

When will a dictator be good?

Ling Shen

Bonn Graduate School of Economics
University of Bonn

Corresponding author:

Address: Lenner Str. 43 Bonn 53113 Germany

Tel: 0049 228 736149

Email: ling.shen@uni-bonn.de

Abstract

The political system of many developing countries is dictatorship in some sense. However, different dictators act quite differently: the good dictator implements growth-enhancing economic policies, e.g. investment in public education and infrastructure, whereas the bad dictator expropriates the wealth of her citizens for her own consumption. The present paper provides a theoretical model in order to demonstrate the underlying determinants of the behavior of dictators. We assume that the engine of economic growth is the private decentralized investment. It can increase the productivity of investors, as well as the aggregate technical level. The good dictator would like to encourage this investment in order to expropriate more. However, the cost of this encouragement is that the higher growth rate will induce the sooner democratization. We emphasize this trade-off faced by the dictator, between the great economic benefits from the growth-enhancing policy in the short run, as well as the short life-time of the dictator in the long run. Our main result is that, the sufficient condition of this trade-off is that the revolution cost for citizens is great enough. And the higher the return of investments, the less possible the dictator is good.

JEL Classification: H00, O12, P16.

Keywords: dictatorship, political transition, economic growth.

1. Introduction

More and more economists realize the importance of political institutions in shaping economic performance. Most academic studies of political economy (e.g. Shepsle and Weingast 1995, Cox 1997, Persson and Tabellini 2000, 2003) focus on the democratic political system, where formal political institutions, such as the constitution, the rule of law, and the election system, are already well advanced. However, few sheds light on the non-democratic system, although most people on earth live in such regimes.¹ A puzzling phenomenon in non-democratic economies is that they can achieve dramatically different economic growth rates. While East Asia dragons have grown 8-10% per year for almost 30 years, many African countries suffered the great economic recession in the same period, although most of both regions are controlled by some autocracies.

The above simple comparison between East Asia dragons and African or South American autocracies implies that the behavior of autocracies might be important for the fortune of nations.² The good dictator invests in public education and infrastructure, establishes the rule of law to encourage private investment, and subsidizes R&D, and so on. However, the bad one simply transfers a large fraction of the social wealth to herself.³ It is of interest to ask why some of dictators are good, and others are bad.⁴ This question is important for economists, because different dictators (good or bad) imply different economic performances. It is also important for politicians, because good economic performance induces early democratization, according to the Lipset/Aristotle hypothesis⁵, that prosperity stimulates democracy. Although the impact of democracy on economic performance is far from reaching a consensus among economists⁶, the reverse causality, the Lipset/Aristotle hypothesis, has

¹ Recent works in this line include e.g. Bueno de Mesquita et al. (2003), Acemoglu (2003) and Acemoglu et al. (Apr. 2004), which examine reasons of longevity of “Kleptocracy”.

² For the formal research of the relationship between the political institution and the economic growth, see Acemoglu et al. (May 2004), and Glaeser et al. (2004).

³ One classic case of dictator is Mobutu Sese Seko in the Democratic Republic of the Congo from 1965 to 1997. According to Acemoglu et al. (Apr. 2004), in the 1970s, 15-20 percent of the operating budget of the state went directly to Mobutu. In 1977 Mobutu’s family took 71 million USD from the National Bank for personal use and by the early 1980s his personal wealth was estimated at 5 billion USD. In 1980, GDP of Congo is only 1.7 billion USD according to the databank of UN.

⁴ Sah Raaj K. (1991) believes that dictatorship is a risky investment.

⁵ We owe this terminology to Barro 1999.

⁶ Barro (1997) points out that there is a non-linear relation between democracy and economic growth. Whereas democracy is growth enhancing in the young period, it is bad for further economic growth when democracy exceeds beyond a certain point.

shown strong empirical regularity in many empirical studies (e.g. Barro 1999, Boix and Stokes 2003).

The present article assumes a dichotomy world, where democracy is defined by the one-person-one-vote majority voting system (Huntington 1991, Schumpeter 1947) and non-democracy (or autocracy, or dictatorship, we treat all as equal for simplicity) means that one person holds all political power. We provide a theoretical model in order to illustrate the underlying determinants of the dictators' behavior. We emphasize the trade-off faced by the dictator, between the great economic benefits from the growth-enhancing policy in the short run, as well as the shorter life-time of the dictator due to the sooner democratization, which is induced by the economic growth in the long run. There are three important components of this simple model.

First, consistent with literature, the present article assumes also that the political power affects the economic performance through the redistribution policy. However, the redistribution policy in the current model is a two-dimensional vector, which consists of the tax rate and the group-specific social transfer. This assumption is distinct from other new growth literature (e.g. Benabou 1996), where the redistribution policy includes only the tax rate, whereas the social transfer is assumed equal for all individuals. The direct result of such one-dimensional assumption is that the tax rate in democracy is higher than that of dictatorship. It is challenged by several new studies (e.g. Wintrobe 1998, Lee 2002 and Acemoglu 2003, Acemoglu et al. Apr. 2004). Following their research, we assume that the dictator decides both the tax rate and the distribution of tax revenues. The tax rate represents expropriation, and the distribution of tax revenues means whether the dictator would like to share the tax revenue with citizens.

Second, we argue that economic growth is generated by decentralized investment. Individuals' investment increases their private productivity. This private investment has a positive external effect on the aggregate technical level. The more individuals invest, the higher the aggregate technical level. Furthermore, we assume that the taxation is undergone after the citizens' investment decision. Hence, any promise to reduce the tax rate in dictatorship is incredible.⁷ The good dictator is the one, who encourages the citizens'

⁷ According to Acemoglu (2000), democratization is the strategic decision of political elites to prevent revolution, because the citizen can not trust that the elite will undergo a pro-citizen redistribution for ever, as long as she holds political power. This commitment problem is the reason of democratization in his framework. I follow his idea and assume that the expropriation is after the private investment. Hence, the promise to reduce the expropriation is incredible, as long as the dictatorship does not change.

investment through the investment subsidy. We name this subsidy as the group-specific social transfer. For instance, the dictator could provide public education only to the intelligent individuals. We assume that this social transfer is implemented before the individuals' investment decision. Hence, it is sunk and irreversible. In this sense, it is the credible commitment to encourage the private investment. The dictator would like to share the tax revenue with some of citizens instead of consuming alone, because she can expropriate more, if citizens invest more. This is the economic benefit from the growth-enhancing policy in the short run. In contrast to dictatorship, we assume that democracy ensures every citizen the same social transfer and the same power to decide the tax rate. This assumption not only simplifies the analysis, but also represents the nature of democracy: everyone is treated equally.

Third, democracy is growth-enhancing in the current model, because it protects the decentralized investment from the expropriative taxation under certain conditions. The higher the aggregate technical level, the greater the expropriated income is in dictatorship, in turn, citizens have greater incentive of political transition. Nevertheless, the ruler impedes this political transition because the loss of political power means simultaneously the loss of economic benefits. The good dictator encourages the private investment, which induces the higher aggregate technical level. Consequently, democracy is more attractive for citizens. It leads to sooner democratization, which is the cost of the good dictator.

We find that the dictator will become good if the return on private investment is sufficiently low and/or the highest expropriation level is sufficiently high. In this case, the dictator has a higher incentive to encourage individuals to invest more. And a sufficient condition of the trade-off between the short-run benefit and long-run democratization faced by the dictator is that the cost of revolution is great enough. Because the effect of growth-enhancing policy on democratization needs time to represent, the dictator considers this negative effect only if she can live for a long time, i.e., the cost of revolution is sufficient large.

The present paper connects literature in two lines. The theory of democratization in the framework of political economy frequently focuses on the pure redistributive model, for instance, Therborn (1977), Rueschemeyer et al. (1992) and Acemoglu and Robinson (2000, 2001). Paul J. Zak and Yi Feng (2003) are more closely related with the current paper because they study also the relationship between economic growth and political transition. However,

they emphasize the acceleration of democratization in different regimes' policies. Contrast to their work, we focus on the condition under which different regimes (good or bad) exist. On the other hand, the literature of the new growth theory studies the impact of democracy on economic growth, e.g. Barro (1997, 1999) Kurzman, C. et al. (2002), or the impact of redistribution policy on growth, e.g. Persson and Tabellini (1994), Benabou (1996, 2002), Chen (2003), but less concern that the most growth-enhancing policies are implemented by dictators in non-democratic societies.

The paper proceeds as follows. In section 2, I present the basic model and study the case without the positive external effect of investments. Then we introduce the democratization process in section 3. In section 4, the external effect is investigated, in order to establish the relationship between political transition and economic growth. Moreover, we study the behavior of dictators who face the pressure of political transition. In section 5, the main results are summarized.

2. The model

There are two types of political state: dictatorship and democracy, and two kinds of agents: the ruler and citizens. Citizens invest and produce outputs, whereas the ruler expropriates the output through taxation after production in dictatorship. The dictator can choose to be good or bad. The good dictator shares part of tax income with some of citizens, whereas the bad dictator consumes all tax revenue by herself. Democracy is characterized by equality: every citizen has same political power to determine the tax rate and gets the same social transfer.

2.1 The environment

We consider an infinite horizon economy with two types of agents: a ruler and a continuum 1 of citizens, which is denoted by $i \in [0,1]$. The ruler could live infinitely if she was not killed in democratization, whereas the life-time of the citizen is one period. We assume the uncertain life-time of the ruler, because she represents the political power, which could be transferred to the successor. Nevertheless, the citizen represents the productive ability in our economy, which is normally not transferable between generations. Hence, we assume the life-time of the citizen is one period. Each citizen is born with an ability ε_i , which is invariant in time and equally distributed in $[0,1]$. Hence, $\varepsilon_i = i$. The citizen is able to produce the final good y

with her ability, while the ruler does not produce anything, but can tax the output of citizens after their production. The production function of the citizen i in time t is:

$$y_{i,t} = A_t \varepsilon_i \lambda^{I_i}, \lambda > 1 \quad (1)$$

where A_t represents the aggregate technical level in time t , and I_i is an indicator function of the investment. $I_i = 1$ represents that the individual i invests, whereas $I_i = 0$ indicates not to invest. The investment cost is eA_t , $e > 0$, and it enables the investor to increase her productivity by λ times. Citizens choose to invest if the benefit of investment is at least as same as its cost. We denote the breakeven point as β , i.e., individuals with ability lower than β do not invest, and ones with ability higher than β invest. Hence, the investment ratio is $1 - \beta$. In this section, investment has no effect on A_t . Hence, the long run economic growth rate, which depends on A_t , is exogenous. In section 4, we assume that the investment has a positive external effect on the aggregate technical level. Hence, the long run economic growth rate is endogenous.

The political institution is defined by the institution vector (τ, s) , where the tax rate τ is between $[0, \bar{\tau}]$ $\bar{\tau} < 1$ and the social transfer s is financed by taxation.⁸ They are distinguished by two types: dictatorship and democracy. In dictatorship the ruler can choose the tax rate and decide how to distribute the tax revenue. The bad dictator consumes the entire tax income alone, i.e., $s_i = 0 \forall i$. However, the good dictator shares the benefit with some citizens through social transfer, i.e., $s_i \geq 0$, for some i , $s_i > 0$, which is named by the group-specific social transfer. The dictatorship is characterized by the expropriation, whose level is measured by the tax rate. Both the good and bad dictators expropriate citizens. The dictator is good in the sense that her redistribution policy ($s_i \geq 0$, for some i , $s_i > 0$) is growth-enhancing.

In democracy there is no ruler and the tax rate is determined by all citizens through “one-person-one-vote” majority voting system and every agent gets the same transfer $s_i = s^{dem}, \forall i$. We assume that the social transfer of democracy is not group-specific, not because in reality

⁸ This idea comes directly from Lee (2002), where he uses two variables, i.e., participation bias and redistribution bias, to describe the difference between dictatorship and democracy. However, he does not consider the commitment problem. Hence, both of them are determined simultaneously in his model.

there is no group-specific social transfer in the democratic society (in general, all social transfers are group-specific), but because the nature of democracy is that everybody is treated equally. Hence, although the individual project, which is financed by the democratic government, could be group-specific, in aggregate, the democratic government concerns the interests of all citizens, and the social transfer is more equally distributed among individuals than that of dictatorship. Furthermore, allowing group-specific social transfers in democracy would complicate our analysis of democracy, whereas the current article focuses on the non-democracy. In fact, different majorities of citizens will support different group-specific social transfer schemes. Finally, everybody gets the same *a priori*.

In order to change the political state (through revolution or democratization, here, both are same), the citizen i has to pay P_i for the weapon. Contrary to the dictator, citizens lose a constant cost c in aggregate during the revolution. This cost of revolution could be either considered as the destroyed income in turmoil (Acemoglu 2001), or reflect the cooperation and/or coordination problem among a large scale of citizens. The cooperation problem among citizens has modeled in details in some literature, e.g., Acemoglu et al. (Apr. 2004). The ruler is single. Hence, she has no such problem. If the revolution is successful, the ruler dies. As a result, the ruler always tries to prevent the revolution. She buys also the weapon in order to repress the revolution. For simplicity, we assume the price of weapon is fix and same for all. Whether the revolution can succeed depends on who has more weapons. This political transition is modeled by a sequential game. The citizens move firstly, the ruler then reacts. We assume that the ruler move later, in order to reflect the advantage of holding political power. She can adjust the expenditure on weapons according to the revolution decision of citizens. However, the reverse timing does not change the condition of revolution.

The timing of events within a period is as follows:

1. The technical level A_t , and other exogenous parameters $(\bar{\tau}, \lambda, e)$ are revealed.
2. At birth all citizens realize their ability and determine whether to undertake revolution.
3. If there is no revolution, or the revolution is repressed, the ruler can keep her political power. Then she decides whether to be a good dictator or not, i.e., to choose the scheme of the social transfer (s_i) . The ruler can not observe the individuals' ability, but she can see whether the citizen invests or not.

4. If the revolution is successful, the ruler is killed and the citizens establish the democratic political system.
5. After watching the political state and the behavior of the dictator, citizens decide whether to invest, i.e., β is determined.
6. Citizens produce the output.
7. The tax rate is determined either by the ruler in dictatorship, or by the one-person-one-vote majority voting system in democracy. The tax revenue is collected and citizens get the rest of output as their net incomes.

We assume that the tax rate is determined after production in order to reflect that the expropriation is the key property of the dictatorship. The dictator “has to” expropriate the citizens because she has the whole political power. Any promise to reduce the expropriation level is incredible for the citizens. This concept is the base of the democratization theory of Acemoglu (2000). However, we assume that the social transfer is paid to citizens before production, hence, it is credible. Thus, the prepaid social transfer gives the dictator an opportunity to become good.

For simplicity, we assume a perfect capital market with zero interest rate within a period, so that the dictator can finance the social transfer before taxation and the citizen can also finance the investment cost and/or the revolution cost before production. However, nobody can be financed through this capital market more than one period.

All agents are risk neutral. Hence, the utility could be measured by the net income, which is totally consumed by agents within the period. The net income of the citizen i in time t is:

$$Y_{i,t} = y_{i,t}(1 - \tau_t) + s_{i,t} - I_t e A_t \quad (2)$$

And the ruler’s net income is:

$$Y_{ruler,t} = \int (\tau_t y_{i,t} - s_{i,t}) di \quad (3)$$

2.2 The dictatorship

We begin with the dictatorship. Because the tax rate is determined after the investment decision, the ruler sets it as high as possible. Hence, we have $\tau^{dic} = \bar{\tau}$ regardless of the good and the bad dictator. The dictator expropriates all outputs if possible. Although the good

dictator is willing to encourage the citizen to invest, she can not use the tax rate as the policy tool. As long as she controls all political power in her hand, citizens are never convinced by the commitment of tax reduction and increase their investment. We assume that there is a highest tax rate $\bar{\tau} < 1$ in order to avoid the corner solution, where the tax rate is 1 and nobody invests.

Citizens decide whether to invest or not with the expectation that the tax rate will be set at the highest level. It is clear that the citizen with the lowest ability ($\varepsilon = 0$) does not invest regardless of the tax rate. We assume that the citizen with the highest ability ($\varepsilon = 1$) will invest under the highest tax rate. Then we need following assumption:

$$\frac{e}{\lambda - 1} < 1 - \bar{\tau} \quad (\text{A.1})$$

Hence, there is a citizen with ability $0 < \beta < 1$, who is indifferent between investment and not. As we assumed, the bad ruler simply consumes all tax income and sets the social transfer at $s_i = 0 \forall i$. β^{bad} , reflecting this breakeven point in the bad dictatorship, satisfies the following condition:

$$Y_{\beta,t}(invest) = Y_{\beta,t}(no\ invest)$$

Leads to: $A_t \lambda \beta (1 - \bar{\tau}) - e A_t = A_t \beta (1 - \bar{\tau})$

We get:
$$\beta^{bad} = \frac{e}{(\lambda - 1)(1 - \bar{\tau})} \quad (4)$$

Substituting $\tau^{dic} = \bar{\tau}$, $s_i = 0 \forall i$, and β^{bad} in (2) and (3), incomes of the ruler and the citizen i in the bad dictatorship are then determined, respectively:

$$Y_{ruler,t}^{bad} = \frac{1}{2} \bar{\tau} A_t \left(\lambda - \frac{e^2}{(\lambda - 1)(1 - \bar{\tau})^2} \right) \quad (5)$$

$$Y_{i,t}^{bad} = \begin{cases} A_t i (1 - \bar{\tau}) & i < \beta^{bad} \\ A_t \lambda i (1 - \bar{\tau}) - e A_t & i \geq \beta^{bad} \end{cases} \quad (6)$$

The aggregate output of citizens is as follows:

$$Y_{citizen,t}^{bad} = A_t \left(\frac{\lambda(1-\bar{\tau})}{2} - e + \frac{e^2}{2(\lambda-1)(1-\bar{\tau})} \right) \quad (7)$$

The aggregate output of the whole society Y_t^{bad} is the sum of $Y_{citizen,t}^{bad}$ and $Y_{ruler,t}^{bad}$:

$$Y_t^{bad} = A_t \left(\frac{\lambda}{2} - e + \frac{e^2(1-2\bar{\tau})}{2(\lambda-1)(1-\bar{\tau})^2} \right) \quad (8)$$

Contrary to the bad dictator, the good one is willing to invest in public projects to encourage the private investment. We model this public investment as the group-specific social transfer implemented before the private investment decision. It is clear that the ruler is willing to give the positive social transfer only to the citizen who will invest, because the ruler can then benefit from the enlargement of the investment ratio. The social transfer to the non-investing citizen can not generate any benefit to the ruler. Hence, $s_i^{good} = 0, i < \beta^{good}$ and $s_i^{good} = s^{good} > 0, i \geq \beta^{good}$. This leads to:

$$\beta^{good} = \frac{eA_t - s^{good}}{A_t(\lambda-1)(1-\bar{\tau})} \quad (9)$$

The ruler chooses the optimal transfer s^{good} in order to maximize her income:

$$\begin{aligned} \underset{s}{Max} \quad Y_{ruler} &= \tau \int_0^1 y_i di - (1-\beta)s \\ &= \frac{1}{2} \tau A_t [\lambda + (1-\lambda)\beta^2] - (1-\beta)s \end{aligned} \quad (10)$$

Substitute $\beta = \frac{eA_t - s}{A_t(\lambda-1)(1-\bar{\tau})}$ and recall the assumption that the social transfer is non-

negative, we get s from the first order condition:

$$s = \begin{cases} 0 & \text{if } (1-\bar{\tau})^2 \geq \frac{e}{\lambda-1} \\ A_t \frac{e - (\lambda-1)(1-\bar{\tau})^2}{2-\bar{\tau}} & \text{if } (1-\bar{\tau})^2 < \frac{e}{\lambda-1} \end{cases} \quad (11)$$

The second order condition satisfies. If $(1-\bar{\tau})^2 \geq \frac{e}{\lambda-1}$, then the dictator likes to be bad.

Proposition 1

If the private investment has no external effect on the aggregate technical level A_t , the dictator will be bad if $(1-\bar{\tau})^2 \geq \frac{e}{\lambda-1}$; she will be good if $(1-\bar{\tau})^2 < \frac{e}{\lambda-1}$.

Rearranging the condition $(1-\bar{\tau})^2 < \frac{e}{\lambda-1}$ and substituting (4) in it, we have $1-\beta^{bad} < \bar{\tau}$.

$1-\beta^{bad}$ is the investment ratio in the bad dictatorship, and $\bar{\tau}$ represents the expropriation level. If the private investment is not so attractive for citizens, i.e., $1-\beta^{bad}$ is very low, the ruler has the incentive to be good in order to encourage citizens to invest. As expected, if the expropriation level declines, the ruler is less likely to be good. Because $1-\beta^{bad}$ strictly decreases in $\bar{\tau}$, we have a unique $\bar{\tau}^*$, so that $1-\beta^{bad}(\bar{\tau}^*) = \bar{\tau}^*$. For all $\bar{\tau} \leq \bar{\tau}^*$, the dictator is bad, and for all $\bar{\tau} > \bar{\tau}^*$ vice versa.

If the condition for being good is satisfied, the good dictator sets a positive social transfer s^{good} to the citizen who will invest. Substituting (11) in (9), we obtain:

$$\beta^{good} = \frac{e + (\lambda - 1)(1 - \bar{\tau})}{(\lambda - 1)(2 - \bar{\tau})} \tag{12}$$

It is easy to see that $\beta^{good} < \beta^{bad}$, i.e., more citizens invest. The incomes of the ruler and citizens in the good dictatorship are given as follows:

$$Y_{ruler,t}^{good} = \frac{A_t \bar{\tau}}{2} + \frac{A_t (\lambda - 1 - e)^2}{2(\lambda - 1)(2 - \bar{\tau})} \tag{13}$$

$$Y_{i,t}^{good} = \begin{cases} A_t i (1 - \bar{\tau}) & i < \beta^{good} \\ A_t \lambda i (1 - \bar{\tau}) - e A_t + s^{good} & i \geq \beta^{good} \end{cases} \tag{14}$$

For citizens, the good dictator has two effects: first, the individual who invests can earn more due to the positive social transfer; second, the positive social transfer decreases the entry

barrier of the investment, hence, more citizens invest. Of course the citizen who does not invest can not increase her income in the good dictatorship.

Proposition 2:

If condition $(1-\bar{\tau})^2 < \frac{e}{\lambda-1}$ holds, the transition from the bad to the good dictatorship is a Pareto-improving process. More citizens invest, the aggregate output increases, and all agents have a higher or at least the same income.

Proof: see Appendix 1.

2.3 Democracy:

In the democratic society, the tax rate is determined by all citizens through “one-person-one-vote” majority voting system. The tax revenue is equally distributed to every citizen. Hence, the median voter is the deciding person. She maximizes her income $Y_{0.5,t}$, subject to the budget constraint of redistribution:

$$\begin{aligned} \underset{\tau}{Max} Y_{0.5,t} &= 0.5A_t\lambda^{0.5}(1-\tau) + s - I_{0.5}eA_t \\ s.t. \quad T &= \tau \int_0^1 y_{i,t} di = 0.5\tau A_t(\beta^2 + \lambda - \lambda\beta^2) \end{aligned}$$

There are two cases:

- 1) If $\beta > 0.5$, i.e., the median voter doesn't invest. Hence, her maximization problem reduces to:

$$\underset{\tau}{Max} Y_{0.5,t} = 0.5A_t(1-\tau) + 0.5\tau A_t(\beta^2 + \lambda - \lambda\beta^2)$$

The first order condition is:

$$\frac{\partial Y_{0.5,t}}{\partial \tau} = -0.5A_t + 0.5A_t(\beta^2 + \lambda - \lambda\beta^2) = 0.5A_t(\lambda - 1)(1 - \beta^2) > 0$$

Hence $\tau^{dem,1} = \bar{\tau}$.

In order to solve $\beta^{dem,1}$, we have:

$$Y_{i,t}(invest) = Y_{i,t}(no\ invest) \Leftrightarrow A_t\lambda\beta(1-\bar{\tau}) - eA_t + s = A_t\beta(1-\bar{\tau}) + s$$

We get:
$$\beta^{dem,1} = \frac{e}{(\lambda-1)(1-\bar{\tau})} \quad (15)$$

And:
$$s^{dem,1} = \frac{1}{2}\bar{\tau}A_t \left(\lambda - \frac{e^2}{(\lambda-1)(1-\bar{\tau})^2} \right) \quad (16)$$

Hence,
$$Y_{i,t}^{dem,1} = \begin{cases} A_t i(1-\bar{\tau}) + s^{dem,1} & i < \beta^{dem,1} \\ A_t \lambda i(1-\bar{\tau}) - eA_t + s^{dem,1} & i \geq \beta^{dem,1} \end{cases} \quad (17)$$

If the condition $\beta^{dem,1} = \frac{e}{(\lambda-1)(1-\bar{\tau})} > \frac{1}{2}$ holds, democracy is able to decrease the inequality (comparing (17) and (6)). However, the aggregate output is same as that of the bad dictatorship.

2) If $\beta \leq 0.5$, the median voter invests. Her maximization problem is then:

$$\text{Max}_{\tau} Y_{0.5,t} = 0.5A_t\lambda(1-\tau) + 0.5\tau A_t(\beta^2 + \lambda - \lambda\beta^2) - eA_t$$

The first order condition is:

$$\frac{\partial Y_{0.5}}{\partial \tau} = -0.5A_t\lambda + 0.5A_t(\beta^2 + \lambda - \lambda\beta^2) = 0.5A_t(1-\lambda)\beta^2 < 0$$

Hence, $\tau^{dem,2} = 0$ and $s^{dem,2} = 0$.

We get:
$$\beta^{dem,2} = \frac{e}{\lambda-1} \quad (18)$$

$$Y_{i,t}^{dem,2} = \begin{cases} A_t i & i < \beta^{dem,2} \\ A_t \lambda i - eA_t & i \geq \beta^{dem,2} \end{cases} \quad (19)$$

The aggregate output is as follows:

$$Y_t^{dem,2} = A_t \left(\frac{\lambda}{2} - e + \frac{e^2}{2(\lambda-1)} \right) \quad (20)$$

If the condition $\beta^{dem,2} = \frac{e}{(\lambda-1)} \leq \frac{1}{2}$ holds, democracy is able to increase the aggregate output.

This is because the tax rate is set at the lowest level. Individuals are encouraged to invest.

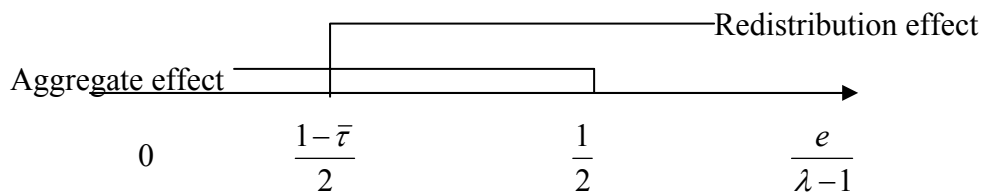


Figure 1: Effects of democracy

These two cases are summarized in Figure 1. The tax rate and the investment ratio in the democratic society depend on the behavior of the median voter. If she finds that it is not worth to invest (this is the case $\frac{e}{\lambda-1} > \frac{1}{2}$), then she supports a higher tax rate (here, $\tau^{dem,1} = \bar{\tau}$). It is same as the tax rate in the bad dictatorship, although it represents the redistribution level, not the expropriation level. They have the same impact on the individuals' investment decision. Therefore, the democratic society suffers also a lower investment ratio. If $\frac{e}{\lambda-1} \leq \frac{1-\bar{\tau}}{2}$, i.e., the investment is attractive enough for the median voter, then she supports a lower tax rate (here, $\tau = 0$). Consequently, the economy enjoys a higher output level due to a higher investment ratio. If $\frac{1-\bar{\tau}}{2} < \frac{e}{\lambda-1} \leq \frac{1}{2}$, the median voter has two choices. Whether the investment is worthwhile to implement depends on her choice of the tax rate. If she decides to support a higher tax rate after production, she knows also the investment is worthless to undertake. Hence, she chooses not to invest before production. All other citizens observe her investment choice and expect that she will support a higher tax rate after production. Hence, the investment ratio is at the lower level. Vice versa, if she would like to invest, then she must choose a lower tax rate after investment. Thus, two possible investment ratios and redistribution schemes could be achieved: $(\beta^{dem,1}, \bar{\tau}, s^{dem,1})$, $(\beta^{dem,2}, 0, 0)$. Which one is actually chosen by the median voter depends on parameters.

Proposition 3:

- 1) If $\frac{e}{\lambda-1} \leq \frac{1-\bar{\tau}}{2}$, democracy can increase the aggregate output, and if $\frac{e}{\lambda-1} > \frac{1}{2}$ democracy can only decrease inequality, but can not increase the aggregate output.
- 2) The impact of democracy is ambiguous in the moderate case of $\frac{1-\bar{\tau}}{2} < \frac{e}{\lambda-1} \leq \frac{1}{2}$, where two possibilities exist: $(\beta^{dem,1}, \bar{\tau}, s^{dem,1})$ and $(\beta^{dem,2}, 0, 0)$. The median voter will choose $(\beta^{dem,2}, 0, 0)$, if $\bar{\tau} \geq \frac{2\beta^{dem,1} - 1}{(1 + \beta^{dem,1})^2 - 2}$.

Proof: The first part is already clear. The second part is easy to see, if we compare the incomes of the median voter in two cases. She will choose $(\beta^{dem}, 0, 0)$, if it generates higher

income for her. I.e., $Y_{0.5}^{dem,2} - Y_{0.5}^{dem,1} \geq 0 \Leftrightarrow \bar{\tau} \geq \frac{2\beta^{dem,1} - 1}{(1 + \beta^{dem,1})^2 - 2}$.

Unfortunately, $\frac{2\beta^{dem,1}-1}{(1+\beta^{dem,1})^2-2}$ depends on $\bar{\tau}$. Hence, the economic meaning of this condition is not very intuitive. However, notice that $\frac{2\beta^{dem,1}-1}{(1+\beta^{dem,1})^2-2} < \frac{1}{2}$. Thus, the sufficient condition is $\bar{\tau} \geq \frac{1}{2}$, i.e., the median voter will choose $(\beta^{dem}, 0, 0)$ if the highest tax rate is high enough.

The existence of multiple effects is consistent with the literature of political economy, which emphasizes the different effects of democracy on the economic performance. Democracy normally induces higher redistribution level, which impedes the incentive to invest. On the other hand, democracy also protects the expropriation through the strong rule of law, which is good for economic performance. In the current model we argue that both could occur in different circumstances. The case of $(\beta^{dem,2}, 0, 0)$ indicates the positive impact of democracy on economic performance, because democracy protects private investment from expropriation. On the other hand, the case of $(\beta^{dem,1}, \bar{\tau}, s^{dem,1})$ reflects the negative impact of democracy on economic growth owing to the high tax rate. However, this negative effect has different economic meaning, compared to that of the bad dictatorship $(\beta^{bad}, \bar{\tau}, 0)$. Whereas the former is pure redistribution, the latter is pure expropriation. Proposition 3 shows us that precisely which case occurs in the moderate case depends on parameters, in particular, the highest level of the tax rate, $\bar{\tau}$. It reflects how large the political power is able to influence the economic performance. If it is large enough ($\bar{\tau} \geq \frac{1}{2}$), individuals try to avoid the redistribution and choose the lower tax rate. Hence, democracy has an aggregate effect on economic performance. For our purposes, it is more interesting to restrict attention to this case, i.e. $(\beta^{dem,2}, 0, 0)$. Hence, we assume $\frac{e}{\lambda-1} \leq \frac{1}{2}$ and $\bar{\tau} \geq \frac{1}{2}$ for simplicity. Combining with above (A.1), we need following assumption:

$$\frac{e}{\lambda-1} \leq 1-\bar{\tau} \quad \text{and} \quad \bar{\tau} \geq \frac{1}{2} \quad (\text{A.2})$$

We focus on the case where democracy has an aggregate effect, because we assume in the present paper that the transition of political institutions depends on the expenditure on

weapons. The pure redistributive democratization $(\beta^{dem,1}, \bar{\tau}, s^{dem,1})$ means that the expenditure of the ruler on weapons is more than that of the citizen net of the democratization cost.⁹ Hence, such “revolution” is impossible.

Combining the condition $(1 - \bar{\tau})^2 < \frac{e}{\lambda - 1}$ and Assumption (A.2), we have:

The “goodness” ASSUMPTION: $(1 - \bar{\tau})^2 < \frac{e}{\lambda - 1} \leq 1 - \bar{\tau} \leq \frac{1}{2}$

This assumption is the sufficient condition of a good democracy in the sense that it has the aggregate effect, and the condition of a good dictatorship. That is why we call it the “goodness” assumption. Since $\beta^{dem,2} < \beta^{good}$, the good democracy leads to a better economic performance than the good dictatorship. However, democratization is a social conflict, while the transition from the bad dictatorship to the good one is Pareto-improving.

3. Democratization:

The process of democratization is modeled as a sequential game with perfect information in the present paper. The citizen decides whether to revolt, then the ruler decides whether to repress. Both revolution and repression need weapons. The citizen attempts to undertake a revolution, if she expects that a higher income could be earned in a democratic society. Hence, if necessary, the citizen will offer the difference of her incomes in two political states as the highest payment for the weapon. Similarly, the dictator is willing to use her whole income to prevent the possible political transition, because she will lose all in the democratic society. Although the dictator is willing to offer the whole life-time income, she can not do so because we assume that the perfect finance market acts well only within one period. This assumption simplifies the analysis without loss of generality. Moreover, there is a revolution cost c for citizens. Hence, citizens don’t invest in weapons if they expect that the ruler is able to invest more than their highest payments in weapons net of the revolution cost. If they find that the ruler’s income is lower than their highest payment for weapons net of the revolution cost, their best choice is to invest in weapons a little more than the ruler’s income. Thus we need only to compare the highest payments of both players for weapons, which are named the

⁹ For more details, see section 3.

incentive of political transition. Revolution is the best choice for the citizen if and only if the citizens' incentive to revolt net of the revolution cost is higher than the incentive of the ruler to repress. For simplicity, we assume that the citizen will choose revolution when both are equal.

There are two possible democratization processes: from the bad dictatorship directly to democracy, and from the bad dictatorship indirectly to democracy via the good dictatorship.

3.1 The incentive of political transition in the bad dictatorship

The highest payment of citizen i in time t is the difference between incomes in the bad dictatorship and the democratic society within t :

$$P_{i,t}^{bad} = \begin{cases} A_t \lambda i \bar{\tau} & i \geq \beta^{bad} \\ A_t (\lambda - 1) i - e A_t + A_t i \bar{\tau} & i \in (\beta^{dem}, \beta^{bad}) \\ A_t i \bar{\tau} & i \leq \beta^{dem} \end{cases} \quad (21)$$

The first part ($A_t \lambda i \bar{\tau}$) is the expropriated income of the citizen who invests in both political states. The second difference of incomes ($A_t (\lambda - 1) i - e A_t + A_t i \bar{\tau}$) comes from the citizen who invests in democracy but not in the bad dictatorship. The benefit of democracy for this group of citizens comes from two sides: the release of the expropriating taxation ($A_t i \bar{\tau}$), and the investment return ($A_t (\lambda - 1) i - e A_t$). Finally, the citizen, who invests neither in democracy nor the bad dictatorship, saves the tax in democracy ($A_t i \bar{\tau}$). The sum of individual offers net of the revolution cost is the citizens' highest net expenditure on weapons.

$$P_{citizen,t}^{bad} = \int_0^1 P_{i,t}^{bad} di - c = \frac{A_t \lambda \bar{\tau}}{2} - \frac{A_t e^2 \bar{\tau}}{2(\lambda - 1)(1 - \bar{\tau})} - c \quad (22)$$

For the ruler:
$$P_{ruler,t}^{bad} = Y_{ruler,t}^{bad} = \frac{1}{2} \bar{\tau} A_t \left(\lambda - \frac{e^2}{(\lambda - 1)(1 - \bar{\tau})^2} \right) \quad (23)$$

The difference of payments between the citizen and the dictator determines whether the revolution will succeed:

$$\Delta_t^{bad} = P_{citizen,t}^{bad} - P_{ruler,t}^{bad} = \frac{A_t e^2 \bar{\tau}^2}{2(\lambda - 1)(1 - \bar{\tau})^2} - c \quad (24)$$

If $\Delta_t^{bad} \geq 0$, the aggregate highest payment of citizens exceeds that of the ruler. Hence, citizens choose revolution and expend a little more on weapons than the highest payment of the ruler. The ruler knows the repression will not be successful, thus, the actual repression does not occur. If $\Delta_t^{bad} < 0$, citizens know that the revolution will be repressed, hence, they don't choose to revolt. We assume the society begins from the non-democracy. Hence, at the beginning period ($t = 0$), Δ_0^{bad} is negative. We have the following assumption:

The “status quo” ASSUMPTION: $\frac{A_0 e^2 \bar{\tau}^2}{2(\lambda - 1)(1 - \bar{\tau})^2} < c$

Equation (24) has the following important indications. First, $\bar{\tau}$ reflects the expropriation level. The higher $\bar{\tau}$, the bigger incentive for citizens to undertake democratization. Second, as the most political economy literature argues, e.g. the Lipset/Aristotle hypothesis, democracy follows the economic growth. Here, the economic growth rate is given by the exogenous growth rate of the aggregate technical level A_t . With A_t growing, the benefit from revolution increases. Third, the effects of the investment project on the incentive of democratization is demonstrated by the parameters e and λ . The more beneficial the project (i.e. the lower e and/or the higher λ), the lower the incentive to democratize. The first part of equation (24) is from the investment return of the “middle class”, who invests in democracy but not in dictatorship, i.e., $\int_{\beta^{dem}}^{\beta^{bad}} ((\lambda - 1)i - e) di$. The citizen of “middle class” has a higher incentive to revolt, if λ increases and/or e declines. However, the size ($\beta^{bad} - \beta^{dem}$) of this group decreases in λ . The more beneficial the investment project, the smaller the aggregate effect of democracy. Hence, the net social incentive (Δ_t^{bad}) decreases. This relationship between economic performance and political transition is possibly supported by the reality. Political scientists (e.g., Ross 2001) believe that oil and other nature resources impede democratization. In this framework, we can argue that a country's oil wealth increases the return rate of the private investment. Hence, the size of middle class shrinks. Such societies have a lower incentive to democratize.

Proposition 4:

In the bad dictatorship, the incentive of democratization increases in the economy growth (A_t). The higher the expropriation level ($\bar{\tau}$), the greater is the incentive of revolution. The net social incentive of democratization decreases in the return of the investment project and increases in its cost.

3.2 The incentive of political transition in the good dictatorship

For the good dictator the positive social transfer increases the tax revenue. Hence, she has more incentive to prevent the revolution than the bad dictator:

$$P_{ruler,t}^{good} = \frac{A_t \bar{\tau}}{2} + \frac{A_t (\lambda - 1 - e)^2}{2(\lambda - 1)(2 - \bar{\tau})} \quad (25)$$

The democratization incentive of citizens is as follows:

$$P_{i,t}^{good} = \begin{cases} A_t \lambda i \bar{\tau} - s^{good} & i \geq \beta^{good} \\ A_t (\lambda - 1) i - e A_t + A_t i \bar{\tau} & i \in (\beta^{dem}, \beta^{good}) \\ A_t i \bar{\tau} & i \leq \beta^{dem} \end{cases} \quad (26)$$

The poor who don't invest in both political states suffer the expropriative taxation in the dictatorship. Hence, she prefers to undertake revolution. Here, we model this as a positive payment $A_t i \bar{\tau}$ for weapons. For the middle class who invest in democracy but not in the good dictatorship, they support democratization, because they can earn more in democratic society¹⁰. However, *a priori*, it is unclear whether the rich, who invest both in the good dictatorship and democracy, support democracy or not. If their payment for political transition $A_t \lambda i \bar{\tau} - s^{good}$ is negative, they can earn more in the good dictatorship and become the supporter of this political institution.

¹⁰ $A_t (\lambda - 1) i - e A_t + A_t i \bar{\tau} = A_t [(\lambda - 1 + \bar{\tau}) i - e] > A_t [(\lambda - 1 + \bar{\tau}) \beta^{dem} - e] > 0$

Proposition 5:

The citizen with the highest ability 1 always supports democracy, whereas some of the rich, who invest both in the good dictatorship and democracy, could support the dictatorship under certain conditions.

Proof: see Appendix 2.

This Proposition indicates that the dictator can extend the social base of the regime through the positive social transfer. A little surprisingly, the group who possibly supports the regime is not the one with the highest ability, but the group with relatively lower ability, although their ability great enough to let them invest in both dictatorship and democracy. In this sense, the “top rich” is not the friend of the good dictator.

Again, $P_{citizen,t}^{good} = \int_0^1 P_{i,t}^{good} di - c$ and the aggregate incentive of democratization of the whole society is:

$$\begin{aligned}\Delta_t^{good} &= P_{citizen,t}^{good} - P_{ruler,t}^{good} \\ &= A_t \frac{(\lambda - 1 - e)^2 (1 - \bar{\tau})^2}{2(\lambda - 1)(2 - \bar{\tau})^2} - c\end{aligned}\quad (27)$$

Proposition 6:

1) In the good dictatorship, the incentive of democratization increases in the aggregate technical level. The higher the expropriation level, the less the incentive of revolution is. The net social incentive of democratization increases in the return of the investment project and decreases in its cost.

2) Because of Pareto-improving social transfer the incentive of democratization in the good dictatorship is lower than the bad one.

Proof: 1) It is clear that $\frac{\partial \Delta_t^{good}}{\partial A_t} > 0$, $\frac{\partial \Delta_t^{good}}{\partial \bar{\tau}} < 0$, $\frac{\partial \Delta_t^{good}}{\partial \lambda} > 0$, $\frac{\partial \Delta_t^{good}}{\partial e} < 0$.

$$2) \Delta_t^{bad} = P_{citizen,t}^{bad} - P_{ruler,t}^{bad} = \int_0^1 (Y_{i,t}^{dem} - Y_{i,t}^{bad}) di - c - Y_{ruler,t}^{bad}$$

$$\Delta_t^{good} = P_{citizen,t}^{good} - P_{ruler,t}^{good} = \int_0^1 (Y_{i,t}^{dem} - Y_{i,t}^{good}) di - c - Y_{ruler,t}^{good}$$

$$\Delta_t^{bad} - \Delta_t^{good} = \left(\int_0^1 Y_{i,t}^{good} di - \int_0^1 Y_{i,t}^{bad} di \right) + \left[Y_{ruler,t}^{good} - Y_{ruler,t}^{bad} \right] > 0$$

It is of interest to see that the effects of investment and the tax rate on the incentive of revolution are different between the bad and the good dictatorship. Analogously, the first term of (27) is also from the investment return of the “middle class”, i.e., $\int_{\beta^{dem}}^{\beta^{good}} ((\lambda - 1)i - e)di$. The size $(\beta^{good} - \beta^{dem})$ of this group decreases, if λ increases and/or e declines. However, this effect is smaller than the effect on the investment return $(\lambda - 1)i - e$. Hence, the net social incentive (Δ_t^{good}) increases. In the good dictatorship, taxation is the mixture of redistribution and expropriation. The increase of the highest tax rate implies that the social base of the dictatorship could enlarge. Hence, the incentive for democratization declines.

Improvement of the citizen’s income due to the positive social transfer decreases their incentive to change the political state, whereas the good dictator resists the democratization more than the bad one because of the higher economic benefit. Hence, given the technical level, we argue that the opportunity of democratization decreases in the economic performance during the transition from the bad dictatorship to the good. However, it does not directly contradict the Lipset/Aristotle hypothesis. As we have seen, if the economy grows with the technical level, the society has a higher incentive to become a democracy. In the following section, we consider the external effect of the individual’s investment on the aggregate technical level and demonstrate that the technical progress enlarges the income difference between dictatorship and democracy.

4. External Effect and Endogenous Growth

So far the aggregate technical level, as well as the long run economic growth, is given exogenously. The dictator would be good if she finds that the positive social transfer can increase her instantaneous income. In other words, we assume that the behavior of the dictator can affect the short run economic performance, but not on the long run economic growth. Now we extend our simple model to adopt the endogenous technical progress. As the standard endogenous growth theory,¹¹ the aggregate technical level, in turn, the economic growth rate increases in the investment ratio $1 - \beta$. We assume for simplicity that the private investment has an positive externality on the aggregate technical level, i.e., $A_t = A_{t-1}(1 + g(\beta))$, where

¹¹ There are two main approaches to model the role of human capital in economic growth: Lucas (1988) emphasizes the externality of human capital in production; Nelson and Phelps (1966), Romer (1990), Grossman and Helpman (1991), and Aghion and Howitt (1992) argue that the human capital will induce more innovation or let the economy easily accept new technology.

$g(\beta)$ is the growth rate of the aggregate technical level, $g'(\beta) < 0$. From equations (24) and (27) we know that the higher growth rate of technical level leads to a sooner political transition. Hence, there could be a tradeoff for the ruler between a greater benefit in the short run and relatively faster democratization in the long run.

After investment the aggregate productive ability increases from $\frac{1}{2}$ to $\frac{\lambda - \beta^2(\lambda - 1)}{2}$. In order to make the analysis tractable, we assume for simplicity that the aggregate technical level grows at the same rate as $\lambda - \beta^2(\lambda - 1)$, i.e., the individual productive ability becomes the public good in the next period. Here we consider only the steady-state, where $s = A_t S$, and S is same in every period. Hence,

$$A_t = A_{t-1}(\lambda - \beta^2(\lambda - 1)) = A_{t-1}\left(\lambda - \frac{(eA_{t-1} - s)^2}{A_{t-1}^2(\lambda - 1)(1 - \bar{\tau})^2}\right) \equiv A_{t-1}(1 + g(S)) \quad (28)$$

The life-time of the dictator, denoted by T , is the root of $\Delta_t = 0$. As we know from (24) and (27), $\Delta_t = A_t \int_{\beta^{dem}}^{\beta^{dic}} ((\lambda - 1)i - e) di - c$. The dictator maximizes her life-time income R_{ruler} as follows:

$$\text{Max}_S R_{ruler} = \sum_{t=0}^{T(S)} Y_{ruler,t}(S) \quad (29)$$

The first order condition is:

$$\frac{dR_{ruler}}{dS} = Y_{ruler,T(S)} \frac{dT}{dS} + \sum_{t=0}^T \frac{dY_{ruler,t}}{dS} = 0 \quad (30)$$

where $\frac{dY_{ruler,t}}{dS} = \frac{dA_t}{dS} Y_{ruler}^{exg} + A_t \frac{dY_{ruler}^{exg}}{dS}$ and $Y_{ruler}^{exg} = \frac{1}{2} \tau [\lambda + (1 - \lambda)\beta^2] - (1 - \beta)S$. Recall that the optimal social transfer S^* in the exogenous growth case is given by $\frac{dY_{ruler}^{exg}}{dS} = 0$ (see equation

(10)). $Y_{ruler,T(S)} \frac{dT}{dS}$ is the long run effect of social transfer, i.e., the effect on the life-time of

the dictator, whereas $\frac{dA_t}{dS} Y_{ruler}^{exg}$ represents the short run effect of social transfer, i.e., the effect on the instantaneous income of the dictator. We know from (28) that $\frac{dA_t}{dS} > 0$, hence, the short run effect is positive. If $\frac{dT}{dS} < 0$, then the positive social transfer leads to a shorter life-time of the dictator. Hence, the dictator faces a trade-off between the increase in her instantaneous income (positive short run effect) and the decrease in her life-time (negative long run effect), if she implements the positive social transfer. Comparing to the exogenous growth case, the dictator becomes better if the positive short run effect of social transfer is greater than the negative long run effect, whereas she becomes worse if the effect of sooner democratization is dominant. In the latter case, the optimal transfer in the endogenous growth case $S^{**} < S^*$.

Proposition 7

If the revolution cost c is not very small, here, $\frac{2c}{A_0} > \max\left\{\lambda, \frac{e^2 \bar{\tau}^2}{(\lambda-1)(1-\bar{\tau})^2}\right\}$, then the good dictator faces a trade-off between the short run benefit through the positive social transfer and the long run cost in the sense of shorter life-time.

Proof: see Appendix 3.

The positive social transfer affects the life-time of the dictator through two channels: the income of citizens increases in S , hence, the incentive to revolt decreases, then the ruler can live longer; on the other hand, the positive social transfer increases the investment ratio, which has a positive external effect on the long run economic growth, hence, the dictator faces a greater risk of revolution and her life-time becomes shorter. If the revolution cost is big enough, the life-time is also long enough. The external effect on the economic growth is dominant. In other words, the external effect on the growth rate needs time to present. If the dictator faces an urgent revolution risk, she may have a higher incentive to share the tax revenue with her citizens. This prediction can be used to explain the different reform time between China and the USSR. After “the big revolution of culture”, the Chinese regime faced an unstable society, whereas the USSR has a relative good development in 60’s and 70’s. Hence, the democratization seemed much easier in China than in the USSR. We can model this by a lower c in China and a higher c in the USSR. Because of the lower revolution cost, the Chinese regime had a higher incentive to implement reform, whereas the USSR faced a

long run negative effect. Hence, China began the reform at the end of 70's and almost 15 years before the USSR.

5. Summary

In the current paper we discuss the determinants of the dictator's incentive to be good in the sense that she would like to share the tax income with certain citizens. We emphasize two important effects of the private investment in production: the individual effect which improves the private output, and the positive externality on the aggregate technical level. We find that the dictator would more likely be good if the individual faces a less profitable investment project. The dictator's incentive to be good is to expropriate more through encouraging citizens to invest more. After endogenizing the growth rate, we find two different effects of economic performance on the democratization. The good dictatorship is able to reduce the incentive of revolution through increasing the citizens' investment ratio and their income, but it is also possible to lead to an earlier democratization because of the higher economic growth rate. If the revolution cost is great enough, the long run negative effect is dominant. Hence, the dictator has less incentive to be good.

Appendix

Appendix 1:

It is already clear that citizens can get more under the good dictatorship than the bad one. Because the citizen who invests can get subsidy from the dictator, and the citizen who does not invest does not lose anything. Now we check whether the good ruler can have more tax income than the bad one.

$$\begin{aligned}
 Y_{ruler}^{good} &\geq Y_{ruler}^{bad} \\
 \Leftrightarrow \frac{A\bar{\tau}}{2} + \frac{A[(\lambda-1)-e]^2}{2(\lambda-1)(2-\bar{\tau})} &\geq \frac{\bar{\tau}A}{2} \left(\lambda - \frac{e^2}{(\lambda-1)(1-\bar{\tau})^2} \right) \\
 \Leftrightarrow 1 + \frac{[(\lambda-1)-e]^2}{\bar{\tau}(\lambda-1)(2-\bar{\tau})} &\geq \lambda - \frac{e^2}{(\lambda-1)(1-\bar{\tau})^2} \\
 \Leftrightarrow \frac{[(\lambda-1)-e]^2}{\bar{\tau}(\lambda-1)(2-\bar{\tau})} + \frac{e^2}{(\lambda-1)(1-\bar{\tau})^2} &\geq \lambda - 1 \\
 \Leftrightarrow [(\lambda-1)(1-\bar{\tau})^2 - e]^2 &\geq 0
 \end{aligned}$$

Hence, the income of ruler increases in the transition from the bad dictatorship to the good one. That is why we say that this transition is Pareto-improving process.

Appendix 2:

The payments of citizens whose ability over β^{good} are:

$$P_{i,t}^{good} = A_t \lambda \bar{\tau} i - s^{good} = A_t \left(\lambda \bar{\tau} i - \frac{e - (\lambda-1)(1-\bar{\tau})^2}{2-\bar{\tau}} \right)$$

In order to determine the political attitude of this group of citizens, we should check whether $A_t \lambda \bar{\tau} i - s^{good}$ is positive or not.

For the person with ability 1, the payment is:

$$P_{1,t}^{good} = A_t \left(\lambda \bar{\tau} - \frac{e - (\lambda-1)(1-\bar{\tau})^2}{2-\bar{\tau}} \right) \geq A_t \left(\lambda \bar{\tau} - \frac{\lambda - 1 - (\lambda-1)(1-\bar{\tau})^2}{2-\bar{\tau}} \right) = A_t \bar{\tau} > 0$$

Hence, the citizen with ability 1 always supports democracy.

For the person with ability β^{good} , the payment is:

$$P_{\beta^{good},t}^{good} = A_t(\lambda\bar{\tau}\beta^{good} - \frac{e - (\lambda-1)(1-\bar{\tau})^2}{2-\bar{\tau}}) = A_t \frac{e(\lambda\bar{\tau} - \lambda + 1) + (\lambda-1)(1-\bar{\tau})(\lambda + \bar{\tau} - 1)}{(\lambda-1)(2-\bar{\tau})}$$

If conditions $\lambda > \frac{1}{1-\bar{\tau}}$ and $e > \frac{(\lambda-1)(1-\bar{\tau})(\lambda + \bar{\tau} - 1)}{\lambda - \lambda\bar{\tau} - 1}$ are satisfied, $P_{\beta^{good},t}^{good}$ is negative. It implies that there is $i^* \in (\beta^{good}, 1)$, $\forall i \in (\beta^{good}, i^*) P_{i,t}^{good} < 0$ and $\forall i \in [i^*, 1] P_{i,t}^{good} \geq 0$. Hence, the citizen $\forall i \in (\beta^{good}, i^*)$ becomes the supporter of the good dictatorship under conditions $\lambda > \frac{1}{1-\bar{\tau}}$ and $e > \frac{(\lambda-1)(1-\bar{\tau})(\lambda + \bar{\tau} - 1)}{\lambda - \lambda\bar{\tau} - 1}$.

Appendix 3:

We need to prove $\frac{dT}{dS} < 0$.

At the time of revolution, the weapon expenditure of citizens is same as that of the ruler,

hence, we have $\Delta_T = A_T \int_{\beta^{dem}}^{\beta^{dic}} ((\lambda-1)i - e)di - c = 0$.

It is equivalent to: $\frac{(e\bar{\tau} - S)^2}{2(\lambda-1)(1-\bar{\tau})^2} A_0(1+g(S))^T - c = 0$.

We define $\psi(T, S) \equiv \frac{(e\bar{\tau} - S)^2}{2(\lambda-1)(1-\bar{\tau})^2} A_0(1+g(S))^T - c$.

$$\text{Hence } \frac{dT}{dS} = -\frac{\frac{\partial \psi}{\partial S}}{\frac{\partial \psi}{\partial T}} = 2 \frac{1+g(S) - T \frac{(e-S)(e\bar{\tau} - S)}{(\lambda-1)(1-\bar{\tau})^2}}{(1+g(S))(e\bar{\tau} - S) \ln(1+g(S))} \quad (\text{A3.1})$$

If $e\bar{\tau} - S < 0$, then $\frac{dT}{dS} < 0$. The proof is over.

If $e\bar{\tau} - S > 0$, then $\frac{dT}{dS} < 0 \Leftrightarrow 1+g(S) < T \frac{(e-S)(e\bar{\tau} - S)}{(\lambda-1)(1-\bar{\tau})^2}$.

Substitute $1+g(S) = \lambda - \frac{(e-S)^2}{(\lambda-1)(1-\bar{\tau})^2}$ and $T = \frac{\ln(\frac{2c(\lambda-1)(1-\bar{\tau})^2}{A_0(e\bar{\tau} - S)^2})}{\ln(1+g(S))} \approx \frac{\frac{2c(\lambda-1)(1-\bar{\tau})^2}{A_0(e\bar{\tau} - S)^2} - 1}{g(S)}$,

for sufficiently small $g(S) < 1$.

$$\text{We need to prove: } \lambda - \frac{(e-S)^2}{(\lambda-1)(1-\bar{\tau})^2} < \frac{\frac{2c(\lambda-1)(1-\bar{\tau})^2}{A_0(e\bar{\tau} - S)^2} - 1}{g(S)} \frac{(e-S)(e\bar{\tau} - S)}{(\lambda-1)(1-\bar{\tau})^2} \quad (\text{A3.2})$$

This is equivalent to:
$$\frac{\lambda(\lambda-1)(1-\bar{\tau})^2}{(e-S)(e\bar{\tau}-S)} - \frac{e-S}{e\bar{\tau}-S} < \frac{\frac{2c(\lambda-1)(1-\bar{\tau})^2}{A_0(e\bar{\tau}-S)^2} - 1}{g(S)} = T \quad (\text{A3.3})$$

The sufficient condition for (A3.3) is:
$$\frac{\lambda(\lambda-1)(1-\bar{\tau})^2}{(e-S)(e\bar{\tau}-S)} - \frac{e-S}{e\bar{\tau}-S} < \frac{2c(\lambda-1)(1-\bar{\tau})^2}{A_0(e\bar{\tau}-S)^2} - 1 \quad (\text{A3.4})$$

The sufficient condition for (A3.4) is:
$$\frac{\lambda(\lambda-1)(1-\bar{\tau})^2}{(e-S)(e\bar{\tau}-S)} < \frac{2c(\lambda-1)(1-\bar{\tau})^2}{A_0(e\bar{\tau}-S)^2} \Leftrightarrow \frac{2c}{A_0} > \lambda \frac{e\bar{\tau}-S}{e-S}.$$

Hence, if $\frac{2c}{A_0} > \lambda$, then $\frac{dT}{dS} < 0$.

Combining with the “status quo” assumption: $\frac{A_0 e^2 \bar{\tau}^2}{2(\lambda-1)(1-\bar{\tau})^2} < c$, we have the sufficient

condition $\frac{2c}{A_0} > \max\left\{\lambda, \frac{e^2 \bar{\tau}^2}{(\lambda-1)(1-\bar{\tau})^2}\right\}$.

References

- Acemoglu, Daron and Robinson, A. James** “Why did the West Extend the Franchise? Democracy, Inequality and Growth in Historical Perspective” *Quarterly Journal of Economics* 115(4), 2000, pp. 1167-1199.
- _____. “A Theory of Political Transitions” *American Economic Review* 91(4), Sept. 2001, pp. 938-963.
- Acemoglu, Daron** “The Form of Property Rights: Oligarchic vs. Democratic Societies” NBER Working paper No: w10037, Oct. 2003.
- Acemoglu, Daron, Robinson, A. James and Verdier Thierry** “Kleptocracy and Divide-and-rule: a model of personal rule” *Journal of European Economic Association*, 2(2/3), Apr.2004, pp.162-192.
- Acemoglu, Daron, Johnson, Simon and Robinson, James** “Institutions as the fundamental cause of long run growth” NBER Working paper No: w10481, May 2004.
- Aghion, P. and Howitt, P.** “A model of growth through creative destruction”, *Econometrica* 60, March 1992, pp.323-351.
- Barro, Robert J.** *Determinants of economic growth: a cross-country empirical study*, Cambridge, MA: MIT press, 1997
- _____. “Determinants of Democracy”: *Journal of Political Economy*, December 1999, pp.158-183.
- _____. “Democracy & the rule of law” in *Fraser Forum*, June 2000
- Benabou, Roland.** “Inequality and Growth” in Ben S. Bernanke and Julio J. Rotemberg, eds., *NBER macroeconomics annual 1996*. Cambridge, MA: MIT Press, 1996b, pp.11-74.
- _____. “Tax and Education Policy in a heterogeneous-Agent Economy: What levels of Redistribution Maximize Growth and Efficiency?” *Econometrica* 70(2), Mar. 2002, pp.481-517.
- Boix, Carles and Stokes, Susan C.** “Endogenous Democratization” *World Politics* 53(4), Jul. 2003, pp.517-547
- Bueno de Mesquita, B., Smith, A., Siverson, R., Morrow, J.** *The Logic of Political Survival*. MIT Press, Cambridge, 2003
- Chen, Been-Lon.** “An inverted-U relationship between inequality and long-run growth” *Economics Letters* 78, 2003, pp.205-212.
- Cox, Gary W.** *Making Votes Count*, New York: Cambridge University Press. 1997

- Glaeser, L. Edward, Porta, La Rafael, Lopez-de-Silnes, Florencio and Shleifer, Andrei** “Do institutions cause growth?”, *Journal of Economic Growth* 9(3), 2004, pp. 271-303.
- Grossman, G. and Helpman, E.** “Quality ladders in the theory of growth”, *Review of Economic Studies* 58, 1991, pp.43-61.
- Huntington, Samuel P.** *The third wave: Democratization in the Late Twentieth Century*. Norman: Univ. Oklahoma press, 1991
- Kurzman, C., Werun R. and Burkhart RE** “Democracy's effect on economic growth: A pooled time-series analysis, 1951-1980” *Studies in Comparative International Development* 37 (1) Spr. 2002 pp.3-33.
- Lee, Woojin** “Is Democracy more expropriative than dictatorship? Tocquevillian wisdom revisited” *Journal of Development Economics* 71(1), Jun.2003, pp. 155-198.
- Lucas, R.** “On the mechanics of economic development”, *Journal of Monetary Economics* 22(1), 1988, pp.3-42.
- Nelson, R. and Phelps, E.** “Investment in humans, technological diffusion, and economic growth”, *American Economic Review: Papers and Proceedings* 51(2), 1966, pp.69-75.
- Persson, Torsten and Tabellini, Guido.** “Is Inequality Harmful for Growth?” *American Economic Review* 84(3), June 1994, pp. 149-187.
- _____. *Political Economics: Explaining Economic Policy*. Cambridge: MIT Press 2000
- _____. *The Economic Effects of Constitutions: What Do the Data Say?* Cambridge: MIT Press 2003
- Romer, P.** “Endogenous technological change” *Journal of Political Economy* 89(5), Oct.1990, pp.71-102.
- Ross, L. Michael** “Does oil hinder democracy?” *World Politics* 53, Apr. 2001, pp. 325-361.
- Rueschemeyer, Dietrich, Stephens, Evelyn H. and Stephens, John D.** *Capitalist development and democracy*. Chicago: University of Chicago Press, 1992
- Sah, Raaj K.** “Fallibility in Human Organizations and Political Systems” *Journal of Economic Perspectives* 5, 1991, pp.67-88.
- Schumpeter, Joseph A.** *Capitalism, Socialism and Democracy*. 2d ed. New York: Harper, 1947.
- Shepsle, Kenneth A. and Weingast, Barry R.** *Positive Theories of Congressional Institutions*, Ann Arbor: University of Michigan Press 1995
- Therborn, Goran.** “The rule of capital and the rise of democracy” *New Left Review* 103(1) 1977, pp.3-41.

Wintrobe, Ronald *The political economy of dictatorship*. Cambridge: Cambridge University Press. 1998

Zak, Paul J. and Feng, Yi “A dynamic theory of the transition to democracy” *Journal of Economic Behavior & Organization* 52, 2003 pp.1-25.