

# Will China Escape the Middle-income Trap?

## A Politico-economic Theory of Growth and State Capitalism\*

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### Abstract

Is China's rapid growth sustainable if the current labor and capital market distortions persist? Will democratization occur given that Chinese middle-class are supportive of the regime now? To answer the above questions, this paper proposes a politico-economic theory, as follows. In oligarchy, a political elite extracts surplus from the state sector and taxes the private sector, but it also needs political support from sufficiently many citizens to maintain its power. "Divide-and-rule" strategy is implemented to guarantee such support: state workers receive high wages and become supporters of the elite, while wages of private workers are reduced due to this policy distortion. In the short-run, the low wages in the private sector lead to rapid growth of the private firms and total output. However, long-run growth is harmed by capital market distortions favoring the state firms. The theory suggests that the economy develops along an endogenous three-stage transition: "*rapid growth*", "*state capitalism*", and two cases in the third stage: "*middle-income trap*" or "*sustained growth*", depending on whether democratization occurs. The theory is consistent with salient aspects of China's recent development and gives predictions on China's future development path.

**Keywords:** China, rapid growth, state capitalism, middle-income trap, democratization, middle-class, financial repression, inequality, state wage premium, low wage

**JEL Classification:** E22 J31 O41 P16

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# 1 Introduction

China has by now been growing at a stellar rate for over 3 decades. While this is generally acknowledged to be a great historical achievement, there is major controversy on how far in time and scope the Chinese success story can go. The optimists argue that China can provide a new model for growth as an alternative to the liberal democracy growth model - the Washington Consensus. For example, in a debate hosted by *The Economist* (see also Musacchio and Lazzarini (2012)), Aldo Musacchio argues that China's hybrid form of capitalism can become a new growth model for the 21st century. In his view, such a model offers three very attractive features: less pronounced recessions, focus on long-term investing and producing world champions. These considerations make him optimistic about the sustainability of China's future growth, and even about the possibility that China can become a role model for other developing and emerging countries. In contrast, critics predict that the growth rate will soon slow down. For example, Acemoglu and Robinson (2012) argue that China's extractive political institution is not compatible with innovation and high growth in the long run. In their view, although the growth process driven by catch-up, import of foreign technology, and export of low-end manufacturing products may continue for a while, it is deemed to come to a halt as soon as China reaches the living standards of a middle-income country.

The pessimistic perspective of Acemoglu and Robinson raises a number of questions. If growth under the current regime slows down, as they predict, will this trigger changes in the political system? Will unsatisfied citizens oust the oligarchy and allow growth to be resumed under a more democratic system? Or, alternatively, will the oligarchy be able to retain sufficient support even in a low-growth economy? On the one hand, modernization theory suggests that the first scenario is likely to occur. But, then, one can argue that it may have been right for China to adopt its hybrid form of state capitalism to achieve high economic growth in the catch-up stage, and then switch to liberal democracy when state capitalism runs out of steam. The Chinese model, in other words, could be a model of transition, albeit not of long run growth for mature economies. On the other hand, this view may well be overly optimistic: at the time of transition, the political elite may be unwilling to give up state capitalism and stick to power in order to keep control on political power and economic resources, as we see in countries like Venezuela. In the language of Acemoglu et al. (2006), state capitalism may be appropriate to promote growth at an early stage of development, but may become impossible to reform at a later stage when it becomes a burden on further economic development.

To answer these two questions about China's growth and political transition, this paper proposes a theory of politico-economic transition. A two-sector dynamic general-equilibrium model is built and calibrated to China's economy. Moreover, the theory is consistent with salient aspects of China's recent developments, including: rapid growth with low wages and large state investments. Most notably, the theory can explain the high support of the Chinese middle-class to the political regime.

In this theory, a political elite is able to extract surplus from state firms and tax the private sector, however, it faces a political constraint, that is, support from sufficiently many citizens. To gain the support, it implements the “divide-and-rule” strategy. It creates a dual labor market, in which state workers receive high wages and private workers’ wages are reduced due to the policy distortion. The state workers who benefit from the policy become the elite’s supporters. Furthermore, to satisfy the political constraint, the elite finds it optimal to distort the allocation of capital between state and private sector. The private sector contributes taxes, but also competes for labor with the state sector. So the elite first encourages the growth of the private sector but then restricts it when the growth of private employment turns into a threat for the elite’s supporter base, i.e., state employees. Therefore, government policy and economic growth, follow different patterns in different stages of development. The economy develops along a three-stage transition, as follows. The first stage is “*rapid growth*”, during which the GDP share of the private sector grows fast, triggering high reallocation and productivity growth. In this stage, private firms benefit from the distorted low wage in the private sector induced by the policy. The government supports privatization as this increases its tax revenue. However, as privatization goes on and the state employment share declines to a critical level, the economy enters the second stage - “*state capitalism*”. In this stage, the elite over-invests in the state sector to keep the state employment sufficiently high. The government also imposes gradually increasing financial repression to limit the growth of private firms. Growth continues to be high due to large state investment, but the financial repression on private firms causes a slowdown. As the private sector capital keeps growing (largely through self finance), two possible outcomes emerge. The first is the “*middle-income trap*”: the state over-investment and financial repression on private firms continue, but due to decreasing return to capital and the capital market distortion, the efficiency loss grows larger. Finally, the growth stops before the output converges to the level in democracy. This happens when the cost of retaining the state sector is low, i.e., when the number of supporters needed is small. The other possible outcome is democratization leading to “*sustained growth*”. In this case, the elite finds it too costly to keep investing in the less efficient state sector and therefore chooses to democratize. State over-investment and financial repression on private firms both disappear and the economy keeps growing in democracy.

The first two stages in the theory are consistent with the recent development in China. First, the distorted low private sector wage helps private firms and the economy grow rapidly. Between 1995 and 2007, the private employment share increases from 40% to 80% (see more details in section 2). This era of fast privatization implies large efficiency gain and “*rapid growth*”, as the first stage of the theory. However, afterward, private sector employment share stops growing. Private firms face tighter financial constraints while around 60% of investment and the majority of bank loans are

diverted to less productive state firms.<sup>12</sup> This capital market misallocation in favor of state firms implies that the economy is entering the “state capitalism” stage. Second, the middle-class, consist largely of state sector workers and private entrepreneurs, are the beneficiaries and supporters of the regime. This is because state workers receive high wages, and entrepreneurs benefit from the cheap and abundant labor in the private sector. Chen and Lu (2011) and Tsai (2007) document that the Chinese middle-class, including state employees and private entrepreneurs are “achieving their material interests without pursuing any real freedom”. This phenomenon will be discussed in great details in section 2. Besides the above phenomena, the theory is also useful to understand a few more, including: high capital labor ratio in the state sector, low and decreasing state sector capital return, high and non-decreasing private sector capital return, etc..

The third stage of the transition in the theory provides an answer to the questions on China’s future political and economic developments. The model, calibrated to China’s economy, predicts that the economy will enter the “middle-income trap”. The reason is the relatively low cost of retaining enough supporters in the state sector. On the one hand, the government is economically powerful and it is able to invest and maintain a large state sector, because it controls the banking sector and holds abundant financial asset, including the huge foreign reserve. On the other hand, the current government is politically powerful, meaning that unless a very large fraction of citizens are against it, it can retain its control over the country. In other words, a relatively small fraction of supporters is sufficient to maintain the regime and state employment share doesn’t have to be too high. Given these conditions, the current regime and policy distortions will persist, which will eventually slow down the growth before China becomes a rich country.

Is China doomed to fall into the middle-income trap? Is there any way to redirect China to the other development path - “sustained growth”? Many China watchers and researchers have proposed insightful reform plans to the government, including financial reform, state sector reform, political reform, etc., which can help to sustain the growth. However, is the government willing to implement those reforms? Many reforms beneficial for growth can be harm the elite’s interests, therefore the government may decide not to implement them. In the extension of the baseline model, I consider reforms as changes on model parameters which may affect the development path, and consider the government’s decision on a reform as a bargain between two groups in the government: the elite who cares about its own interest and technocrats who care about the economic performance. With the aid of the model, we can evaluate how various reforms affect growth and the elite’s interest. This helps to think on the direction of future reforms, in other words, which reforms will face strong resistance from the elite and which are more likely to be implemented.

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<sup>1</sup>80% of bank loans are received by large firms who contribute to only 30% of GDP and 20% of employment. Most of them are state firms.

<sup>2</sup>Hsieh and Klenow (2009) estimate that the total factor productivity (TFP) of state firms is 42% lower than the TFP of domestic private firms.

Our theory is related to three strands of literature. The first one is on China’s economic growth with resource re-allocation. Song et al. (2011) construct a two-sector growth model to study how the capital and labor reallocation from the state to the private sector leads to rapid growth. Brandt and Zhu (2000, 2010) document the contribution of private firms to growth and the government’s strategy to maintain state sector employment. These studies capture some key features in China’s economic growth, including the capital and labor market frictions. However, an important unanswered question lies in the previous research: why are there large labor and capital market frictions and how will they evolve in the future? To answer this question, political economy needs to be modeled, as it is the root for frictions, including the financial constraint on private firms in Song et al. (2011) and the state employment constraint in Brandt and Zhu (2010). This paper provides the microfoundation for the endogenous evolution of financial constraint, labor market wedge, state employment and so on. It not only helps to understand better the frictions, and more importantly, allows us to predict their future trends. In contrast to the conventional wisdom which believes that these frictions will gradually decline as China develops, this paper predicts that they will be persistent and even increasing in China.

Second, our theory contributes to the study of “middle-income trap”, i.e., the significant slowdown of economic growth when a country’s GDP per capita reaches the middle level. Gill and Kharas (2007) is the first paper that formally uses this term to describe the growth slowdown of emerging economies. After that, this phenomenon attracts high attention in the public (see *The Economist* 2012 and *The Economist* 2013). In empirical studies, Eichengreen et al. (2013) document this pattern with data, and then Robertson and Ye (2013) formally propose a statistical definition of a middle income trap, namely, a country’s relative income to the U.S. is stationary and falls into the range of 8% to 36%. They test the definition with time-series data find that out of 46 middle income countries, 19 fall into their strict definition of middle income trap. On why it occurs, there are insightful ideas. For example, Fatás and Mihov (2009) argue that this is because growth from low income to middle income doesn’t require good institutions but only right policies, but good institutions are necessary for achieving high income. Without improved institutions, rapid growing countries will “hit the wall”. This discussion is also heated in the public. However, there are in lack of theoretical frameworks to provide guidelines for the discussion. This paper tries to formally model how a country grows within the extractive institution and why it stops growing at a middle-income level if there’s no reform on the political institution. Moreover, the theory allows us to study under which conditions a country can jump out of the middle-income trap and which reforms are necessary to achieve this.

The third is the literature on the relation between the political and economic institutions. Acemoglu and Robinson (2012) study how the political institution affects economic performance in the long run. They argue that the *extractive* political institution in a non-democratic country is detri-

mental to economic growth. Lipset (1959) and Fukuyama (1992) study how the long-term effect of economic development on the political development. Their modernization theory argues that the economic development will ultimately lead to political modernization, i.e., liberal democracy. Our contribution to this strand of literature is two-fold: first, we study the effects on both directions, i.e., the inter-dependency of the economic institution and the political institution; and second, we distinguish the short-run effects of political institution on economic development from the long-run effect, which can be quite different.

The rest of the paper is organized as follows. Section 2 shows some important empirical facts on China's political-economic development. Section 3 discusses a two-sector dynamic growth model with the three-stage political-economic transition. The first two stages explain puzzles in China's recent development, while the third stage predicts future politico-economic trend. Section 4 concludes.

## 2 Empirical Facts on China's Recent Development

In this section, we discuss the key phenomena and puzzles in China's recent development, including: (1) large wage gap between the state and the private sector; (2) the middle-class's low support for democracy, as the opposite of the conventional wisdom; (3) the partial privatization; and (4) financial repression on private firms.

### 2.1 Large State-Private Wage Gap

China's rapid growth is accompanied by increasing inequality: the Gini index grows from 0.36 in 1992 to 0.47 in 2010 as in the official report but as high as 0.6 in various survey data. One important contributor to the inequality is the increasing state-private worker income gap. State workers enjoy a wage premium of around 20% to 30%, all the characteristics - age, education, industry, region and so on - being equal, as documented by ? with the Urban Household Survey 1992-2007. Their result is reproduced in figure 1. In contrast, the wage premia of state workers in Canada, Germany and the U.S. are estimated to be lower than 5% after the 90s. See Melly (2002), Mueller (1998) and Poterba and Rueben (1994).

On the one hand, relatively low private sector wage help private firms to grow, and also contribute to China's growing export and output. Meanwhile, because of the high state sector wage, state sector jobs are very popular and in short supply in the market, especially for the newly graduated - on average 169 applicants for 1 position in 2013 Shanghai. In principle, state firms can reduce wages, hire more workers and enjoy higher profits. Why doesn't this happen? Why is there a large and persistent wage gap between the state and private firms? This is one puzzle that our theory aims to explain.

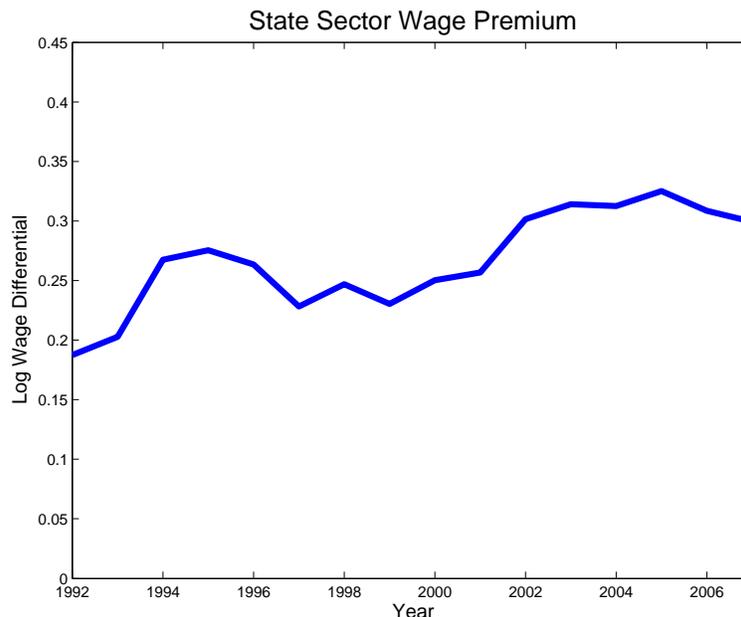


Figure 1: State sector wage premium.

## 2.2 The Middle-class’s Political Support for the Regime

China’s middle-class largely consist of state workers and private entrepreneurs. State sector workers are beneficiary and supporters of the regime, because of the high wages they receive. Private entrepreneurs benefit from the cheap and abundant labor in the private sector, and are also satisfied with the current policies. Tsai (2007) documents that the Chinese entrepreneurs are “achieving their material interests without pursuing any real freedom”, different from “the business classes in historical England, France and the United States” who “have risen up against the government to defend material interests”. The Chinese middle-class are not supporters of democracy, on the contrary to the conventional wisdom that the middle-class are the driving force for democratization. This phenomenon is systematically documented by Chen and Lu (2011). They use a survey data of 2810 individuals, collected in three Chinese cities in late 2006 and 2007 to estimate how the individual’s political opinions depend on his/her characteristics, especially the social group identity. They find that state sector employment and the middle-class membership are negatively correlated with the support for democratic values.<sup>3</sup> For example, only 24.9% of the middle class support multi-party competition, while 38.7% of the lower-class do. Only 22.9% of the middle class agree demonstration

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<sup>3</sup>The authors define class according to the employment status. Individuals with jobs which usually pay low wages are classified as the lower class, including blue-collar workers, unemployed and self-employed with very little capital. The middle class mainly consist of white-collar workers. The authors distinguish the middle class from private entrepreneurs, but report that private entrepreneurs hold similar political opinions as the middle class. So their findings on the middle class can be applied to private entrepreneurs.

should be allowed, while this number is 35.6% for the lower class. Similar patterns apply for other questions related to democratic values and institutions. To formally show the difference between the middle class and the lower class, the authors combine answers to multiple questions into one index of support for democratic values and institutions using factor analysis.<sup>4</sup> Then they run a regression of this index on individual characteristics, including the dummy for middle-class and the dummy for state employer. The coefficients of dummies for middle-class and state employment are both negative (-1.23 and -0.54) and significant at at 1% level. Compared to them, party membership is a weaker predictor, whose coefficient is -0.37 and not significant at 5% level. This suggests that the economic interest plays a more important role than ideology. In other words, the middle class, including many state sector workers, are more supportive for the current political system.

### 2.3 Partial Privatization

Since the fifteenth national congress in 1997, the state firm reform has transformed state firms into independent units who are responsible for their own operations, decisions and profits. Unprofitable state firms bankrupt and exit the market while more private firms enter and replace them. The privatization was very rapid for a couple of years. As the blue line in figure 2 shows, the employment share of state sector in the urban area decline from 53% in 1997 to 28% in 2002, and 22% in 2006. After that, the privatization slows down and the state employment share stagnates at around 20%. If we focus only on the manufacturing, mining and construction, represented by the red line, the trend is similar though the state employment share stops declining at around 40%, and even slightly increases in 2011. The phenomena, called "the state advances as the private sector retreats", is intensively discussed in the public and becomes a major concern for China's growth. Moreover, the government seems to intentionally keep the state sector alive. For example, in the closing announcement of the Third Plenary Session of 18th Chinese Communist Party Central Committee, it is stated that "China will stick to the dominant role of public ownership, playing the leading role of the state-owned economy, while encouraging, supporting and guiding the non-public sector..." Why doesn't the privatization continue - as a pure economic model would predict - until all the inefficient state firms exit?

### 2.4 Financial Repression on Private Firms

The direct reason why the inefficient state firms are still alive is that they get cheap loans from state banks while private firms get much less loans though their capital return is higher. Song et al. (2011) report that while state firms finance more than 30% of their investment through bank loans

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<sup>4</sup>The survey data contain four dimensions of questions on support of democratic values, including right consciousness, valuation of political liberty, support for participatory norm and support for competitive election. The index for support for democratic values and institutions is the constructed as the single dominant factor using factor analysis.

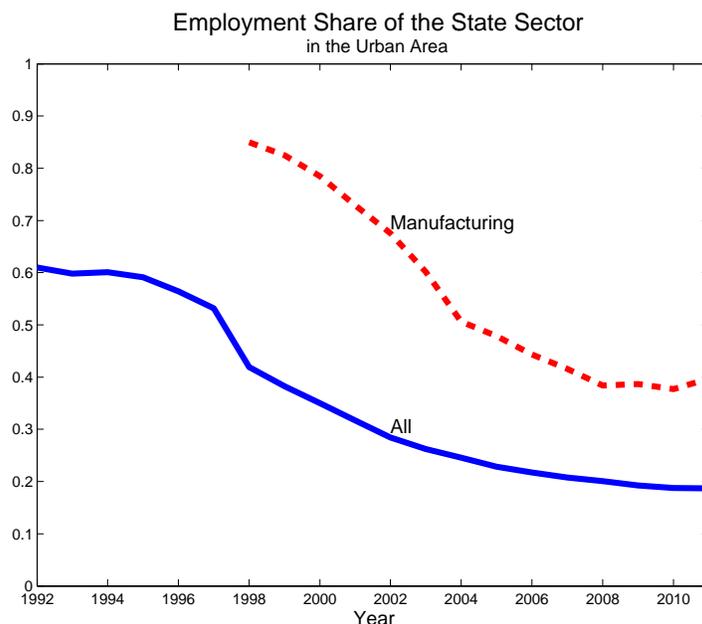


Figure 2: State sector's employment share.

and government budget, this number is less than 10% for private firms. Their result is reproduced in figure 3. Huang (2008) argues that the disadvantage of the private firms in the financial market is due to government policies in favor of state firms and repressing private firms, and this capital market distortion is getting more severe over time. ? estimate that the capital wedge, i.e. the ratio of costs per unit of capital between state and private firms has increased in all the provinces, on average from 4.2 in 1996 to 6.8 in 2007.

### 3 The Model

In this section, we present a theory of politico-economic transition to address the questions raised above on China's future economic growth. We build a two-sector dynamic general equilibrium growth model in which agents also make choices affecting the sustainability of the political system. We first discuss the general properties of the model and then its implications for China with the aid of a calibrated economy.

#### 3.1 Environment

The model economy is populated by three classes of infinitely many agents: elites (e), private entrepreneurs (p), and workers (w). The population of workers is normalized to measure 1, and the population sizes of elites and private entrepreneurs are assumed to be very small and of measure 0.

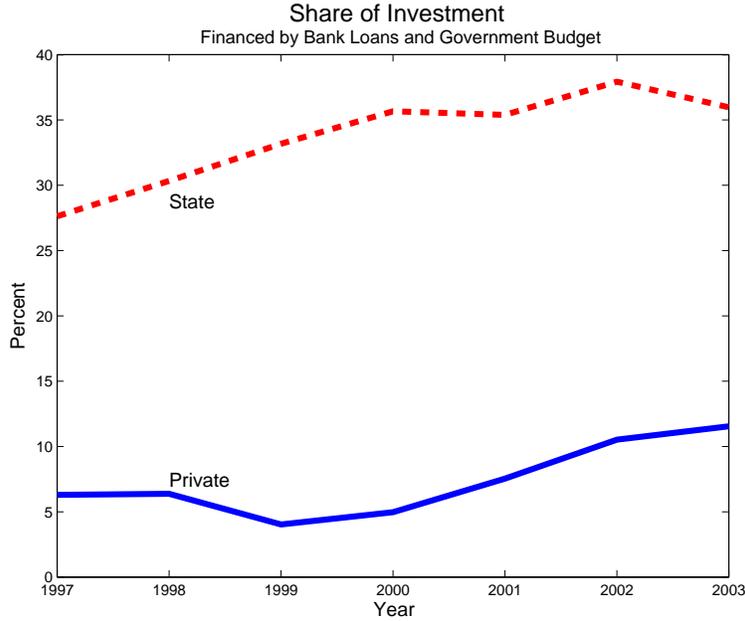


Figure 3: Share of investment financed by bank loans and government budget.

There are two sectors and two types of firms. State (S) firms produce in the state (S) sector, while private (P) firms in the private (P) sector. There are infinitely many of them. They produce the same final goods with capital and labor to maximize profits. They are different in two aspects. First, ownership: S firms are owned by elites, while P firms by private entrepreneurs. Second, productivity: S firms are less productive than P firms. Technology of S and P firms are described by the following production functions:

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

where  $z_S < 1$ ,  $K_S, K_P$  are S and P sector capital while  $L_S, L_P$  denote for S and P sector labor, respectively.

Elites provide capital to S firms while entrepreneurs to P firms. They earn income from the capital returns. They live for infinite periods, and are forward looking. Their instantaneous utility is assumed to be logarithmic and the discount factor is denoted by  $\beta$ . Workers provide 1 unit of labor inelastically. For simplicity, we assume that workers live hand-to-mouth, i.e. they consume all the income every period.

Elites have access to the deep pockets of banks. In other words, they can borrow from banks and set S sector capital without constraint. An entrepreneur finances P firm capital partly with her

asset, and partly with bank loan. However, she faces the financial constraint: the bank loan can not exceed  $\eta - 1$  fraction of her asset. In other words, the P firm leverage - ratio of capital over net asset - is bounded above by  $\eta$ .  $\eta$  is set by the government within a region:  $\eta \in [\underline{\eta}, \bar{\eta}]$ . Furthermore, we assume banks can borrow and lend in the international bond market at the interest rate  $r$  and they compete with each other, so the interest rates for loans to state and private firms are both  $r$ , and the interest rates for elite and entrepreneur savings in the bank are also  $r$ .

Song et al. (2011) also assume that the state firms have unlimited access to bank loans while private firms face financial constraints. The key difference in this paper is that it allows the financial constraint - P firm leverage  $\eta$  - is endogenously determined by the government. This setting captures better the financial market in China and generates different dynamic implications on China's financial resource allocation and output growth. In China, the private firms have limited access to external financing, not only because of exogenous characters such as smaller size and lack of connections with state banks, but also largely because of the endogenous government policies that make state banks less willing to lend to private firms. The government can create barriers in loans to private firms, or directly give administrative instructions to banks (see Brandt and Zhu (2000)).  $\underline{\eta}$  is the lower bound of the leverage. For example,  $\underline{\eta}$  equals 1 if the strictest policy that the government can set is to order banks not to lend to private firms at all, but the private firms can still finance their investment using entrepreneurs' asset.  $\bar{\eta}$  is the highest leverage if the government doesn't restrict the private firm financing at all. It is not infinity, because of the moral hazard problem, i.e., an entrepreneur with too much loans compared to her asset will choose to steal and run away.<sup>5</sup>

There are two types of political regimes: democracy and oligarchy. In democracy, the government is elected by the majority vote; therefore workers determine the government policies, given their dominating population. In oligarchy, elites control the government, but they still face the political constraint, i.e., support from a sufficiently large fraction of the population, which is equivalent to support from a large fraction of workers given their dominating population. Each worker, after being employed by a S or P firm and observing the government policies, decides to support the oligarchy or not based on the expectation on her income. The oligarchy is sustained if more than  $\underline{L}$  fraction of workers choose to support it. If it gets less than  $\underline{L}$  workers' support, democratization occurs.<sup>6</sup>The setting on political constraint and political support in oligarchy can be micro-founded

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<sup>5</sup>The logic is similar to Song et al. (2011), as follows. Banks want to make sure that the borrower will not steal and run away. The borrower with asset  $s$  might be an entrepreneur who has access to production technology and obtain high return to asset  $r_p > r$ , or simply a worker who only saves all the money in other banks and gets return  $r$ . The borrower can choose to steal and run away, and a worker facing lower return than an entrepreneur, is more likely to do that. The bank has to guarantee that even a worker doesn't want to steal. Suppose that the bank can still take back  $\tilde{\eta}(1+r)(l+s)$ , where  $l$  is the loan. The borrower gets  $(1-\tilde{\eta})(1+r)(l+s)$ . So the incentive constraint for the worker as the borrower is  $(1-\tilde{\eta})(1+r)(l+s) \leq (1+r)(l+s) - (1+r)l \Rightarrow l \leq \frac{\tilde{\eta}}{1-\tilde{\eta}}s$ . Finally, we define  $\bar{\eta} = 1 + \frac{\tilde{\eta}}{1-\tilde{\eta}}$ , which is the maximal leverage.

<sup>6</sup>The micro-foundation for  $\underline{L}$  is the following: if elites and their supporters form a coalition which has large enough political power, oligarchy is sustained, as in Acemoglu et al. (2012). In their language, a level of political power is

on a sequential game between workers and elites. We leave the details of the sequential game in the appendix. Notice that  $\underline{L}$  captures the relative political power of elites compared to workers. If elites are very powerful, they need only a small fraction of workers as supporters, in other words,  $\underline{L}$  is small. If workers are well-organized and politically motivated,  $\underline{L}$  is large.

In both political regimes, the government decides a set of economic policies. The first is the tax rate and which groups to tax. We assume that tax payers can hide their income at the cost of  $\bar{\tau}$  fraction of their income. This implies that if the tax rate is lower than  $\bar{\tau}$ , tax payers choose to pay the tax. Otherwise they hide the income and pay no tax. Then if the government wants to tax a group as much as possible, it sets the tax rate to  $\bar{\tau}$ . This is a simple way to model the exogenous tax rate, as used in Acemoglu (2008) and referred as “state capacity” in Besley and Persson (2009). The tax payers can be different in democracy and oligarchy. We will see after we solve the model, that generally speaking, in democracy, elites and entrepreneurs are the tax payers. In oligarchy, the government taxes entrepreneurs and P workers, but not elites or S workers. Basically, the government doesn’t tax the ruling group and the necessary supporters of the ruling group. This is in fact optimal for the government.

The others policies that the government decides includes transfer, P sector financial constraint  $\eta$ , S sector capital  $K_S$ , S sector minimal wage  $w_S$ . We will discuss them in greater details in the next subsection when we illustrate the model in greater details.

### 3.2 The Equilibrium Given Capital Allocation

The dynamic equilibrium consists of infinite periods, and each period can be decomposed into three stages: (1) determination of capital in S and P sectors, (2) the equilibrium of the labor market and political outcome in this period given capital allocation, and (3) decisions on consumption and saving. In this subsection, we first focus on the stage (2) of each period and study the equilibrium in that stage. It is crucial for understanding how the political outcome is determined by the government policies and economic power. We also don’t consider how tax is determined in this subsection. So in this stage, the government can use S sector minimal wage to influence the labor market, firms hire and produce, and workers decide political support.

In democracy, workers do not want to impose distortive policies on the labor market or change the political system, because the competitive equilibrium in democracy maximizes the labor income. Moreover, the government, controlled by workers, collects tax from elites and entrepreneurs and

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assigned to each coalition of agents. If one coalition has large enough political power, it decides the political system. In oligarchy, elites as the ruling group are granted political power  $\omega_e$ . Each worker has political power  $\omega_w$ , and each entrepreneur has  $\omega_p$ . The aggregate political power of entrepreneurs is 0 given its size of 0. Workers can change the political regime from oligarchy to democracy if and only if they form a coalition of size  $L_r$  whose power is larger than  $\alpha$ , namely  $\frac{\omega_w L_r}{\omega_w + \omega_e} > \alpha \Leftrightarrow L_r > \alpha \frac{\omega_w + \omega_e}{\omega_w}$ , where  $\alpha$  is exogenous. In other words, to sustain a oligarchy, there must be at least  $1 - \alpha \frac{\omega_w + \omega_e}{\omega_w}$  workers supporting it, and we can denote this size as  $\underline{L}$ .

transfers it to workers. In the competitive equilibrium, wages in S and P firms are the same and are equal to the marginal productivity of labor:

$$w^D = (1 - \alpha) (z_S K_S)^\alpha (L_S^D)^{-\alpha} = (1 - \alpha) (K_P)^\alpha (L_P^D)^{-\alpha}.$$

A worker's one-period income equals the wage plus the tax collected from entrepreneurs and elites:

$$\begin{aligned} y_w^D &= w^D + \tau^D (\pi_S^D + \pi_P^D) \\ &= \left( 1 + \tau^D \frac{\alpha}{1 - \alpha} \right) w^D, \end{aligned}$$

where  $\pi_S^D$  and  $\pi_P^D$  are the capital incomes in S and P sectors, respectively and  $\tau^D$  is the tax rate in democracy. The transfer to workers is  $\tau^D \frac{\alpha}{1 - \alpha} w^D$  simply because the tax base - capital income - is  $\frac{\alpha}{1 - \alpha}$  times labor income.

In oligarchy, the following events happen sequentially: (1) the government sets S sector minimal wage; (2) S and P firms hire workers; (3) S and P workers decide whether to support the current political system; (4) number of supporters determine the political outcome; (5) firm produce, labor and capital incomes are distributed; (6) the government collects tax and makes transfer.

First, the government chooses S sector minimal wage  $w_S$  to affect the labor market outcome and the economic benefits of S and P workers.<sup>7</sup> Without loss of generality, we assume that  $w_S \geq w^D$  so the minimal wage constraint is tight.<sup>8</sup> Given the minimal wage, S firms employment is determined given the following assumption:

**Assumption 1.** *S firms maximize profits. They freely determine the employment while obeying the minimal wage set by the government.*

So S firms choose labor demand  $L_S$  such that wage equals marginal productivity:

$$w_S = (1 - \alpha) (z_S K_S)^\alpha L_S^{-\alpha}. \quad (1)$$

Furthermore, we make a second important assumption.

**Assumption 2.** *In oligarchy, the government can not make direct transfer to the ruled groups to buy their political support.*

Then the final income of S workers is simply their :

$$y_{wS} = w_S.$$

---

<sup>7</sup>Notice that we use  $w_S$  instead of  $w_S^O$  to simply the notation. We drop the superscript  $O$  for variables in oligarchy when there is no confusion.

<sup>8</sup> $w_S < w^D$  is equivalent to  $w_S = w^D$ .

## Wages and Labor in Oligarchy

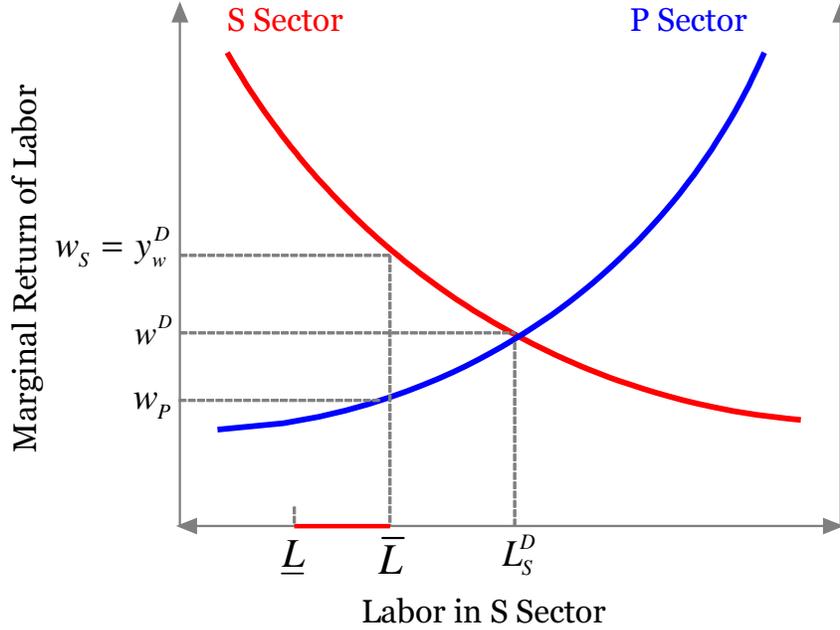


Figure 4: Labor allocation and marginal productivities.

These two assumptions together imply the following: to increase S worker income, the government has to set a high S sector minimal wage, which distorts the labor market. We can see this in figure 4. Red and blue lines are the marginal productivities of labor in S and P sectors, respectively. The intersection of the two lines pin down the equilibrium in democracy: the S sector labor, wage and worker income in democracy are denoted as  $L_S^D, w^D$  and  $y_w^D$ . In oligarchy,  $w_S$  pins down S sector labor and its marginal productivity. The rest of labor is in the P sector and pins down the P sector wage  $w_P$ . We can see that setting  $w_S$  larger than  $y_w^D$  implies that the marginal productivity of S sector labor is higher than  $y_w^D$  and the S firms hire labor lower than  $\bar{L}$ . Observing the government policy on  $w_S$ , a S worker knows her one-period income in oligarchy. A worker supports oligarchy if and only if her income in oligarchy is higher than in democracy. This is very intuitive, hence we leave the discussion why this is optimal for a worker in the appendix. For simplicity, we assume that workers are myopic, so they care only about the current period income. So a S worker supports oligarchy if  $w_S > y_w^D$ .

Are the two assumptions and their implications reasonable? Why does the government have to use distortive policies to guarantee high incomes for S workers? If possible, the government may want to simply order S firms pay wage higher than the marginal productivity, or make direct government transfer to S workers. The two assumptions are reasonable for China, for the following

reasons. First, China's 30 years of state firm reform is essentially delegation of rights from the government to firms so that they are incentivized to maximize the profits. Nowadays, state firms are responsible for important decisions including hiring workers. Though the government can still affect the state sector wage through laws and regulations, for example, state firms must pay the pension tax for workers, buy the health insurance for workers, and so on, a state firm is free to decide labor to maximize its profit. Second, direct transfer from the government to workers is very rare. This more direct tool to provide economic benefits and solve political conflicts is difficult to implement in reality. This is not only the case in China, but is also discussed in other circumstances in the literature. One reason is the commitment problem. Acemoglu (2003) and Acemoglu and Robinson (2005) explain that though the state promises to make a transfer to the ruled group, the latter, without political power, gets no guarantee that they will eventually receive the transfer. So in many cases, transfer can not be used solve the political conflicts. The other reason is the high cost of government transfer due to local capture. This is supported by empirical evidences. Reinikka and Svensson (2004) document that 87% of the transfer from the central government to local schools in Uganda was not received during 1991-1995 due to local capture. This means that the cost of 1 dollar of transfer is as high as 7.7 dollars. For these two reasons, the government usually builds inefficient "white elephant" projects (see Robinson and Torvik (2005)) to guarantee the economic benefits for certain groups. In our model, state firms can be considered as a special type of "white elephants".

As we can see from figure 4, P sector wage is lower than the wage and worker income in democracy, due to the general equilibrium effect. Setting  $w^S \geq w^D$  implies less labor in S sector:  $L_S \leq L_S^D$ , more labor in P sector:  $L_P \geq L_P^D$ , and lower wage for P workers:  $w_P \leq w^D < y_w^D$ . Because the government can not make transfer to the ruled groups, including P workers, P worker income is always lower than in democracy and P workers do not support oligarchy. Notice this is also related to the setting that the government can only set S sector minimal wage but not the P sector minimal wage. This is realistic for China because the government has better control over state firms and can guarantee that state firms follow the wage regulation and pay high wage but not the private firms.

In the case that  $w_S$  is high enough and S workers are supporters of oligarchy, if the number of S workers is sufficiently large, oligarchy is sustained. As we discussed previously, the minimal number of supporters to sustain oligarchy is exogenously give as  $\underline{L}$ . Later we will discuss what is a reasonable value for  $\underline{L}$  in China. If  $L_S \leq \bar{L}$ , which implies high enough state wages, and at the same time  $L_S \geq \underline{L}$ , which guarantees enough supporters, oligarchy is sustained.

To sum up, to sustain oligarchy, the government faces two political constraint. The first is the "high state wage constraint", i.e.  $w_S \geq y_w^D$  so that S workers support oligarchy. Because equation (1) gives a one-to-one mapping from  $w_S$  to  $L_S$ , we can alternatively treat  $L_S$  as the control variable

in the high state wage constraint. Then high enough state wage is equivalent to low enough state employment share  $L_S \leq \bar{L}$ . The second is the “*minimal support constraint*”, i.e.,  $L_S \geq \underline{L}$ . So the government faces a critical trade-off between these two political constraints, stated in the following lemma.

**Lemma 1** (Trade-off of state sector wage). *Increasing  $w_S$  guarantees high state wage constraint and buys S workers’ political support. However, it reduces S sector employment  $L_S$ , which may violate the minimal support constraint.*

The two political constraints give an area of  $L_S \in [\underline{L}, \bar{L}]$  that the oligarchy can be sustained. If  $\underline{L} \leq \bar{L}$ , this area is non-empty, otherwise no  $L_S$  can satisfy both constraints.  $\underline{L}$  is an exogenous parameter, determined by political power of workers and elites. If citizens are well-organized and have relatively high political power, elites need to buy off many workers to sustain oligarchy. If most citizens are not politically mobilized, the government can stay in power with a small number of supporters. In the latter case,  $\underline{L}$  can be low.  $\bar{L}$  is endogenously determined by labor allocation in democracy, which again depends on the capital allocation  $K_S$  and  $K_P$ .  $\bar{L}$  is pinned down by  $w_S \geq y_w^D$  and can be calculated as follows:

$$\begin{aligned} w_S &= (1 - \alpha) K_S^\alpha L_S^{-\alpha} \geq y_w^D = \left(1 + \tau^D \frac{\alpha}{1 - \alpha}\right) (1 - \alpha) K_S^\alpha (L_S^D)^{-\alpha} \Rightarrow \\ L_S &\leq \nu L_S^D = \nu \frac{zK_S}{zK_S + K_P} \doteq \bar{L}, \end{aligned}$$

where  $\nu = \left(1 + \tau^D \frac{\alpha}{1 - \alpha}\right)^{-\frac{1}{\alpha}}$ . So if  $\frac{zK_S}{K_P}$  is large enough,  $\bar{L}$  can be larger than  $\underline{L}$ . In other words, sustaining oligarchy requires that S sector is equipped with enough capital, relative to the P sector capital. The equilibrium is summarized in the following proposition.

**Proposition 1** (Equilibrium given capital allocation). *If there is sufficiently large capital in S sector relative to the capital in P sector, oligarchy can be sustained. In the state sector, wage and capital labor ratio are high while capital return is low. P sector capital return and entrepreneur income are higher than in democracy because of low private sector wage. If S sector capital is small, democratization occurs.*

The capital labor ratio in S sector is high in oligarchy because of the low S sector labor, as can be seen from 4. Because of the high wage, S sector capital return is low. In contrast, because of the low wage and the abundant labor in P sector, P sector capital return is high and entrepreneur income is high.

### 3.3 Discussions on the Equilibrium Given Capital Allocation

Given capital allocation, the government creates a dual labor market: state workers get high wages and hence support the government, while private workers get low wages. This is essentially the so-called “divide-and-rule” strategy: breaking the group of workers into two groups, and providing different economic interests to gain support from one group and maintain power.

The equilibrium given capital allocation are useful to explain three phenomena in current China: (1) large gap of state-private sector wages, (2) middle class’s political support for the current regime, (3) higher capital labor ratio and low capital return in the state sector.

The first fact is discussed in section 2, and is the immediate consequence of proposition 1. High state sector wage is necessary for getting political support from workers, and the general equilibrium effect leads to abundant and cheap labor in the private sector. This contributes to the high inequality among workers. The inequality, provides abundant cheap labor to the private sector, benefits the entrepreneurs. This allows potentially faster capital accumulation and growth of the private sector and the whole economy. We will discuss more on this in the dynamic model.

Second, the middle class, consisting of state workers and entrepreneurs in the model, are supportive to the existing political regime because of the economic benefits. This is consistent with the finding of Chen and Lu (2011) discussed in section 2, but on the contrary of the traditional wisdom that the middle class are the natural driving force of democracy, as in the European history. This is not surprising. In the history of democratic movement in Europe, such as the Glorious Revolution and French Revolution, the middle class were against the aristocracy of the Kings, whose political power relied on repression. The middle class did not rely on the state but emerged from private businesses. In contemporary China, the state sector is large and a significant fraction of the middle class are created by and rely on the state, so they become supporters of the state. It is also similar in many other developing countries. This helps to understand why in some emerging markets, economic growth and the burgeoning bourgeoisie do not push for democratization. For example, as reported in *The Economist* 2009, 95% of adult Kuwaitis work for the government, usually in white-collar civil-service jobs which are typical middle class jobs, while its private-sector middle class consists almost entirely of foreigners. The wage gap between the state and private sector is large there. These distortions keep politically important local workers in the state sector and is a smart way to maintain oligarchy. More examples are the anti-democracy middle class - the “Yellow Shirts” - in Thailand and the growing state middle class linked with growing inequality in 1960’s Brazil.

The third fact is well documented in the literature. Song et al. (2011) show that state sector capital labor ratio is much larger than the private sector, in every industry. Brandt and Zhu (2010) show that the capital return in the state sector is lower than 5% while the number for the private sector is above 50%, as shown in figure 5. The difference of capital returns is partly due to the

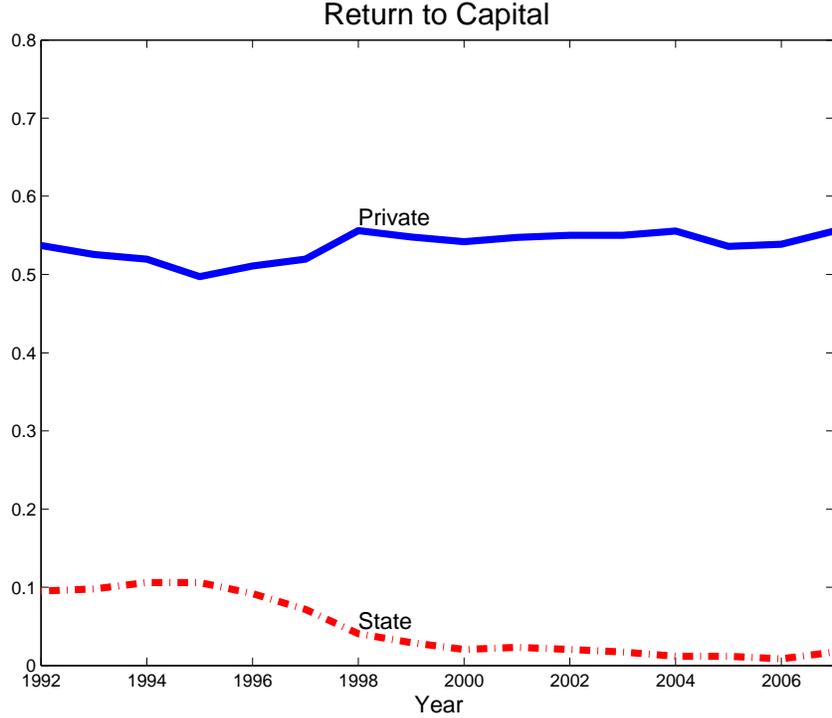


Figure 5: Capital return in the state and private sectors.

difference of wages and distorted labor allocations. It is also due to the capital allocation, as we will see in the dynamic model below.

In a nutshell, the simple analysis on the equilibrium given capital allocation is useful to illustrate the interactions of the political and economic systems in oligarchy in each period. On the one hand, the political interests, largely shape the state distortions and economic outcome. Taking into account political considerations, we can understand some economic puzzles in China. On the other hand, economic power determines political outcome. When the state sector is economically powerful and equipped with enough capital, elites can keep a large enough supporter base and sustain oligarchy.

### 3.4 The Dynamic Equilibrium

In the previous section, we see that the economic power, i.e., size of state capital, relative to the private capital, is crucial for sustaining oligarchy with the “divide-and-rule” strategy. Only when holding abundant state capital, can the government buy enough political support. So the oligarchic government is motivated to control the capital formation and allocation between the state and private sectors. Now we study the whole dynamic equilibrium, including how S and P sector capitals are allocated, tax decisions, consumption and saving in each period, in addition to what

we learned in subsection 3.2, i.e., the equilibrium given capital allocation.

In democracy, workers control the government to maximize their income. We have seen above that the government does not want to distort the labor market or change the political system. Moreover, it does not impose any financial repression on the more efficient P firms because more capital in P sector implies higher wage for workers. So P firm leverage can reach  $\eta = \bar{\eta}$ . The government also doesn't want to distort the S sector capital but let it determined by the market if the tax rate is not too high. So we can safely assume that the equilibrium in democracy is a competitive equilibrium. Finally, the government taxes elites and entrepreneurs to the maximal level  $\tau = \bar{\tau}$  and transfers the tax income to workers to maximize worker income in this period. The dynamics in democracy is basically a two sector growth model with an initial misallocation which is removed over time, as in Lewis (1954) and Song et al. (2011). The dynamic equilibrium is summarized in the following proposition.

**Proposition 2.** *In democracy, elites get return on their asset at interest rate  $r$ , and entrepreneur asset yields return greater or equal to  $r$ . If  $\beta$  is large enough, entrepreneurs accumulate more and more asset over time. Eventually, the relative size of S sector over P sector, measured by  $k = \frac{z_S K_S}{K_P}$ , decreases over time to 0 .*

The intuition for the above proposition is the following: efficient labor allocation implies the same wages in S and P sector. S firms compete with each other, so the capital return equals the cost of financing, i.e., the interest rate -  $r$ . The capital return pins down S firm capital labor ratio and wage. P firms hire workers at the same wage rate as S firms, but they are more productive, so P firm capital return is higher. S firms exist if P firm capital is small and P firms can't hire all the labor given the wage. This happens when entrepreneur asset is small. In this case, entrepreneurs get higher return than  $r$  on their asset. If  $\beta$  is large enough, entrepreneur asset and P firm capital increase over time, and finally P firms hire all workers and S firms all exit. In other words, market force is decisive in this pure economic model without any political constraints.

In oligarchy, the representative elite controls the government and makes four policies - P firm leverage  $\eta$ , S sector capital  $K_S$ , minimal wage in S sector  $w_S$ , and tax - to maximize her life-time utility. In China, the government controls state banks, and thus is able to determine the size of loans to private firms and affect private firm leverage  $\eta$ . Moreover, the government can use both direct investment and interest subsidy to control state firm capital. In terms of modeling, controlling interest rate for the loan to state firms to influence their capital choice is the same as directly setting the state capital. So in the model we let the government directly set the S sector capital. For the tax, the elites can tax private workers without affecting the political outcome, so the government sets the tax rate on private workers to the maximum. The tax for state workers is set to 0 because taxing them makes it more difficult to provide them high enough final income and buy their political support. The only tax rate undetermined is the one on private entrepreneurs  $\tau_p$ .

The decisions of workers and entrepreneurs are simple. S and P workers behave as in subsection 3.2, i.e., support oligarchy if and only if the income is higher than in democracy. Then they consume all the income. An entrepreneur, as an infinitely small agent, takes the political outcome and P sector capital return as given. So her choice is simply maximizing the current period income and then consume and save for the next period. The entrepreneur income can be written as:

$$\begin{aligned} y_p &= \max_{K_P} (1 + r_P) K_P - R(K_P - a_p), \\ \text{s.t. } K_P &\leq \eta a_p, \end{aligned}$$

where  $R = 1 + r$ ,  $a_p$  is the entrepreneur asset, and  $r_P = (1 - \tau_p) \alpha K_P^{\alpha-1} L_P^{1-\alpha} - \delta$  is the P sector capital return. The entrepreneur's choice on  $K_P$  is obvious: if  $r_P > r$ , the entrepreneur chooses to invest as much as possible, the income is proportional to  $a_p$  and the return to her asset is larger than  $r$ . If P sector capital return is smaller or equal to  $r$ , she doesn't invest to the maximal level and gets asset return  $a_p$ . Since she lives only on asset return, given the logarithmic utility form, she always saves a constant fraction  $\beta$  of her total income to the next period.

Given our discussion in subsection 3.2, we know the equilibrium outcome given  $K_S, K_P$  in each period, that is, if  $\frac{K_S}{K_P}$  is large enough and  $w_S$  is sufficiently high, oligarchy can be sustained. In this case, the one period elite income is the following:

$$y_e = \pi_S + (1 - \delta) K_S - R(K_S - a_e) + \bar{\tau} w_P L_P + \tau_p \pi_P, \quad (2)$$

where  $\pi_S = \alpha (z K_S)^\alpha L_S^{1-\alpha}$  and  $\pi_P = \alpha (K_P)^\alpha L_P^{1-\alpha}$  are capital income of S and P firms.

The representative elite's dynamic problem can be decomposed into two steps. First, she chooses to sustain oligarchy or to democratize:

$$W(a_e, a_p) = \max \{W^O(a_e, a_p), W^D(a_e, a_p)\}. \quad (3)$$

If the later is chosen, the economy end up in the democratic equilibrium discussed above. If the former is chosen, she picks government policies  $\eta, K_S, w_S, \tau_p$  to sustain oligarchy in the second step.<sup>9</sup>

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<sup>9</sup>Here we assume that if in the first step oligarchy is chosen, then in the second step the government only pick policies that sustain oligarchy. If the government picks policies that can't sustain oligarchy, the economy ends up in democracy in the second step, which gives the same elite income - interest revenue on  $a_e$  - as democratizing in the first step. elites are indifferent and assumed to choose to simply democratize in the first step, to save us from infinite equilibria which only differ trivially.

Moreover, she decides consumption and saving to maximize her lifetime utility:

$$\begin{aligned}
W^O(a_e, a_p) &= \max_{\eta, K_S, w_S, \tau_p, c_e, a'_e} \log c_e + \beta W(a'_e, a'_p) & (4) \\
\text{s.t. } w_S &\geq y_w^D(\eta, K_S, a_p), \\
L_S &\geq \underline{L}, \\
a'_e &= y_e(\eta, K_S, w_S, \tau_p, a_p) - c_e, & (5) \\
a'_p &= \beta y_p(\eta, K_S, w_S, \tau_p, a_p).
\end{aligned}$$

From the expression of  $y_e$  in equation 2, we see that within each period  $a_e$  only contributes to elites' income through interest revenue, and it does not affect other equilibrium outcomes at all. It also doesn't directly affect future state variables  $a'_p$  and  $a'_e$ . So the contribution of  $a_e$  is simply  $Ra_e$  in the elite's budget constraint. Its only role is to smooth the life-time consumption. Therefore the representative elite's problem in oligarchy can be again split into two sub-problems: first, maximization of the lifetime income with discounting rate  $\frac{1}{R}$  with government policies; second, maximization of the lifetime utility using  $a_e$  to smooth consumption. The second sub-problem is straight-forward and it doesn't affect the first one and other politico-economic outcomes. The first sub-problem has only one state variable, as follows:

$$\begin{aligned}
V^O(a_p) &= \max_{\eta, K_S, w_S, \tau_p} \hat{y}_e(K_S, \eta, w_S, \tau_p, a_p) + \frac{1}{R} V(a'_p) & (6) \\
\text{s.t. } w_S &\geq y_w^D(\eta, K_S, a_p), \\
L_S &\geq \underline{L}, \\
a'_p &= \beta y_p(K_S, \eta, w_S, \tau_p, a_p),
\end{aligned}$$

where  $\hat{y}_e = y_e - Ra_e$  is the income not related to  $a_e$ . Next period value  $V(a'_p)$  depends on the political outcome of next period. We can write:

$$V(a_p) = \max \{V^O(a_p), V^D(a_p)\},$$

where  $V^D(a_p) = 0$  because the elite income in democracy is simply the asset return  $Ra_e$ , as stated in Proposition 2.

The model can be solved numerically and the general properties of its solution will be explained in the following parts: (1) given  $K_S$  and  $K_P$ , the choices of other variables; (2) given  $K_P$ , the choice of  $K_S$ ; (3) the choice of  $\eta$  that affects  $K_P$ . Combining the three parts, the structure of the solution will be clear.

First, given  $K_S$  and  $K_P$ , we know from subsection 3.2 that if  $K_S$  is large enough, there exists

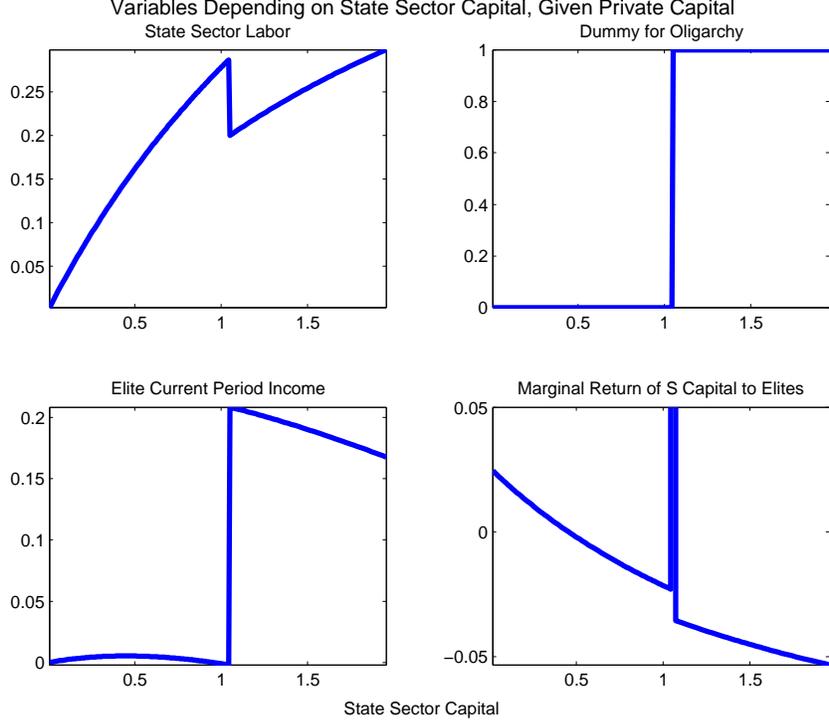


Figure 6: The outcome depending on choice of  $K_S$

some  $w_S$  that sustains oligarchy, or equivalently, some  $L_S$  that falls into the region  $[\underline{L}, \bar{L}(K_S, K_P)]$ . Generally, the optimal choice of  $w_S$  is  $y_w^D$ , or equivalently,  $L_S = \bar{L}$ . This choice implies the least labor distortion but still satisfies high state wage constraint.<sup>10</sup> In other words, elites prefer not to distort the labor market more than the necessary. Furthermore,  $\tau_P$  is generally set at the highest level  $\bar{\tau}$ .

Then how does the government choose  $K_S$ , given  $K_P$ ? This is the second part of the solution. In figure 6, we use a numerical example to depict how state sector labor, political outcome, elite income, and marginal benefit of state capital for elites depend on the choice of  $K_S$  (the x-axis). Given a  $K_P$ , if  $K_S$  reaches certain critical level, there can be enough state workers (left-upper panel) - in this figure,  $\underline{L} = 0.2$  - and oligarchy can be sustained (right-upper panel). Then there is a jump of elite income above the critical level of  $K_S$  (left-lower panel) because in oligarchy elites control the government and the tax system. For this reason, though the capital return goes down to even lower than 0 as more capital is invested in the state sector, elites still prefer to invest until the critical level of  $K_S$  (right-lower panel) to sustain oligarchy.

<sup>10</sup>This is true as long as the tax rate  $\bar{\tau}$  is not too high. One sufficient condition is  $\bar{\tau} \leq \alpha$ , which is a reasonable constraint, considering that  $\alpha$  is estimated to be around 0.5 in China. If  $\bar{\tau}$  is too large, elites can extract more from the private sector than from the state sector, the solution may change, but this is not very reasonable.

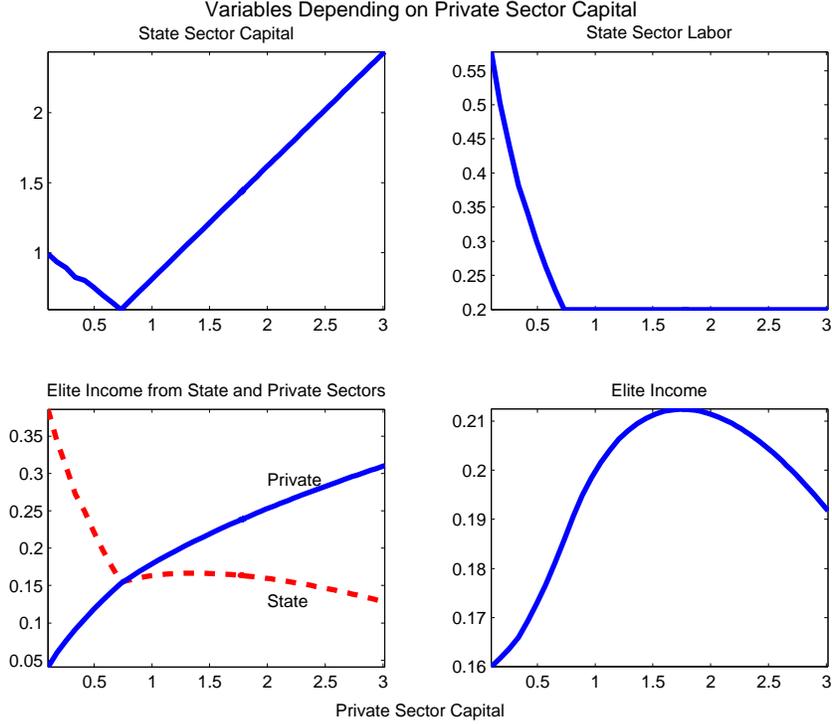


Figure 7: The outcome depending on choice of  $K_S$

In the example above, given the particular level of  $K_P$ ,  $K_S$  that just sustains oligarchy gives highest current period income to elites. But for other levels of  $K_P$ , the situation may be different. As we can see in figure 7, when  $K_P$  (the x-axis) is very small,  $K_S$  is negatively related to  $K_P$  (left-upper panel) and  $L_S$  is larger than  $\underline{L}$  (right-upper panel).<sup>11</sup> In this region, a larger  $K_P$ , corresponds to a larger P sector labor and a smaller S sector labor, hence it is optimal for elites to reduce investment in S sector -  $K_S$  - accordingly. However, when  $K_P$  is large enough, and S sector labor reaches the minimal level  $\underline{L}$ , a larger  $K_P$  implies that the government has to invest more in S sector to maintain oligarchy. We can see that a larger P sector not only increases benefit for elites - tax income, but also creates higher cost - larger interest payment for  $K_S$  (left-lower panel). Due to the decreasing return to capital, there is a level of  $K_P$  that maximizes the elite income (right-lower panel).

How do elites set  $K_P$  to be closer to the optimal level for them? In the third step here, we discuss the choice of  $\eta$  that affects entrepreneur borrowing ability and capital available for P firms. When the government prefers a larger  $K_P$ , it sets  $\eta = \bar{\eta}$  and imposes no financial repression. When it wants a smaller  $K_P$ , it sets  $\eta < \bar{\eta}$ , and P firms receive less bank loan than the maximal level. This can be seen in figure 8.<sup>12</sup> The x-axis is  $a_p$ . As we move  $a_p$  from very small to very large, the

<sup>11</sup>Figure 7 comes from the same numerical example as figure 6.

<sup>12</sup>Figure 8 comes from the same numerical example as figure 6.

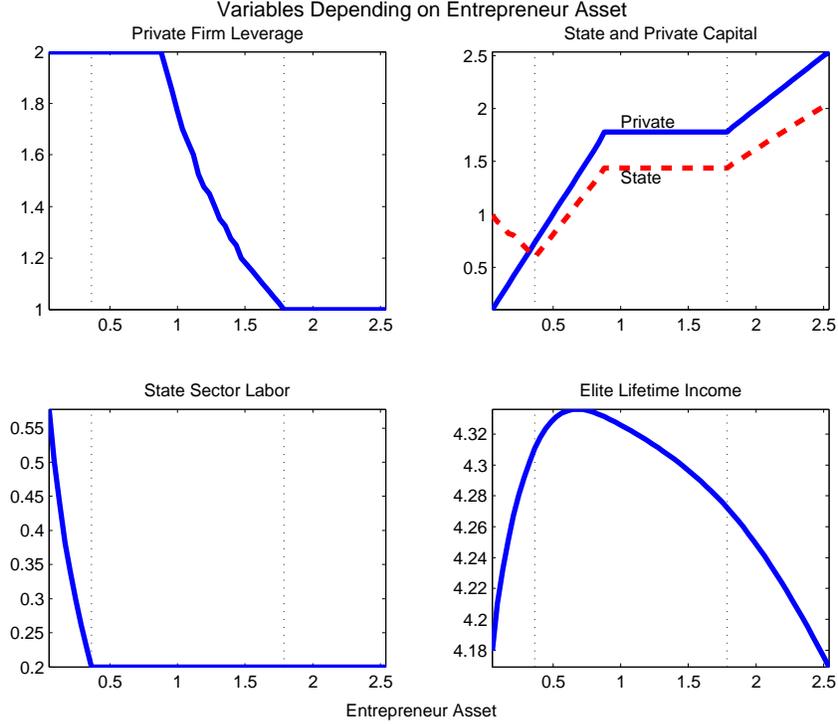


Figure 8: Equilibrium variables, depending on entrepreneurs' asset.

P firm leverage goes down gradually (left-upper panel) as the government prefers  $K_P$  not too small or too large. The S sector capital first goes down but then goes up proportionally to the P sector capital (right-upper panel), because enough S employment share needs to be guaranteed (left-lower panel). The government's influence on  $K_P$  is limited because  $\eta$  is bounded by  $\underline{\eta}$  and  $\bar{\eta}$ , so it may not be able to set  $K_P$  to its favorite level when  $a_p$  is too small or too large. This is why the elite lifetime income is maximized for an intermediate level of  $a_p$  (right-lower panel). This is the second tradeoff for the elites, in addition to the first tradeoff of state wage and employment.

**Lemma 2** (Trade-off of private sector capital). *A larger  $K_P$  contributes more tax income, but it also requires larger  $K_S$  to sustain oligarchy and more interest expense. As  $K_P$  increases from a very small level, elites' current-period income first increases and then decreases. elites' lifetime income also follow a similar pattern. This trade-off also applies to entrepreneur asset because it is an important determinant of the private capital.*

Now we have the solution in oligarchy, and the next question is under which conditions does the government choose to democratize or to sustain oligarchy? The government can invest as much as it wants in S sector to guarantee enough state employment with high wage, for any size of P sector capital. However, large investment in S sector means large cost, while the return can be small due

to decreasing return to scale. If P sector capital is large enough, sustaining oligarchy gives lower lifetime income to the elite compared to democracy - the line for elites' income in figure (8) can drop below the horizontal zero line:  $V(a_p) < 0 = V^D(a_p)$  if  $a_p$  is large enough. In this case, elites choose to democratize.

Given the solution of equilibrium, we can simulate the dynamics, starting from a small  $a_p$ . Will  $a_p$  keep growing until  $V(a_p) < 0$  and democratization occurs? It depends on the parameter  $\underline{L}$ . Given other parameters, if  $\underline{L}$  is large enough, democratization will occur. In this case, sustaining oligarchy requires many S workers, so elites have to invest a lot in S sector proportional to the P sector capital. As P sector capital grows larger and larger, elites find the cost of maintaining the state sector too large, and it is optimal to democratize for them. However, if  $\underline{L}$  is small enough, elites may prefer oligarchy even when the P sector capital reaches its steady state level. Democratization never occurs. So, given small or large  $\underline{L}$ , there are two different development paths. The two paths are different in the long-run, but they are similar in the early stages: starting from small P sector, in the beginning, P sector employment share grows until it reaches the critical level for sustaining oligarchy; then the government over-invests in S sector to maintain enough supporters for oligarchy; finally the two paths differ in the long-run. This divergence of two paths is the so-called "critical juncture" of development in Acemoglu and Robinson (2012). The properties of the transition is summarized in the following proposition.

**Proposition 3** (Three stage transition). *The economy, starting with a small enough private sector, develops along the following path with three stages:*

*Stage 1: "Rapid growth". Growth rate is high. Private sector grows rapidly, benefiting from the low wage. Moreover, the government encourages private sector growth and doesn't impose financial repression:  $\eta = \bar{\eta}$ . Rapid privatization reallocates labor from the state to the private sector.*

*Stage 2: "State capitalism". Growth continues. The government over-invest in the state sector, while restricting private firms' access to the financial market:  $\eta < \bar{\eta}$ . Privatization stops and the state employment share stays at the critical level  $\underline{L}$ .*

*Stage 3: Two cases.*

*Case 1: "Middle-income trap". Oligarchy is sustained permanently and growth slows down. State investment keeps growing at the same rate of the private sector capital, to keep state employment share at  $\underline{L}$ . Financial repression on private firm reaches the tightest level  $\eta = \underline{\eta}$ . This happens if  $\underline{L}$  is sufficiently small.*

*Case 2: "Sustained growth". Democratization occurs and output growth becomes rapid again. Financial repression and labor market distortion disappear. State sector declines while private sector grows. This happens if  $\underline{L}$  is sufficiently large.*

Figure 9 and 10 plot key variables and output during the transition in the case of small  $\underline{L}$ . It ends up at middle-income trap. The three stages are separated by vertical dashed lines. In comparison,

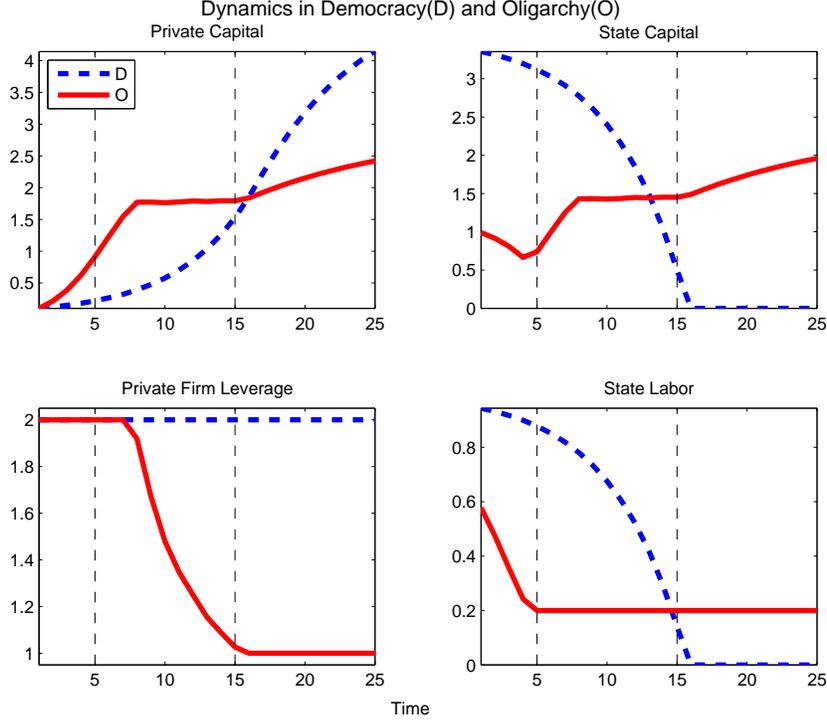


Figure 9: Dynamics in democracy (blue) and oligarchy (red) ending in middle-income trap.

we plot the transition in democracy with the blue dashed line, while the transition in oligarchy is the red solid line. Starting in oligarchy, during the first stage, the private sector is small, therefore not a threat to oligarchy. Elites encourage the growth of private capital to extract more tax income. So the government sets  $\eta = \bar{\eta}$  to lend to private firms as much as possible (left-lower panel of figure 9). Moreover, private firms and entrepreneurs benefit from low wage and abundant labor, so private sector capital grows rapidly (left-upper panel). State employment and capital decline accordingly (right-upper panel). Because the more efficient private sector is reallocated with more capital and labor (right-lower panel), the economic growth is rapid (figure 10). For this reason, this stage is called “*rapid growth*”.

As the private sector grows larger and the state employment share declines to the critical level  $\underline{L}$ , the economy enters the second stage. The declining state employment share threatens the supporter base of oligarchy. If no action is taken, elites can’t keep their political power any more. So they increase state investment and then restrict private firms’ access to the financial market. Because of the policies in favor of state firms, the state sector keeps its relative economic power and the ability to hire  $\underline{L}$  labor with high enough wage. The privatization stops, and no more labor reallocation to the more efficient private sector. However, the large investment in state sector can still keep growth high for a while. But the growth gradually slows down because the financial repression on

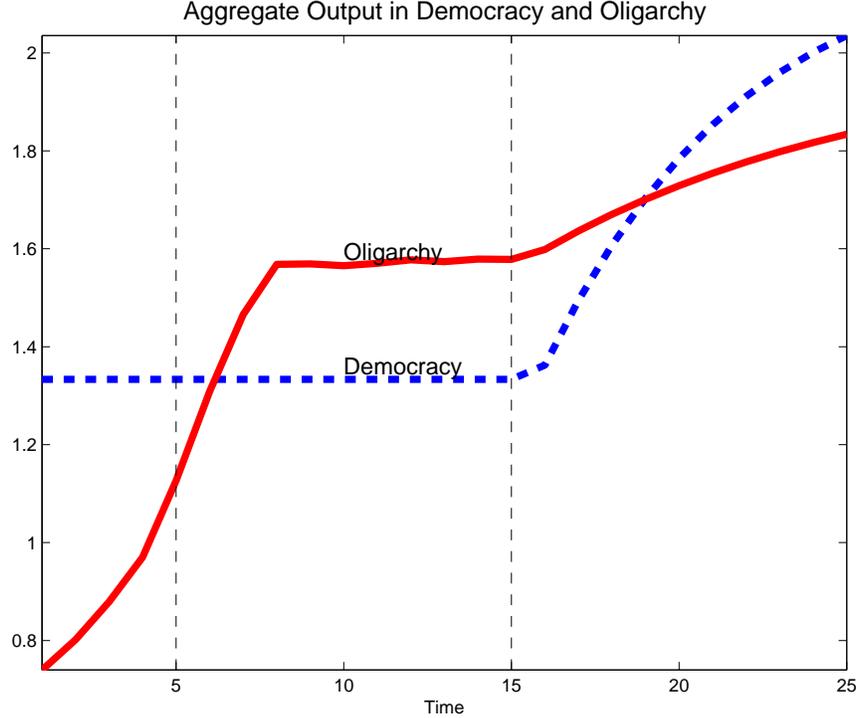


Figure 10: Output in democracy (blue) and oligarchy (red) ending in middle-income trap.

private firms harms the economic efficiency, as shown in the middle section of figure 10. This stage features large state investment and financial repression on private firms, so it is a stage of “*state capitalism*”. Notice that though the initial output is lower in oligarchy than in democracy, due to the labor market distortion, the output can catch up with democracy in the second stage due to rapid capital accumulation and large state investment.

In the long-run, if  $\underline{L}$  is small, elites find it optimal to always sustain oligarchy. They keep over-investing in the state sector as the private sector capital grows to its steady state level. Employment share stays at  $\underline{L}$ . Though elites have to pay large investment cost, they still extract from tax income from the private sector, so they don’t want to democratize. The economy continues as the second stage: over-investment in state firms, financial repression on private firms, no labor reallocation to private firms. The inefficient capital market harms growth. Furthermore, due to decreasing return to capital, growth gradually slows down and eventually output stops growing at the middle level, which is lower than the level in democracy. So in this case, the third stage is called “*middle-income trap*”.

If  $\underline{L}$  is large enough, elites choose to democratize when the private sector capital reaches certain level. The cost for elites to keep enough workers in the state sector with high wage keeps growing as the private sector capital grows. Additionally, marginal return of capital decreases, so elites find the

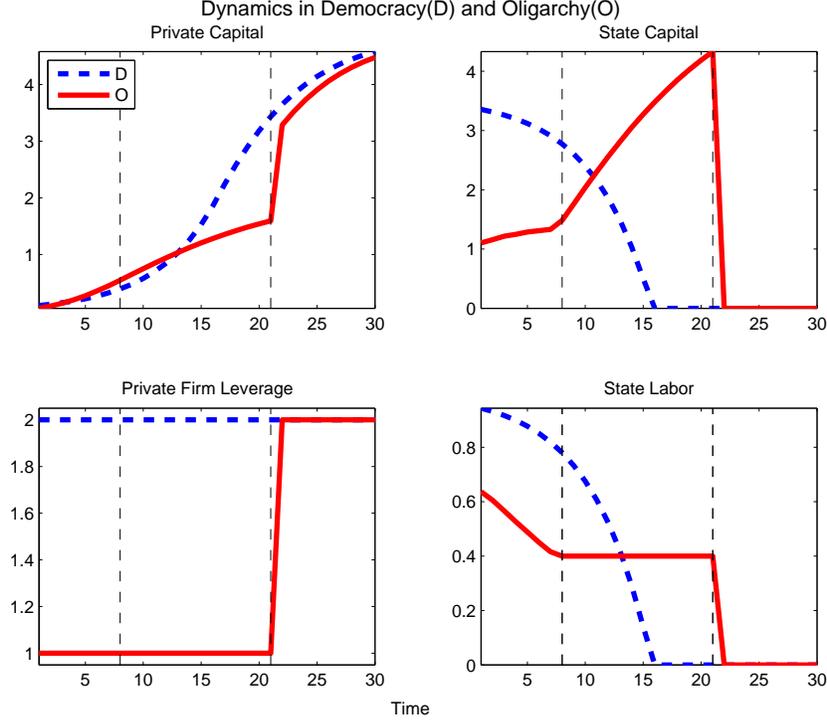


Figure 11: Dynamics in democracy (blue) and oligarchy (red) ending in sustained growth.

cost of maintaining oligarchy dominates the income in oligarchy when private sector capital grows large enough. They choose to democratize. As we can see in figure 11, the state capital quickly drops while the private capital soars up because the financial repression is removed. The output, as shown in figure 12, though slightly goes down due to super rapid decline of the state sector, eventually recovers and converges to the high level in democracy.

### 3.5 Quantitative Analysis

Which case of the third stage will be China's future? We calibrate the model to the Chinese economy and provide an answer in this subsection. The targets of the calibration are the key facts in China's recent development, including the wage gap, speed of privatization, and the state employment share.

The economic parameters are set as follows. First, the production function is Cobb-Douglas with the capital share  $\alpha = 0.5$  (Bai et al. (2006)) and depreciation rate  $\delta = 0.1$  (Song et al. (2011)). The state capital efficiency is set to be half of the private capital  $z_S = 0.5$ . This implies that the TFP of state firms is 71% of the TFP of private firms. This is higher than 59% estimated by Hsieh and Klenow (2009) with data before 2005, but is reasonable considering that the trend of declining TFP gap discussed in Hsieh and Song (2013). Second, the interest rate of bank saving is  $r = 5\%$ .

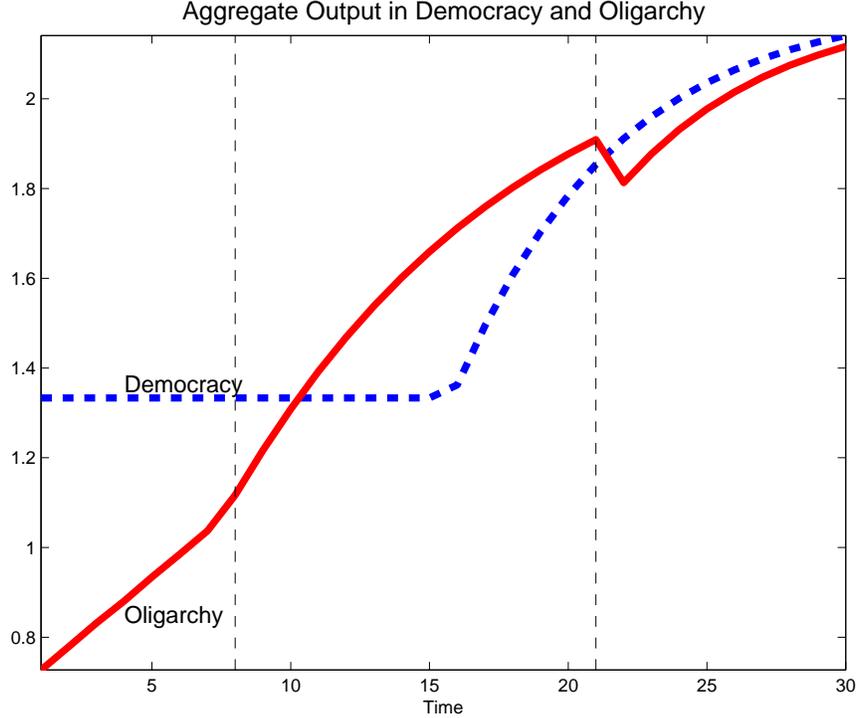


Figure 12: Output in democracy (blue) and oligarchy (red) ending in sustained growth.

Third, the discount factor of entrepreneurs, which is also their saving rate of their lifetime income, is set to  $\beta = 0.9$  to match the rapid private sector employment share growth from around 40% to around 80% in 5 years, as we can see from figure 2. Finally, the tax rate upper bound is set to  $\bar{\tau} = 20\%$  to match the state-private wage gap of 30%, as in figure 1. The political parameter in this model is  $\underline{L}$ , the minimal support needed to sustain oligarchy. We set  $\underline{L} = 20\%$ , as the state employment share converges to around 20% as in figure 2.

Given these parameters, we solve the equilibrium and simulate it starting from a very small private sector:  $a_e = 0.05$ . Figure 8 is the solution of the elites' problem given these parameters, while figure 9 is the dynamics (figure 11 and 12 correspond to setting  $\underline{L} = 0.5$ ). The model's prediction is that China will stay in oligarchy and fall into the middle-income trap, given the current conditions. This is not surprising. The government is right-now strong, politically and economically, meaning that a relatively small fraction of the citizens' support is sufficient to sustain the current regime, and it has enough financial resource - for example, large foreign reserves - to build up the state sector if it needs to. After 2008 financial crisis, the Chinese government initiates the 400 billion stimulus package and bails out mostly state firms while letting many private firms die. This shows that it keeps the economy and resource allocation under control and stable, and it is able to maintain a powerful state sector to guarantee political stability, according to this theory.

### 3.6 Discussions and Policy Implications

The first two stages of the dynamic model are consistent with China's recent development. From 1997 to around 2003, it is a stage of rapid privatization, as the state employment share declines dramatically. The private sector, in terms of employment share and GDP, grows rapidly, for two reasons. First, the wage is low in the private sector. Compared to state firms which face the regulations on the wage and other payments, including pension tax, health insurance, unemployment insurance and so on, private firms pay relatively low wages, which result in high capital returns. Therefore, private firms accumulate capital rapidly and grow fast. The low wage keeps Chinese private firms competitive. It contributes a lot to the growth of export, and the growth of the economy. Second, the government encourages the private sector growth, because a larger private sector contributes more tax while it is still not too large to threaten the supporter base of the government - state employment. So the government encourages various financial resources flowing into the private sector, not only bank loans but also foreign direct investment (FDI), and so on.

At around 2003, as the state employment share approaches the critical level, the privatization slows down and stops dramatically. The direct reason is that more and more investment is diverted to state firms but not private firms. State sector investment share stays at around 60% though its employment is much smaller (see Brandt and Zhu (2010)). The state over-investment retains state employment, but reduces the capital return. In the private sector, the capital return is high, not only because they are more efficient, but also because of the credit constraint: private firms can't get enough bank loans for their high return projects. In fact, the financial constraint on private firms has been getting tighter over time, signaling growing financial repression on them. The growing financial repression on private firms is formally documented as the growing state-private capital wedge in Brandt and Zhu (2010). The protection on state firms and repression on private firms have gained much attention and are called "the state advances as the private sector retreats". For example, in the passenger airline industry, by 2006, eight private carriers had grown rapidly and had challenged the three state-controlled majors, thanks to the previous government policies encouraging private investors to enter. However, afterward, the government starts supporting the state airlines and keeps them alive with policies including stock purchases from the central government. The state airlines not only survived and also are able to keep their dominance. Our theory's prediction indeed explains why this is happening in the second stage "state capitalism". Elites prefer to maintain a sufficiently strong state sector to guarantee the political control. Our model's prediction on the capital return in the second stage is broadly consistent with the trend: a large gap between the state and private capital returns and declining state capital return, as shown in figure 13. Though the capital return in state firms is so slow, the government still keeps investing into them to keep them alive.

Is China doomed to fall into the middle-income trap? Not necessary. If the underlining con-

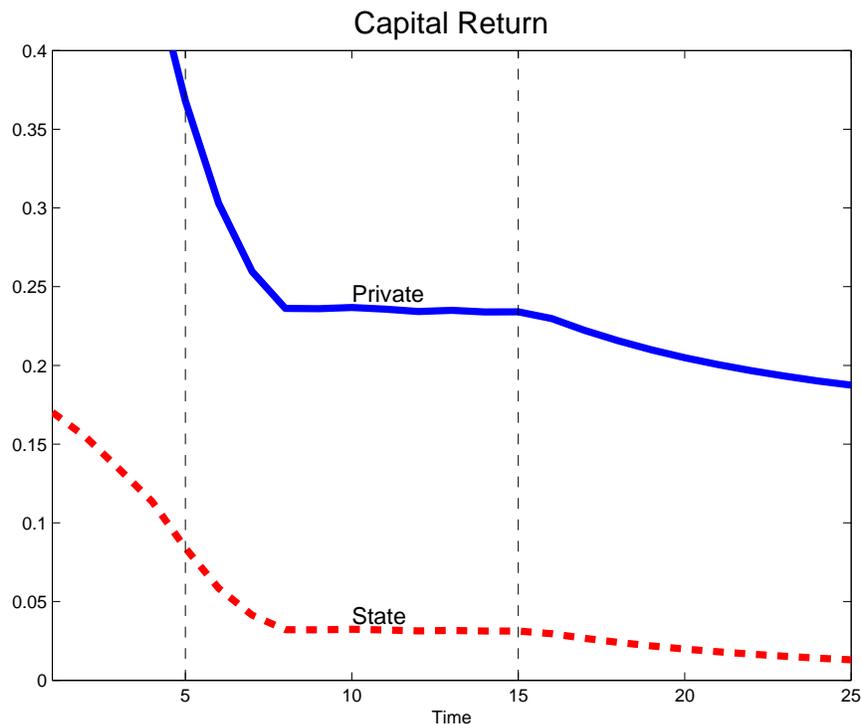


Figure 13: Capital return in the state sector (red dashed) and the private sector (blue).

ditions change, the policies and the development path can change accordingly. Mapping into the model, if the parameters such as  $\underline{L}, \underline{\eta}, z_S$  change, the government policies and the dynamics, including the third stage, will change. Many policy suggestions on how to switch China's development to a more sustainable path have been made by economists and China watchers. For example, Gary Becker suggested that financial reform should be taken to allocation more resource to private firms, and rural immigrants should be given more rights. Will the government take the suggestions and implement all the policies and reforms that sustain growth? We need to notice that policies or reforms that benefit economic growth may not benefit the elites, who are very influential in the government.

Suppose the government takes a reform that gives more political rights to workers, especially the immigrant workers. This implies that the government has to buy support from a larger fraction of the population. We know that if  $\underline{L}$  increases from 0.2 to 0.5 leads to democratization and sustained growth. But do elites like that? Their income goes down to 0 if democratization occurs, so obviously this reform will encounter strong resistance from political elites.

In the above model, we assume that the government is completely under the control of political elites. Some may believe that, in some cases, some technocrats become powerful in the government, and they care only about the output growth in the long-run, but not the economic benefit of elites.

In this case, they can initiate reforms which correspond to changing the key parameters of the model, such as  $\underline{L}, \underline{\eta}, z_S$ . To which extent they can push the reform to depends on their political power in the government, which is modeled as the Nash bargaining power of the following bargaining between technocrats and elites:

$$\max_P (Y_\infty(P) - Y_\infty)^\alpha (V(P) - V)^{1-\alpha},$$

where  $\alpha$  is the bargaining power of technocrats,  $V(P)$  is the lifetime income of elites and  $Y_\infty(P)$  is the long-run output given the new parameters after the reform.  $P$  can be one of the key parameters  $\underline{L}, \underline{\eta}, z_S$ . Notice that we consider reform as changing parameters but not the endogenous policy variables such as  $K_S, \eta$ . This implies that technocrats only get a key moment to push for a big change of the society and the political and economic system, and afterwards, the government decisions will be made by elites again.

Figure 14 depicts that technocrats would like to increase workers' political rights and increase  $\underline{L}$  from the current level  $\underline{L} = 0.2$ , because this makes the government invest more in the state sector, or even choose to democratize. Both of them lead to larger output levels. However, the reform as the result of the bargaining can only push  $\underline{L}$  to the right limited by  $\alpha$ . If  $\alpha$  is small, the increase of workers' political rights won't be large.

Similarly, financial reform, which reduces the financial repression on private firms can be considered as increasing  $\underline{\eta}$ . It again increases output, because the private firms can grow larger, and it may even leads to democratization. But again, it harms the elite interests and is hard to be implemented.

One exception is the state firm reform. If a successful reform is taken to increase state firm productivity and reduce the TFP gap between the private and state firms, it increases the output potential. More than that, under the condition that oligarchy is sustained, a more efficient state sector implies that the government can allow the private sector to grow more without worrying about their supporter base - state workers. Less financial repression on private firm is needed and higher economic efficiency can be achieved. This reform also increases elite income because of higher total output. Figure 15 plots how the long-run efficiency, measured as the long-run output in oligarchy over democracy, can be improved by a more efficient state sector (in the region  $z_S \in [0.6, 0.75]$ ), while the elite income always increase with that. This reform is more likely to be implemented the government. In fact, this is happening right now in China. Hsieh and Song (2013) document the state-private TFP gap is declining. The so-called "industrial upgrading", which aims at building high-tech state firms, is at the top of the agenda for China's further economic reforms. However, it is also very difficult to completely close the gap between the state and private firms, because they are less flexible and provide less economic incentives for the managers, compared to private firms.

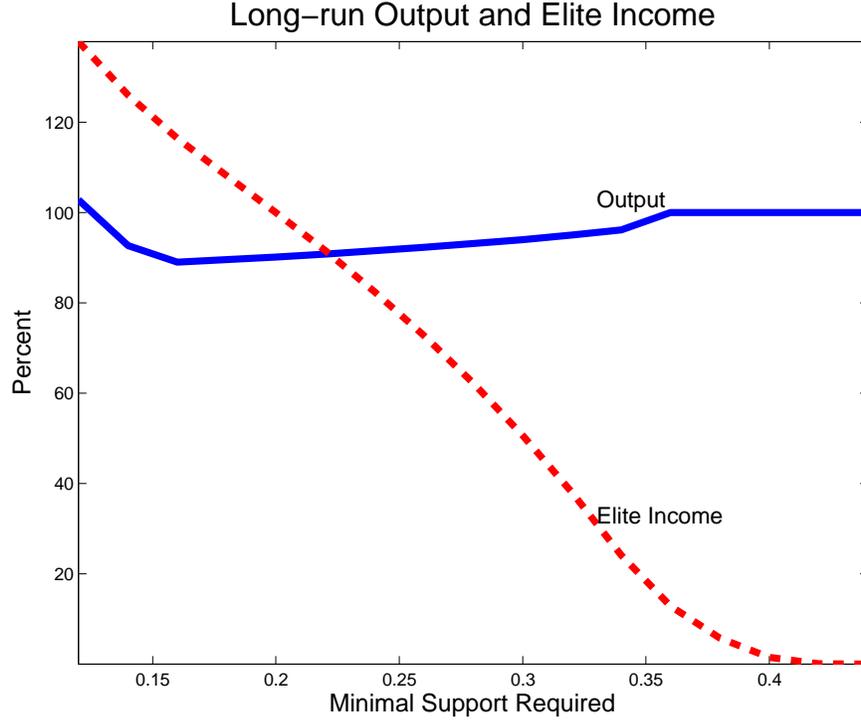


Figure 14: elite income and long-run output depending on  $\underline{L}$ .

## 4 Conclusion

This paper provides a political-economic theory to study China’s future economic and political transition and to understand China’s recent development. Based on a dynamic growth model, I add the political constraint that the ruling elite faces: sufficient political supporters. To satisfy the constraint, the government creates a dual labor market, which gives high wages to state workers and turn them into supporters. Moreover, in the financial market, the government encourages private sector growth when it is small enough, but switches to protecting state sector and restricting the private sector when the private sector capital is too large. The economic policies lead to a three-stage transition. The first two stages are “rapid growth” and “state capitalism”, which are consistent with a couple of salient aspects of China’s development, including (1) rapid growth with repressed wage in the private sector; (2) political support from the middle class, including state sector workers and private entrepreneurs; (3) financial constraints on private firms and support for state firms. In the future, i.e., the third stage of development, China is likely to enter a “middle-income trap” given the current conditions, especially the economically and politically powerful state. To switch to the other development path that leads to “sustained growth”, necessary reforms have to be taken, though they may face resistance from elites.

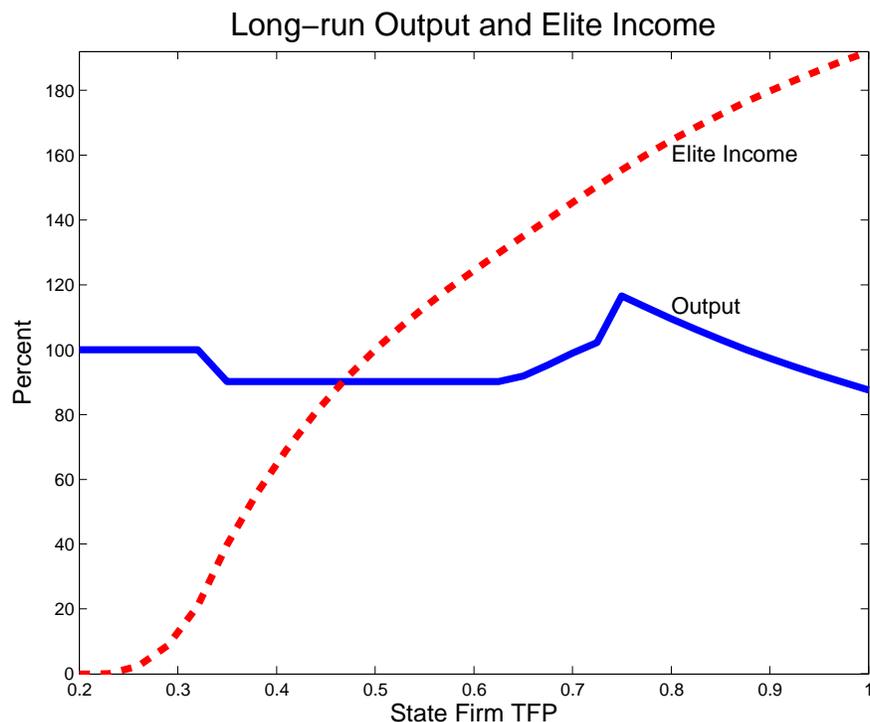


Figure 15: elite income and long-run output depending on  $z_S$ .

Even though the focus of this paper is on China, it is also useful to study the development of many other emerging countries and even some developed countries with similar patterns compared to China. First, the key political constraint in the theory also exist in some other countries such as Kuwait, Korea in the 80s, and Greece, as political elites or politicians need to buy political support from public workers or workers in industries under their control. So similar stories occur in these countries. Before the 90s, the large local conglomerates (chaebol) in Korea are granted privileged access to low-cost credit. In Kuwait, the oil industry is under the control of the government, so the public sector can hire more than 90% of Kuwaiti nationals with relatively high wage while the private sector is populated with expatriates. Greece public sector workers also receive more than 20% premium (see Giordano et al. (2011)). Second, the theory is also useful to think on a question in development: whether other developing countries should apply the “China model” - the combination of authoritarian politics and state-guided capitalism - to promote economic growth. Some suggestions in favor of adopting this model is based on its past success, but the long-run outcome should be carefully examined and distinguished from the short-run effect. Our theory provides a quantitative framework to evaluate the economic and political consequences.

Further empirical work can be done to examine the theory, especially the three-stage political-economic transition. Which conditions determine the transition to democracy and the long-run

growth? Is it consistent with the theory? The theory predicts that if a country can easily build a large state sector - for instance due to rich natural resource - is more likely to sustain the oligarchy, while if efficiency is very important for a country - for example because of exposure of international competition - democratization is more likely to occur. Anecdotal evidence on Gulf countries compared to export oriented economies like Taiwan seem to support the theory. Still, more systematic evidence will be useful to check and improve the theory.

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## 5 Appendix

### 5.1 Details on Equilibrium Given Capital Allocation

In subsection 3.2, we state the equilibrium outcomes in democracy and oligarchy without going into details. Most importantly, we state that to sustain oligarchy, the political constraint is that there must be sufficiently many supporters for oligarchy, and a worker supports oligarchy if she gets higher income than in democracy. In facts, those statements can be derived from a sequential game played between workers and elites, as follows.

In democracy, the majority, namely workers, elect a representative worker into the government, then she decides government policies to maximize her income, or equivalently, workers’ income. The government policies in democracy are the following: the government taxes elites and entrepreneurs, transfers the tax income to workers and it doesn’t regulate the S sector wage. First, taxing elites and entrepreneurs involves no cost and making transfer to them gives no benefits, so they are taxed and get no transfer. Second, since tax income is transferred to workers, taxing workers and transferring this income back to them is equivalent to no tax on them. Third, the government has no incentive to distort the wage in S sector and the labor market allocation. Setting a binding minimal wage in S

sector leads to inefficient labor allocation, lower total output and lower final income for workers. So the government does not regulate wage in democracy. The labor market is competitive and efficient.

Given the above analysis, the timing of events is the following:

1. Capital in S and P sectors are given as  $K_S, K_P$ .
2. Workers decide tax rates on elites and entrepreneurs.
3.  $S$  and  $P$  firms hire workers in the competitive labor market and produce.  $S$  and  $P$  firms produce. Capital incomes and wages are distributed.
4. Elites and entrepreneurs decide whether to hide income at the cost  $\bar{\tau}$ .
5. Tax are collected and transferred to workers.

Now we can solve the equilibrium in democracy from backwards. In stage (4), tax payers choose to pay the tax if  $\tau \leq \bar{\tau}$ , otherwise they hide the income<sup>13</sup>. In stage (3), competitive labor market implies that wage in S and P firms are the same and equal to the marginal productivity of labor:

$$w^D = (1 - \alpha) (z_S K_S)^\alpha (L_S^D)^{-\alpha} = (1 - \alpha) (K_P)^\alpha (L_P^D)^{-\alpha}.$$

The market clearing condition  $L_S^D + L_P^D = 1$  helps us to pin down the labor allocation:

$$\begin{aligned} L_S^D &= \frac{z_S K_S}{z_S K_S + K_P}, \\ L_P^D &= \frac{K_P}{z_S K_S + K_P}. \end{aligned}$$

The pre-tax income for elites and entrepreneurs are the capital returns, respectively:

$$\begin{aligned} \pi_S^D &= \alpha (z_S K_S)^\alpha (L_S^D)^{1-\alpha}, \\ \pi_P^D &= \alpha (K_P)^\alpha (L_P^D)^{1-\alpha}. \end{aligned}$$

In stage (2), the government decides  $\tau = \bar{\tau}$  to get the maximum tax income, given the taxpayers' strategy on income hiding, and the fact that in this static model without investment, tax is not distortive. Now we have solved the problem and we can write the final income of workers, elites

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<sup>13</sup>Without loss of generality, we assume that when tax payers are indifferent between paying tax or hide the income, they pay the tax.

and entrepreneurs as follows:

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

The transfer to workers is  $\bar{\tau} \frac{\alpha}{1-\alpha} w^D$  simply because the tax base - capital income - is  $\frac{\alpha}{1-\alpha}$  times labor income.

To sum up, in democracy, no distortive policy and competitive labor market imply first best allocation. elites and entrepreneurs get  $(1 - \bar{\tau})$  fraction of capital income, respectively. The final income of workers is  $\bar{\tau} \frac{\alpha}{1-\alpha}$  times larger than their wage income.

In oligarchy, elites control the government to maximize their income. In this context, we can use the government and the elites interchangeably. First, the government decides to democratize or not. If yes, the economy becomes exactly the same as in democracy. Otherwise, the oligarchic government decides the two policies - tax and state sector wage regulation. Given the policies, agents know their final incomes in oligarchy. Comparing incomes in oligarchy and in democracy, an agent decides to support oligarchy or not. If and only if large enough fraction of citizens choose to support the oligarchy, the regime survives. Otherwise democratization occurs. In the latter case, the economy is again the same as in democracy. The minimal size of supporters is denoted as  $\underline{L}$ , which is exogenous. Because the population of elites and entrepreneurs is as small as measure 0, oligarchy is sustained if and only if more than  $\underline{L}$  workers support it <sup>14</sup>.

The government taxes private entrepreneurs and P workers, but doesn't tax elites and S workers. The logic is the following. Taxing entrepreneurs involves no cost for elites. Tax on elites will be transferred back to themselves, so it is equivalent to no tax. Tax on S workers gives elites no benefit but implies larger distortions, because the government anyway needs to increase S workers' after-tax income to the level in democracy if the government wants to sustain oligarchy. It implies that the tax has to be compensated by higher wage payment to S workers, so tax on S workers should be 0. Furthermore, there is no cost to tax P workers, so the tax rate on P workers can be positive. Tax rate on entrepreneurs is also not determined yet.

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<sup>14</sup>The above setting, that political support decides political regime, is based on the framework of Acemoglu et al. (2012). In their language, a coalition of some agents is assigned with a level of political power, and if the power is large enough, the coalition can change the political system according to their preference. In our context, in oligarchy, elites as the ruling group are granted some level of political power, denoted as  $\omega_e$ . Each worker has political power  $\omega_w$ , and each entrepreneur has  $\omega_p$ . The aggregate political power of entrepreneurs is just 0 given its small size. Workers can change the political regime from oligarchy to democracy if and only if they form a coalition of size  $L_r$  and  $\frac{\omega_w L_r}{\omega_w + \omega_e} > \alpha \iff L_r > \alpha \frac{\omega_w + \omega_e}{\omega_w}$ , where  $\alpha$  is exogenous. In other words, the sustain a oligarchy, there must be at least  $1 - \alpha \frac{\omega_w + \omega_e}{\omega_w}$  workers supporting elites. We denote this size as  $\underline{L}$ .

Given the tax system, the timing of events in oligarchy can be simplified as follows:

1. Elites choose to democratize or not. If yes, the economy is the same as in democracy. otherwise the following events occurs.
2. Elites sets minimal wage in S sector as  $w_S$ .
3.  $S$  firms and  $P$  firms hire workers.
4. Workers in  $S$  and  $P$  sectors decide to support the current regime or democratization, simultaneously.
  - (a) If more than  $\underline{L}$  workers support the regime, oligarchy is sustained.
  - (b) If fewer than  $\underline{L}$  workers support the regime, democratization occurs.
5. If oligarchy is sustained,  $S$  and  $P$  firms produce. Capital income, state and private sector wages are distributed accordingly.
6. Tax is collected and transferred to elites.

Now we can solve the rest of the problem from backwards. First, in stage (5), firms' labor demand gives the relation between wage and labor.  $S$  firms, given the regulated wage  $w_S$ , choose labor demand  $L_S$  so that wage equals marginal productivity. Similar for private firms who face market wage  $w_P$ .

$$w_S = (1 - \alpha)(z_S K_S)^\alpha L_S^{-\alpha}, \quad (7)$$

$$w_P = (1 - \alpha) K_P^\alpha L_P^{-\alpha}. \quad (8)$$

Then state and private workers' final incomes are the following:

$$y_{wS} = w_S,$$

$$y_{wP} = (1 - \tau) w_P.$$

Second, we look at workers' political decisions in stage (4). No matter what others choose, a weakly dominant strategy is to support oligarchy if and only if the income is higher than in democracy. Without loss of generality, we assume that workers use the this strategy<sup>15</sup>. In other words, a worker's political choice truthfully reflects her economic interest.  $S$  and  $P$  workers support

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<sup>15</sup>Other strategies and equilibria give the same outcome. For example, giving support to oligarchy when income in democracy is higher is a best response if and only if this worker's choice doesn't change the outcome. So a worker may use this different strategy, but the equilibrium outcome is still the same.

oligarchy if and only if

$$\begin{aligned} y_{wS} &\geq y_w^D, \\ y_{wP} &\geq y_w^D, \end{aligned}$$

respectively.

Then the rest is the same as the discussion in subsection 3.2 of the body part: in stage 2,  $w_S$  is set to be high enough to guarantee support from S workers:  $w_S \geq y_w^D$ , while the general equilibrium effect reduces the P worker wage  $w_P \leq w^D < y_w^D$ , and private workers never support oligarchy. When S sector capital is large enough, more than  $\underline{L}$  workers are hired by state firms, and oligarchy is sustained.

## 5.2 Proof of Proposition 1

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

1.  $[\underline{L}, \bar{L}] = \emptyset$ . Oligarchy can not be sustained. The government can not strategically make sufficient workers support the oligarchy: if it sets  $L_S < \underline{L}$ , there's not sufficient support; but if  $L_S \geq \underline{L} > \bar{L}$ , workers in S sector don't get high enough wage. The only possible political outcome is democracy. Since  $\underline{L}$  is exogenous and  $\bar{L} = \nu L_S^D = \nu \frac{zK_S}{zK_S + K_P}$  depends on  $\frac{zK_S}{K_P} \doteq k$ , we can simplify the condition  $\bar{L} < \underline{L}$  to  $\nu L_S^D = \nu \frac{k}{1+k} < \underline{L} \Leftrightarrow k < \underline{k} = \begin{cases} \frac{\underline{L}}{\nu - \underline{L}} & \text{if } \nu - \underline{L} > 0 \\ +\infty & \text{if } \nu - \underline{L} \leq 0 \end{cases}$ , given  $k > 0$ . In the case  $\underline{k} = \frac{\underline{L}}{\nu - \underline{L}}$ , we know that when there are not enough capital in S sector compared to the capital in P sector, oligarchy can't be sustained.
2.  $[\underline{L}, \bar{L}] \neq \emptyset$ . Oligarchy can be sustained. The government can choose to sustain the oligarchy by setting some  $L_S \in [\underline{L}, \bar{L}]$  or choose democratization.