_{wP} < w_P\left(L_S\right) \leq w^D < y_w^D$. Due to the decreasing marginal productivity of labor, we know that smaller L_S guarantees higher w_S. In order to keep state workers wage higher than in democracy, the state sector labor size should be restricted to a lower level compared to democracy. Notice that this is when the capital is given. We will see in the next section, adjusting capital is another way to guarantee the high wage. To sum up, we get the following proposition.

Proposition 1. *Workers' choices. Workers in sector S support oligarchy if income in sector S is high enough. This is equivalent to say that labor in sector S is restricted to be small enough: $L_S \leq \bar{L} = \nu L_S^D$,*

where $\nu = \left(1 + \bar{\tau}\frac{\alpha}{1-\alpha}\right)^{-\frac{1}{\alpha}} < 1$. *Wage in sector P is lower and the workers in sector P always support democracy.*

3.3.2 The Representative Elite's Political Choice

Given workers' choices, the representative elite's problem is the following: if he chooses labor in the state sector low enough, $L_S \leq \bar{L}$, oligarchy gets support from state sector workers. If at the same time, there are enough workers in the state sector $L_S \geq \underline{L}$, the oligarchic regime gets sufficient support and is sustained. Otherwise, either $L_S > \bar{L}$, the state sector workers are worse off and do not support the regime, or $L_S < \underline{L}$, there are not sufficient supporters. Since private sector workers never support oligarchy, enough workers in the state sector who get high enough wage is sufficient and necessary for sustaining the oligarchy. The representative elite's problem is shown in the graph below.

The Representative Elite's Political Problem
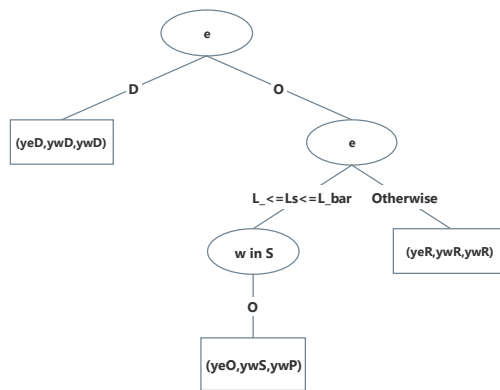
Note: e stands for elites; w for workers, in S and in P mean in the state sector and in the private sector, repsectively.
In the first stage, elites choose democratization or oligarchy; in the second stage of oligarchy, elites choose the quota of state sector workers.
How the choice of Ls leads to different outcomes is discussedin the oligarchy game tree with workers' choices.

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Here we can see the first tradeoff for the elite, in order to sustain the oligarchy:

Remark 2. The tradeoff of labor allocation: reducing the labor in the state sector guarantees higher state sector wage, but the cost is that there may be not sufficient state sector workers to provide sufficient support for the oligarchy.

That is to say, reducing $L_S \leq \bar{L}$ guarantees $w_S \geq y_w^D$. But if $L_S < \underline{L}$, oligarchy can not be sustained. So there are two possibilities, depending on whether $\underline{L} \leq \bar{L}$ is empty or not.

Remark 3. Low Tax Assumption: $\bar{\tau} \leq \frac{\alpha}{1-\alpha}$.

This assumption means that elites don't get too much tax income from the private sector. Otherwise they will allocate even more labor in the private sector than in democracy. With reasonably low tax from the private sector, elites prefer to keep more labor in the state sector, and restricting the state sector labor to the level $L_S \leq \bar{L} < L^D$ is costly for them. The loss of the state sector capital income, which is related to α, can not be compensated by the gain of tax income in the private sector, which is determined by $\bar{\tau}$. We maintain this assumption throughout the paper.

Proposition 4. *Sustainability of oligarchy. If there is sufficiently large capital in the state sector, oligarchy can be sustained. The state sector labor is at the largest level that guarantees the high enough state sector wage. That is to say, $k = \frac{zK_S}{K_P} \geq \underline{k} = \frac{L}{\nu - \underline{L}} \Rightarrow [\underline{L}, \bar{L}] \neq \emptyset, L_S = \bar{L}$. Otherwise, oligarchy can't be sustained. The state sector can not keep sufficient workers while making them better off than in democracy. In other words, $k < \underline{k} \Rightarrow [\underline{L}, \bar{L}] = \emptyset$,*

The following graph shows the logic, where L_ and L_bar refer to $\underline{L}$ and $\bar{L}$. Larger state sector capital pushes the curve of the state sector marginal labor productivity up, and $\bar{L}$ to the right. Then when $\underline{L} \leq \bar{L}$, the elite can choose any $L \in [\underline{L}, \bar{L}]$ and the state sector wage will be larger than in income in democracy, and oligarchy can be sustained.

Labor Allocation in Oligarchy

MPL_S ... MPL_P

1

2   3   4

ywD

wD

L_   LS=L_bar   LSD
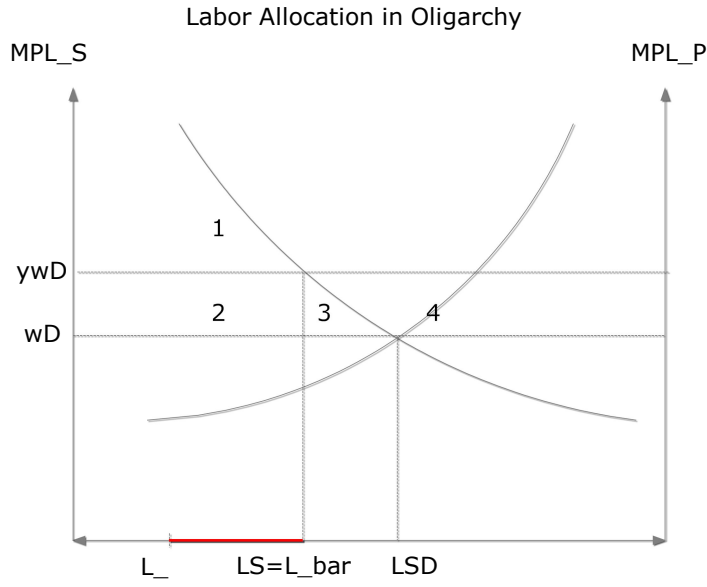
LSD is the labor in sector S under democracy.
L_ is the minimal support needed for a sustained oligarchy.
ywD is the workers' income in democracy.

Then, given $k > \underline{k}$, and oligarchy is sustained, the economic outcome is the following:

$$
\begin{aligned}
L_S &= \bar{L} < L_S^D, \\
w_S &= y_w^D > w_P, \\
y_e &= \pi_S + \bar{\tau} Y_P, \\
y_p &= (1 - \bar{\tau}) \pi_P,
\end{aligned}
$$

Proposition 5. *High inequality in oligarchy. In oligarchy, elites and entrepreneurs gain more income than in democracy. The private sector workers get less. The inequality is larger in oligarchy.*

Oligarchy benefits capitalists - both elites and entrepreneurs gain more income. The private entrepreneurs get higher capital income due to low wage and more labor in the private sector. $L_P > L_P^D, w_p < w^D \Rightarrow$

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$y_p > y_p^D$. The elite also get more in oligarchy, due to the tax and transfer. This is proved in the appendix.

Remark 6. This result in this section, focuses on current period outcome in oligarchy. It is consistent with the following empirical facts in China: (1) wage premium in the state sector and repressed wage in the private sector; (2) more support for the current regime from the state sector workers.

In this section, we show, on one hand, how the economic power determines the political outcome. When the state sector capital relative to the private sector is large enough, there is enough state employment with high wage to sustain oligarchy. On the other hand, the political system - democracy or oligarchy - and the political interests, largely shape the economic outcome - capital and labor allocation.

4 The Dynamic Model: with The Financial System in China

In the static model, we conclude that the state and the private capital are important for the elite, economically and politically. So they have incentives to control the capital formation and allocation. In the dynamically model, we introduce capital accumulation and study how the elite strategically influence it, in different stages of development.

4.1 Environment

In China, SOEs get abundant financial support from state banks while the POEs have limited ability in borrowing. In this section, we follow Song et.al. (2011) and assume that SOEs can borrow as much as they want at the rate R. An private entrepreneur faces borrowing constraint, because banks know that he may choose not to pay back the loan and run away. Due to this moral hazard problem, we assume that the upper bound that a bank is willing to lend to an private entrepreneur is $\bar{\eta}$ fraction of her own asset. [4]Additionally, we consider that in oligarchy the government can further restrict the entrepreneur's borrowing limit to a lower level $\eta \in \left[\underline{\eta}, \bar{\eta}\right]$ if they want. The government can create barrier in loans to

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[4]This assumption comes from the following logic: the bank doesn't know if the borrower is an entrepreneur who has access to high capital return R_p or simply a group of workers who gets return R. If the borrower chooses to steal and leave, the bank can take back $\eta R(l+s)$, which gives the incentive constraint $Rl \leq \eta R(l+s) \Rightarrow l \leq \frac{\eta}{1-\eta}s$. Just redefine $\bar{\eta} = \frac{\eta}{1-\eta}$.

POEs, or directly give administrative instructions to banks, as in Brandt and Zhu (2000). In democracy, the government can but will not restrict the loans to the more efficient private sector.[5] This model can generate an endogenous financial constraint in sector P, which may be tighter than the constraint in democracy.

In this section, we assume that elites and entrepreneurs live for infinite periods and are forward-looking. For simplicity, we still assume that each generations of workers live for only one period, so that they only care about their current period income. We keep the exogenous tax assumption $\tau^D = \tau^O = \bar{\tau}$. We also keep the setting that to sustain the oligarchy in the current period, the elite needs to provide wage premium in the state sector according to $w_S \geq y_w^D$ and attract more than $\underline{L}$ supporters.

The timing within each period is only different from the benchmark model in the beginning and the end. In the beginning, the capital is no longer pre-determined. The elite can freely borrow capital K_S at the interest rate R. $\eta \in \left[\underline{\eta}, \bar{\eta}\right]$ is chosen by the government, and entrepreneurs borrow at the same interest rate but are constrained by $K_P \leq (1 + \eta) a_p$, where A_p is their own asset. In the end of each period, each elite and entrepreneur decide the next period asset a_e' and a_p', respectively.

We assume the logarithm form for the instantaneous utility.

4.2 Democracy

In democracy, the outcome in every period is exactly as the static model. The dynamic is also simple. The optimal choice of a small private entrepreneur is as follows: first, she maximizes the current period income by borrowing as much as possible, given that the capital return is higher than the interest rate. Then she just save a constant fraction of her income and asset into the next period. That is to say, $a_p' = \frac{\beta}{1+\beta} y_p(a_p)$. Each elite also saves a constant fraction of asset and income into the next period, and the asset return to her is R . The representative worker prefer more capital in the private sector therefore set $\eta = \bar{\eta}$. The solution to democracy will be like in Song et.al., 2011 and can be summarized

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[5] In Song et.al. (2011), they set the upper bound in a more sophisticated form which is related to the interest rate and the capital return. This is different from our setting in democracy. But in oligarchy, when the government chooses to restrict the private sector borrowing, these two settings can be the same. The two settings both boil down to allowing the private sector to access capital K_P, given asset a_p, implying $\eta = \frac{K_P}{a_p}$.

in the following proposition.

Proposition 7. *In democracy, the relative size of sector S, measured by $k = \frac{zK_S}{K_P}$, decreases over time to 0 .*

This is because that the state sector is less productive than the private sector, $z < 1$. The growth rates of private sector capital income and capital accumulation are larger. The more efficient private sector will take over the state sector gradually, in democracy. This is also the result of a pure economic model with structural change.

4.3 Oligarchy

4.3.1 Elites' Problem

In oligarchy, the representative elite's problem, given elites' and entrepreneurs' assets a_e, a_p becomes:

$$
\begin{aligned}
W\left(a_e, a_p\right) &= \max_{c_e, a_e', K_S, \eta, L_S} \log c_e + \beta W\left(a_e', a_p'\right) \\
\text{s.t. } a_e' &= Ra_e + y_e\left(K_S, \eta, L_S\right) - c_e, \\
a_p' &= a_p'\left(a_p, \eta, L_S\right).
\end{aligned}
$$

We will notice that a_e, a_e' in fact does not affect the income y_e. This is because that the elite can freely choose K_S, so a_e always contribute to income by Ra_e but is not going to affect the output and the political transition at all. So the elite problem can be reduced to a single state variable value function, depending only on a_p. The elite just try to affect a_p to get the highest the lifetime income, and then use a_e to smooth consumption. Now the problem becomes:

$$
\begin{aligned}
V\left(a_p\right) &= \max_{K_S, \eta, L_S} y_e\left(K_S, K_P, L_S\right) + (1 - \delta) K_S - RK_S + \frac{1}{R} V\left(a_p'\right) \\
\text{s.t. } K_P &= \eta a_p, \\
a_p' &= \beta\left(y_p\left(K_S, K_P, L_S\right) + (1 - \delta) K_P - R\left(K_S - a_p\right)\right).
\end{aligned}
$$

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where δ is depreciation, and y_e and y_p are the income, same as in the static model.

We numerically solve the model and get the following results.

Remark 8. Tradeoff of the private sector size in oligarchy. A larger K_p gives more tax income to the elite, but on the other hand, it also implies the need to build up a larger state sector to sustain the oligarchy and more cost of borrowing for K_S. The elite's income, as K_P increases, increases first and then declines.

In oligarchy, when K_P is very small, its marginal productivity can be very high, because the elite keep at most $\nu L_S^D \leq \nu$ in the state sector to maintain the wage premium, and there are at least $1 - \nu$ labor in the private sector. Larger K_P implies larger tax income. But when K_P is very large, the elite need to borrow large enough K_S to maintain oligarchy and cost can dominate the tax income.

The following graph shows how elites' economic choice and outcome (net of his own asset) depend on K_P. The first subgraph depicts that as K_P increases from a very low level, elites get more tax income and benefit from it. But when K_P becomes large enough, elites have to increase K_S to match K_P so that $\underline{L}$ workers are guaranteed in sector S, as in the second and third subgraph. At some point of time, this over-investment in K_S becomes too costly and elite income decreases. Finally when K_P is large enough, elites find matching K_P is worse off than giving up oligarchy and democratization, as shown in subgraph 4. The above is the subgame if in step 1 the representative elite doesn't choose democratization. In fact, he may as well choose democratization from the beginning, when K_P is large.

Variables on Different Private Sector Capital
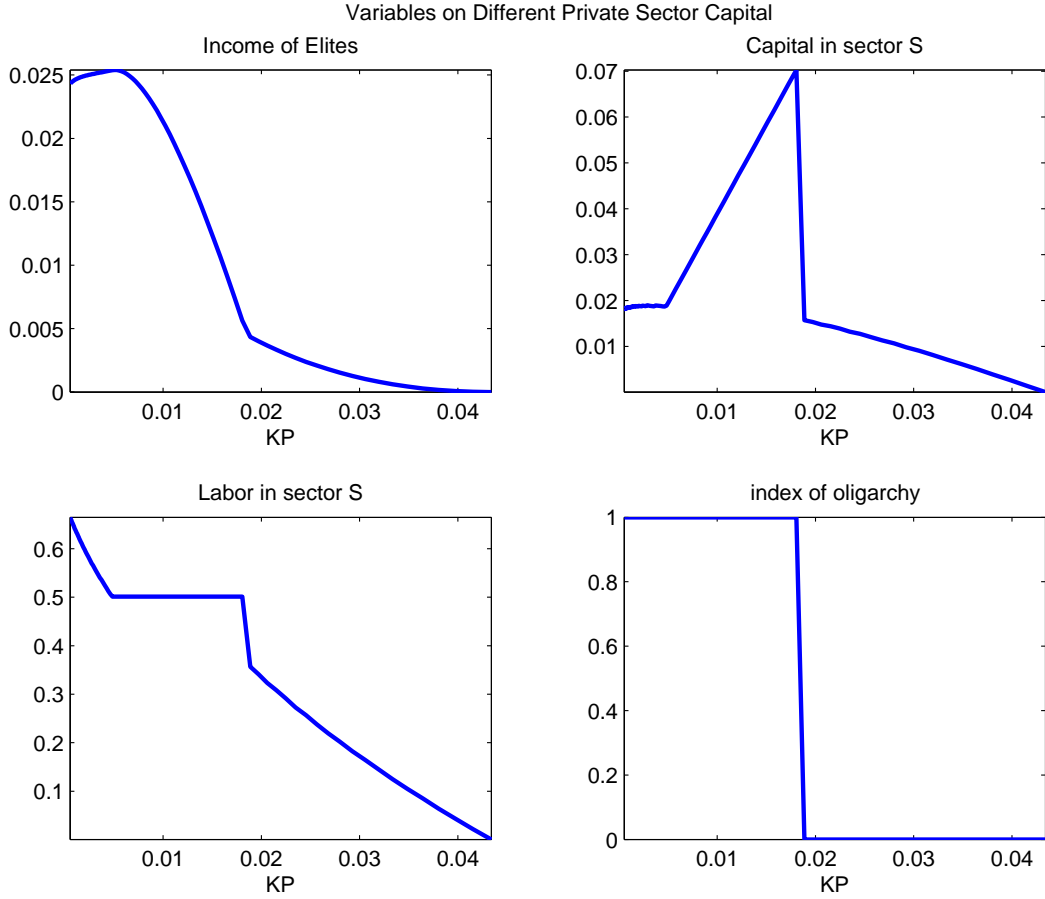
4.3.2 The Dynamics - A Three Stage Politico-economic Transition

Given the elites' choice, we can generate the dynamics of the economy as in the following proposition.

Proposition 9. *There is a three stage politico-economic structural change over time.*
Stage 1: "Rapid growth". Full support for the private sector growth, lowest financial restriction, $\eta = \bar{\eta}$.
Rapid growth and capital accumulation. The workers' income over GDP and the consumption share of
*GDP decline. Large income inequality.*
Stage 2: "State capitalism". Larger financial restriction $\eta < \bar{\eta}$. The private sector growth, in terms of
employment share, slows down. Over-investment in the state sector keeps the race between the state and
private sector capital accumulation.

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Stage 3: "Middle-income trap" or "further growth". depending on the political transition.

Case 1: permanent oligarchy, when it is not costly for the elite to restrict the private sector and build up a large state sector. The private sector stop growing and enough capital and workers in the state sector guarantee sufficient support for oligarchy. The whole economy stops growing.

Case 2: democratization. It is costly to borrow and build a large state sector as the private sector grows rapidly, so the elite decide to democratize. State sector declines rapidly, and leads to a short-run economic decline. But the private sector again grows again and Output eventually grows to a higher level.

The following graph shows the dynamics in democracy (green line), permanent oligarchy (dotted blue line) and democratization (blue line).

Dynamics in Democracy(D), Democratization(OD), Oligarchy(O)
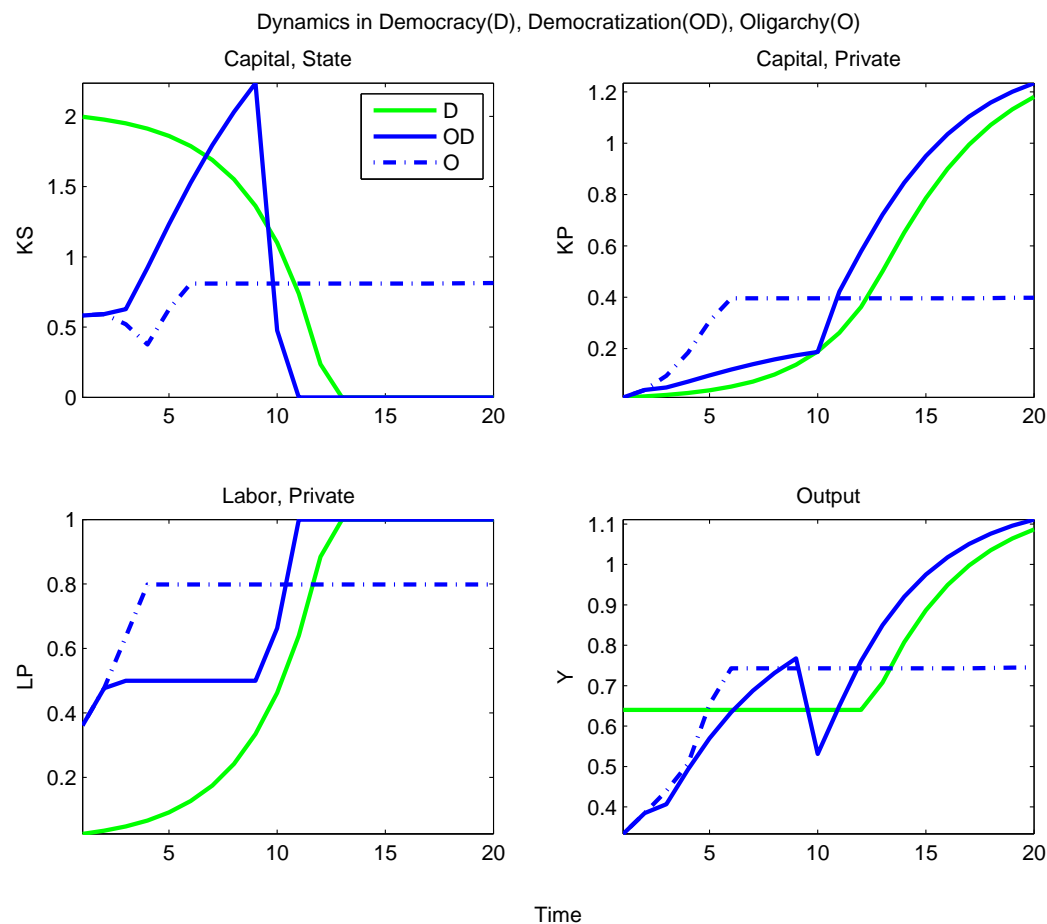
When the private sector is very small, the economy is in stage 1. Elites prefers a larger private sector and more tax income. So the government gives full support to the private sector, setting $\eta = \bar{\eta}$. The private sector grows rapidly, due to the abundant labor and low wage. The workers' income over output in the private sector is lower than in the state sector. As the size of the private sector grows, the average workers' income over GDP decline. Furthermore, as the workers consume a larger share of current income than elites and entrepreneurs, the consumption share of GDP declines given the workers' income share declines.

When the private sector grows larger, the economy goes to the second stage. The elite need to borrow a lot to maintain the state sector employment share, to their interest, restriction on the private sector is chosen: $\eta < \bar{\eta}$. The recent China experiences the slowdown of the private sector growth, in employment share, and a persistent or even increasing financial friction, which means that China has been going through stage 2.

Finally, the elite may successfully restrict the private sector size to a low enough level and keep the employment share in the state sector constant. This sustains oligarchy permanently, or at least for very long in reality. After 2008, the state sector employment stops decreasing and advances of the state and retreats of the private sector, i.e., *guo-jin-ming-tui* is becoming a big concern. This hints that China is getting into case 1 of the stage 3 with long-sustained oligarchy.

The implication of the growth, as we can see in the figure, can be summarized in the following proposition.

Proposition 10. *Long-run growth. Oligarchy leads to short-run fast growth. But the growth slows down when the private sector is restricted in borrowing. In the long-run, democratization leads to further growth to the level of output in democracy. Permanent oligarchy can lead to persistent inefficient allocation to the state sector and a lower level of output.*

5   Conclusion

This paper studies the interactions of the political and economic institutions in oligarchy, in order to understand the puzzles in China's economic growth and to predict the future changes to the economic

and political system. Building a political-economic model, we provide micro-foundation and explanations for some current political and economic phenomena in China, including (1) high wage in the state sector and suppressed wage in the private sector; (2) inefficient capital allocation in favor of the state firms; (3) the support for the regime from the state sector workers; (4) fast economic growth and fast capital accumulation, and (5) slower workers' income and consumption growth than GDP growth. Furthermore, the model predicts that the medium and long run economic growth will be harmed by oligarchy: the elite may choose to restrict the private sector growth and allocate resource inefficiently, according to their own interest. Democratization can leads to a further economic growth and finally efficient resource allocation. The current restrictive policies on the private sector, the slowing down of the private sector labor growth and the sustained support from the state sector workers in China signal that the government can still sustain the state capitalism and the oligarchic regime. However, this means that the growth of the private sector and the whole economy will be lower than the potential.

This model can be extended with ease to discuss the politico-economic effects of policies, such as financial liberalization, and relaxed rural-urban migration. Then we may know when will the elite support or abandon those policies. Financial liberalization and opening to foreign technology and trade which benefit the private sector more may come to an end in the second stage: "state capitalism". The oligarchic government may maintain strict control on the financial system and favor more technology that strengthen the state firms, e.g., technologies in oil industry and the railway system. Also, one can think about the rural-urban migration with this model. Our model is about the urban sector. The rural-urban migration means an increase of the workers. If the new workers of equal political importance as the old workers, the rural-urban migration is neutral. However, if the elite make the migrant workers less political active, by restricting their activities with the residency permit, the regime can be sustained easier, because the total number of worker increases but the elite do not need to please the new workers. This logic can be also applied to understand why the gulf states favors migrant workers in the private sector and keep local workers in the state-controlled sector.

Finally, even though the focus of this paper is on China, the logic can be used to think about many other oligarchic countries. Many phenomena including the patronage strategy, labor and financial market

friction in favor of the elite-controlled firms are common among many other developing countries. For example, most Kuwaitis work for the state in well paid, secure jobs. The private sector workers include a lot of immigrant workers and their political and economic rights are largely ignored. Also, whether to adopt the China model, i.e., the state capitalism or to follow the "Washington Consensus" is an important question for those countries. Our analysis on the benefit and cost of the state capitalism points out that the short-run and long-run effects should be carefully distinguished in this decision making.

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6 Appendix

6.1 Proof of Proposition 1

Next period's efficient capital ratio:

$$
\begin{aligned}
k_{nxt}^{D} &= \frac{zK_{S,nxt}^{D}}{K_{P,nxt}^{D}} \\
&= \frac{z\pi_{S}^{D}}{\pi_{P}^{D}} \\
&= \frac{z\left(L_{S}^{D}\right)^{1-\alpha}}{k^{-\alpha}\left(1-L_{S}^{D}\right)^{1-\alpha}} \\
&= \frac{z\left(\frac{k}{1+k}\right)^{1-\alpha}}{k^{-\alpha}\left(\frac{1}{1+k}\right)^{1-\alpha}} \\
&= zk
\end{aligned}
$$

6.2 Proof of Proposition 2

Given L_S, we can characterize the income of workers and their choice in the political game:

$$y_{wS}(L_S) = (1-\alpha)(zK_S)^\alpha L_S^{-\alpha} \begin{cases} \geq y_w^D & \text{if } L_S \leq \bar{L} = \nu L_S^D \\ < y_w^D & \text{if } L_S > \bar{L} \end{cases},$$

$$y_{wP}(L_S) = (1-\tau^O)(1-\alpha)K_P^\alpha(1-L_S)^{-\alpha} < y_w^D \text{ since } L_S \leq L_S^D.$$

where $\nu = \left(1 + \bar{\tau}\frac{\alpha}{1-\alpha}\right)^{-\frac{1}{\alpha}} < 1$. This means that if the number of SOE workers is small enough, $L_S \leq \bar{L} = \nu L_S^D$, each SOE worker gets higher wage than in democracy. And POE worker always lose in oligarchy. In the subgame where the workers in sector P choose whether to support D or O, supporting D is a best response. And they may choose to support O if and only if their choice doesn't change the outcome of the game going to O. So we can focus on the case that the workers in sector P always choose D, without affecting the outcome. Given this, the workers in sector S's choice and the outcome depends on L_S: (1) $\underline{L} \leq L_S \leq \bar{L}$: supporting O is a best response and it leads to O; (2) $L_S > \bar{L}$, supporting D is the best response and the outcome is D; (3) $L_S < \underline{L}$, no matter what the workers in sector S choose, the outcome is D, because there are not enough support for O. The intuition is the following: restricting workers in sector S can increase the capital labor ratio and wage in sector S at the cost of a lower private sector wage. So workers in the private sector always hate oligarchy and the labor quota system. A worker in sector S will support the oligarchy if L_S is small enough to guarantee a high enough wage in sector S. However, if L_S is too small, the support of the workers in sector S and the elites do not have enough political power to prevent the rebellion and democratization.

6.3 Proof of Proposition 3

There are two possible cases that makes whether oligarchy can be sustained in this period.

1. $[\underline{L}, \bar{L}] = \emptyset$. Oligarchy is not sustainable. The representative elite can not strategically make sufficient workers support the oligarchy: if he sets $L_S < \underline{L}$, there's not sufficient support; but if

$L_S \geq \underline{L} > \bar{L}$, workers in SOE don't get high enough wage. The only outcome is D. Since $\underline{L}$ is exogenous and $\bar{L} = \nu L_S^D$ depends on k, we can simplify the condition to $\bar{L} < \underline{L} \Leftrightarrow \nu L_S^D = \nu \frac{k}{1+k} <$

$\underline{L} \Leftrightarrow k < \underline{k} = \begin{cases} \frac{\underline{L}}{\nu - \underline{L}} & \text{if } \nu - \underline{L} > 0 \\ +\infty & \text{if } \nu - \underline{L} \leq 0 \end{cases}$, given $k > 0$. In the case $\underline{k} = \frac{\underline{L}}{\nu - \underline{L}}$, we know that when the

elites do not have high enough capital compared to the capital in sector P, they can not sustain oligarchy.

2. $[\underline{L}, \bar{L}] \neq \emptyset$. Oligarchy is sustainable. The representative elite can choose to sustain the oligarchy by setting some $L_S \in [\underline{L}, \bar{L}]$ or choose the outcome of democracy. We first look at the elites' income under the first choice, and as we will see later, the first choice always gives higher utility than in democracy, which means that in this case, the elites always choose to sustain the oligarchy. The elites' income under the first choice is:

$$\max_{L_S} \pi_S + \bar{\tau} Y_P$$
$$\text{s.t. } \underline{L} \leq L_S \leq \bar{L}$$

which is equivalent to

$$\max_{L_S} \alpha \left(z K_S \right)^\alpha L_S^{1-\alpha} + \bar{\tau} \left(z K_S \right)^\alpha k^{-\alpha} \left(1 - L_S \right)^{1-\alpha}$$
$$\text{s.t. } \underline{L} \leq L_S \leq \bar{L} \tag{6.1}$$

Write the Lagrangian:

$$L = \alpha \left(z K_S \right)^\alpha L_S^{1-\alpha} + \bar{\tau} \left(z K_S \right)^\alpha k^{-\alpha} \left(1 - L_S \right)^{1-\alpha} + \lambda \left(\bar{L} - L_S \right) + \mu \left(L_S - \underline{L} \right) \Rightarrow$$
$$0 = \alpha \left(1 - \alpha \right) \left(z K_S \right)^\alpha L_S^{-\alpha} - \left(1 - \alpha \right) \bar{\tau} \left(z K_S \right)^\alpha k^{-\alpha} \left(1 - L_S \right)^{-\alpha} - \lambda + \mu \tag{6.2}$$

We claim that given $\bar{\tau} \leq \alpha$ (as a sufficient condition), elites always prefer higher L_S, or say,

$$\alpha \left(1 - \alpha \right) \left(z K_S \right)^\alpha L_S^{-\alpha} - \left(1 - \alpha \right) \bar{\tau} \left(z K_S \right)^\alpha k^{-\alpha} \left(1 - L_S \right)^{-\alpha} > 0, \forall L_S < L_S^D$$

This is because

$$\frac{\alpha \left(1 - \alpha\right) \left(zK_S\right)^\alpha L_S^{-\alpha}}{\left(1 - \alpha\right) \bar\tau \left(zK_S\right)^\alpha k^{-\alpha} \left(1 - L_S\right)^{-\alpha}} = \frac{\alpha L_S^{-\alpha}}{\bar\tau k^{-\alpha} \left(1 - L_S\right)^{-\alpha}}$$

$$> \frac{\left(L_S^D\right)^{-\alpha}}{k^{-\alpha} \left(1 - L_S^D\right)^{-\alpha}} = 1.$$

To satisfy eq (6.2), it must be $\lambda > 0$, so $L_S^Q = \nu L_S^D$. The economic intuition is the following: when the tax income from the private sector is smaller than the capital income share in sector S, the elites always prefer to have more labors in sector S, as long as the constraint (6.1) is satisfied. We assume $\bar\tau \leq \alpha$ throughout the paper.

The final income of workers and elites are:

$$
\begin{aligned}
y_{wS}^O &= w_S^Q = y_w^D, \\
y_{wP}^O &= \left(1 - \bar\tau\right) w_P^O \\
y_e^O &= \pi_S^O + \bar\tau Y_P^O \\
&= \alpha \left(zK_S\right)^\alpha \left(L_S^O\right)^{1-\alpha} + \bar\tau \left(zK_S\right)^\alpha k^{-\alpha} \left(1 - L_S^O\right)^{1-\alpha} \\
&= \left(zK_S\right)^\alpha k^{-\alpha} \left(1 + k\right)^{\alpha-1} \left[\alpha \nu^{1-\alpha} k + \bar\tau \left(1 + \left(1 - \nu\right) k\right)^{1-\alpha}\right] \\
y_p^O &= \left(1 - \bar\tau\right) \pi_P^O \\
&= \left(1 - \bar\tau\right) \alpha \left(zK_S\right)^\alpha k^{-\alpha} \left(1 + k\right)^{\alpha-1} \left(1 + \left(1 - \nu\right) k\right)^{1-\alpha}
\end{aligned}
$$

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Notice that elites are better off than in democracy: $y_e^O > y_e^D$,

$$
\begin{aligned}
y_e^O &> \alpha \left(z K_S\right)^\alpha \left(L_S^O\right)^{1-\alpha} \\
&= \alpha \left(z K_S\right)^\alpha \nu^{1-\alpha} \left(L_S^D\right)^{1-\alpha} \\
&= \alpha K_S^\alpha \left(1 + \tau^D \frac{\alpha}{1-\alpha}\right)^{-\frac{1-\alpha}{\alpha}} \left(L_S^D\right)^{1-\alpha} \\
&> \alpha K_S^\alpha \left(1 - \tau^D\right) \left(L_S^D\right)^{1-\alpha} \\
&= y_e^D.
\end{aligned}
$$

The above result comes from the second order Taylor expansion

$$
\begin{aligned}
\left(1 + \tau^D \frac{\alpha}{1-\alpha}\right)^{-\frac{1-\alpha}{\alpha}} &= 1 - \frac{1-\alpha}{\alpha} \tau^D \frac{\alpha}{1-\alpha} + \frac{1}{2}\left(-\frac{1-\alpha}{\alpha}\right)\left(-\frac{1}{\alpha}\right)\left(1 + \tau \frac{\alpha}{1-\alpha}\right)^{-\frac{1+\alpha}{\alpha}} \\
&> 1 - \tau^D,
\end{aligned}
$$

where $\tau \in \left(0, \tau^D\right)$. Also, private entrepreneurs benefit from dictatorship given $\tau^O = \tau^D = \bar{\tau}$, since there are more labor in sector P and this pushes down the wage cost:

$$
\begin{aligned}
y_p^O &= (1 - \bar{\tau}) \alpha \left(z K_S\right)^\alpha k^{-\alpha} \left(1 - L_S^O\right)^{1-\alpha} \\
&> (1 - \bar{\tau}) \alpha \left(z K_S\right)^\alpha k^{-\alpha} \left(1 - L_S^D\right)^{1-\alpha} \\
&= y_p^D
\end{aligned}
$$

Notice that $\frac{y_p^O}{y_p^D} = \left(\frac{1 - L_S^O}{1 - L_S^D}\right)^{1-\alpha} = (1 + (1-\nu) q)^{1-\alpha}$ increases with q, meaning that the private entrepreneurs benefit more in O when sector P is small.

The fact that $y_e^O > y_e^D$ shows that when possible, the elites choose L_S to sustain the oligarchy.