BONN ECON DISCUSSION PAPERS

Discussion Paper 22/2005

When will a dictator be good?

by

Ling Shen

September 2005

Bonn Graduate School of Economics
Department of Economics
University of Bonn
Adenauerallee 24 - 42
D-53113 Bonn

The Bonn Graduate School of Economics is
sponsored by the

Deutsche Post World Net
MAIL EXPRESS LOGISTICS FINANCE

When will a dictator be good?

Ling Shen

Bonn Graduate School of Economics
University of Bonn

Sept. 2005

Corresponding author:
Address: Lenné str. 43 Bonn 53113 Germany
Tel: 0049 228 736149
Email: ling.shen@uni-bonn.de

Abstract

Dictatorship is the predominant political system in many developing countries. However, different dictators act quite differently: a good dictator implements growth-enhancing economic policies, e.g. investment in public education and infrastructure, whereas a bad dictator expropriates wealth of her citizens for her own consumption. The present paper provides a theoretical model by deriving underlying determinants of dictatorial behavior. We assume that the engine of economic growth is private investment. It can increase the productivity of individuals who invest, as well as the aggregate technological level. A good dictator encourages this investment in order to expropriate more. However, the cost of this encouragement is that the ensuing higher growth rate will induce earlier democratization. In this paper we will illustrate the trade-off between economic benefits from a growth-enhancing policy in the short run and the shorter life-time of the dictator in the long run. Furthermore, we will find that the higher the return from private investments is the less likely the dictator will be a good one. Contrary to McGuire and Olson (1996) we find that a long life-time does not always induce positive incentives among dictators.

JEL Classification: H00, O12, P16.
Keywords: dictatorship, political transition, economic growth.

1. Introduction

Economists have realized 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 studies shed light on dictatorship, although most people on earth live in such regimes.[1] A puzzling phenomenon in dictatorial economies is that they can achieve dramatically different economic growth rates. While East Asian dragons have grown 8-10% per year for almost 30 years, many African countries suffered from recessions in the same period, although both East Asia and African countries are controlled by some dictators.[2]

A simple comparison between East Asian dragons and African or South American dictators implies that the behavior of autocracies might be important for the fortune of nations.[3] The good dictator invests in public education and infrastructure, establishes the rule of law to encourage private investment, subsidizes R&D, and so on. However, the bad one simply transfers a large fraction of social wealth to herself.[4] Here, the good dictator invests more in public projects than the bad, although both are willing to expropriate citizens. It is of interest to ask why some dictators are good and others are bad.[5]

This question is important for economists, because the type of dictator determines the kind of economic performance observed. It is also important for politicians, since good economic performance induces early democratization, according to the Lipset/Aristotle hypothesis,[6] which states that prosperity stimulates democracy. Although the impact of democracy on

[1] Recent works in this line include e.g. Wintrobe (1998), Bueno de Mesquita et al. (2003), Acemoglu (2003) and Acemoglu et al. (2004a).
[2] The study of East Asia, see Collins and Bosworth 1996; the study of Africa, see Easterly and Levine 1997.
[3] For formal research on the relationship between the political institution and economic growth, see Acemoglu et al. (2004b), and Glaeser et al. (2004).
[4] 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. (2004a), 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 14.7 billion USD according to the databank of UN.
[5] Sah Raaj K. (1991) believes that dictatorship is a risky investment.
[6] We owe this terminology to Barro 1999.

economic performance is far from reaching a consensus among economists,[7] the reverse causality--the Lipset/Aristotle hypothesis--has shown strong empirical regularity in many empirical studies (e.g. Barro 1999, Boix and Stokes 2003).

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

First, 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 technology level. The more individuals invest, the higher the aggregate technology level.

Second, consistent with the literature, we assume that the political power affects economic performance through the redistribution policy. The redistribution policy in the current model is summarized by a two-dimensional vector, which consists of the tax rate and the social transfer. A Dictator can invest in public education, infrastructure or provide direct subsidies to individuals. All of them can be considered as the social transfer, which encourages individuals to invest. Following individuals' production, a dictator sets the tax rate and collects tax revenue. Hence, the tax rate represents the expropriation level and the social transfer policy measures the goodness of the dictator. Since we assume taxation follows production the promise to reduce the tax rate in a dictatorship isn't credible[8]. This assumption simplifies the analysis and enables us to concentrate on the key question of this paper: Why do some dictators transfer more to citizens, thereby inducing higher growth rates, while others concern

[7] 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.

[8] According to Acemoglu (2000), democratization is the strategic decision of political elites to prevent revolution. As long as elites hold political power, the citizen can not trust that elites will undergo a pro-citizen redistribution for ever. Hence, citizens would like to revolt if the revolution condition is satisfied. For the elite, it is better to democratize when she faces the risk of revolution. 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.

themselves more with their own consumption and thus less social transfer. A dictator implements a social transfer policy to encourage private investment, because she can expropriate more, if citizens invest more. In the short run this is the economic benefit from a growth-enhancing policy.

Third, democracy is growth-enhancing in the current model, because it protects decentralized investment from expropriative taxation. Hence, it is better than any dictatorship under scrutiny.[9] In a dictatorship, the higher the aggregate technology level, the greater the expropriated income is. In turn, citizens have greater incentives of political transition. Nevertheless, the ruler impedes this political transition because the loss of political power coincides simultaneously with the loss of economic benefits. A good dictator encourages higher private investments, thereby inducing a higher aggregate technology level in the future. Consequently, democracy is more attractive to citizens. It leads to earlier democratization, which constitutes the cost to a good dictator.

We find that the dictator is good if the highest tax rate is sufficiently high and the return rate of private investment is sufficiently low. The goal of the dictator to foster economic growth is to expropriate more in future. If the highest tax rate is great enough, the dictator expects to expropriate more. Hence, she is faced with a large incentive to become good. On the other hand, if the return rate of private investment is higher (e.g., because of more oil or other natural resources), then the initial investment level is higher. Hence, the dictator has lower incentives to encourage private investment. In this sense, oil and other natural resources have a negative effect on the behavior of a dictator.

Contrary to McGuire and Olson (1996), we point out that the longer life-time does not always give the dictator the incentive to do better. Their paper considers only the benefit of public investment (similar to our social transfer), whereas my paper emphasizes the trade-off between economic benefits in the short run and the shorter life-time in the long run. If citizens face a higher revolution cost, i.e., the dictator can live longer, then her positive social transfer policy can generate more benefits for her, in turn, she has a higher incentive to be a good one. This is the argument of McGuire and Olson (1996). Furthermore, by recognizing this effect, we point out, that her positive social transfer will induce a higher economic growth rate in the long run, which leads to an earlier revolution. If the dictator has a longer life-time, she will be

[9] See Proposition 3, assumption A.2 ensures that democracy is better than a dictatorship in the current model.

more concerned with the negative effect of her social transfer policy. Hence, her social transfer is not necessarily larger, if she lives longer.

Another novel result is that we illustrate the different effects of good economic performance on democratization. If the return rate of the private investment increases due to a new discovery of natural resources, such as oil, then more individuals will invest. In turn, the country can achieve good economic performance. However, good economic performance does not imply inducing sooner democratization, vice versa, citizens have lower incentive to revolt and the dictator has also lower incentive to be good. If good economic performance is achieved by the higher technology level, then we can observe the Lipset/Aristotle hypothesis. Hence, this simple model is consistent not only with respect to the empirical results of Barro (1997), but also that of Ross (2001), which finds that oil impedes democracy.

The present paper connects two different strands of the literature. First, the literature of political economy studies expropriation and public investment by dictators (e.g., McGuire and Olson 1996) facing the potential contest of other political groups (e.g., Tornell and Lane 1999, Collier 2001, Konrad 2002). However, this literature does not correlate developments in a dictatorial nation with potential democratization. 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). However, they don't distinguish between different dictators in the sense of growth-enhancing policies. Paul J. Zak and Yi Feng (2003) are more closely related to 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. In 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), but few consider that the most growth-enhancing policies are implemented by dictators in non-democratic societies.

The paper proceeds as follows. In section 2, I will present the set-up of the model. In section 3, we study the exogenous growth case without the positive external effect of investments. Then we introduce the democratization process in section 4. In section 5, 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 6, the main results are summarized.

2. The set-up of the model

There are two types of political states: dictatorship and democracy, and two kinds of agents: the ruler and citizens. Citizens invest in a project which can increase their productive ability and produce output using this ability, 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 a part of the tax income with some citizens, whereas the bad dictator consumes all tax revenue by herself. The larger the social transfer from the dictator to citizens, the better she is. Democracy is characterized by equality: every citizen has the same political power to determine the tax rate and receives the same amount of transfers.

2.1 The economic environment

We consider an infinite horizon economy with two types of agents: a ruler and a continuum 1 of citizens, which is denoted by $i \in [0,1]$. Citizens live infinitely long, but the ruler could live only if she was not killed in democratization, because she represents the political power. Each citizen is born with an ability ε_i, which is invariant over time and uniformly distributed over the unit interval. Hence, $\varepsilon_i = i$. The citizen is able to produce the final good y with her ability, while the ruler does not produce anything, however she can tax the output of citizens. This is the crucial assumption of this paper.[10] It is similar to that of McGuire and Olson (1996), where dictatorship impedes the growth of productivity due to expropriation.

The production function of citizen i in period t equals:

$$y_{it} = A_t N \varepsilon_i \lambda^{I_{it}}, \ \lambda > 1 \qquad (1)$$

[10] According to political economy literature, e.g. Benabou 1996, Persson and Tabellini 1994, 2000, non-democracy means that the rich, who are more productive, have more political power. We argue that this assumption describes an imperfect democracy well, but not dictators. This aspect does not apply to dictators such as Mobutu in the Democratic Republic of the Congo, and the dictators in Chinese history. They became dictators, not because they had higher productivity, but because of their military power in most cases.

where A_t represents the aggregate technology level, N is natural resources per capita, and I_{it} is an indicator function of investment in period t. $I_{it}=1$ means that individual i invests in t, whereas $I_{it}=0$ means that she doesn't invest. The investment cost is eA_t, $e>0$, and it enables the investor to increase her productivity by the factor λ. Hence, the return rate of private investment for individual i is $\frac{N(\lambda-1)}{e}\varepsilon_i$. If her return rate is greater than 1, then she invests. This assumption implies that the private investment decision of individual i depends on her own productivity ε_i, but not the aggregate technology level. The investment fully depreciates within one period. Hence, a citizen needs to invest in each period if investment is valuable to her. Since we assumed a uniform distribution of productivity, there exists a threshold, which is denoted by $\hat{\varepsilon}$, i.e., individuals with ability lower than $\hat{\varepsilon}$ do not invest, while others with ability higher than $\hat{\varepsilon}$ invest. Hence, the investment ratio is $1-\hat{\varepsilon}$. In section 3, investment has no effect on A_t, because economic growth is assumed to be exogenous. In section 5, we assume that investment has a positive external effect on the aggregate technology level. As a result, long run economic growth is endogenous.

2.2 The political environment

The political institution is defined by the vector (τ, s) [11]. The tax rate τ lies between $[0,\bar{\tau}]$, $\bar{\tau}<1$ and the social transfer s is financed through taxation. $\bar{\tau}<1$ reflects the sustenance level. Otherwise all citizens would revolt, because they have nothing left after taxation. For simplicity two extreme cases are considered: dictatorship and democracy. We assume that the initial political state is dictatorship, where 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 the group-specific social transfer. The higher the social transfer is from the dictator to citizens, the better she is. The dictatorship is characterized by the degree of expropriation, which level is measured by

[11] This assumption comes directly from Lee (2003). To describe the difference between dictatorship and democracy he uses two variables, i.e., participation bias and redistribution bias. However, he does not consider the commitment problem. Hence, both of them are determined simultaneously in his model. This assumption is also consistent with Persson and Tabellini (2000). In their book (chapter 14), the taxation of capital income and the public investment in infrastructures are two policy instruments, which naturally affect private rates of return on investment, and in turn, economic performance. However, they study their effects in different models and do not consider group-specific public investment.

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 a democracy, there is no ruler and the tax rate is determined by all citizens through a "one-person-one-vote" majority voting system, where every agent gets the same transfer $s_i = s^{dem}, \forall i$. We assume that social transfer in a democracy is not group-specific, not because in reality there is no group-specific social transfer in the democratic society (in general, all social transfers are considered to be group-specific), but because the nature of democracy is such that everybody is treated equally. Hence, although the individual project, which is financed by the democratic government, could be group-specific, in the aggregate, the democratic government concerns itself with the interests of all citizens, and the social transfer is more equally distributed among individuals than under a dictator. Furthermore, allowing group-specific social transfers in democracy would complicate our analysis of democracy, whereas the current article focuses on the non-democracy. Allowing group-specific social transfer in democracy does not qualitatively change our results concerning dictatorial behavior.[12] In fact, different majorities of citizens could support different group-specific social transfer schemes in democracy. Finally, everybody obtains the same *a priori*.

In order to change the political state (through revolution or democratization, here, both are same), citizen i has to pay P_i for a weapon. Contrary to a dictator, citizens pay a constant cost c in the 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 been modeled in details in some papers, e.g., Acemoglu et al. (2004a). The ruler acts by herself. 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 also buys the weapon in order to repress the revolution. For simplicity, we assume the price of weapon to be fixed and the same for all. Whether the revolution can succeed depends on who possesses more weapons. This political transition is modeled by a sequential game. The citizens move first, the ruler then reacts. We assume that the ruler moves later, in order to reflect the advantage of holding political power. She can adjust the expenditure on weapons according to the revolution

[12] Appendix 2 shows that democracy is even better, if we allow that in democracy, social transfer is only given to the individual who invests. Then the citizens have higher incentive to revolt. Our result that the dictator faces a trade-off when she implements a positive social transfer policy has no qualitative change.

decision of citizens. However, the reverse timing does not change the timing of revolution, but the actual weapon expenditures of citizens and the ruler in political transition. The current model focuses on the behavior of the ruler in dictatorship, hence, the time of revolution, in turn, the life time of the dictator is the key issue. The actual expenditure of weapons in revolution does not affect the social transfer policy of the dictator.

2.3 The timing

Upon birth all citizens realize their abilities, and other exogenous parameters ($\bar{\tau}, \lambda, e$) are revealed. It is a finite repeated game between the ruler and a continuum of citizens until revolution succeeds. Within every period they play a sequential game, whose timing of events can be summarized as follows:

1. At the beginning of period t, the technology level A_t is determined either by the exogenous factor (section 3), or by the endogenous variables in time $t-1$ (section 5).
2. Citizens determine whether or not to undertake a revolution.
3. If there is no revolution, or if 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 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., $\hat{\varepsilon}$ is determined.
6. Citizens produce output.
7. The tax rate τ 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 receive the remaining output.

We assume that the tax rate is determined after production in order to reflect the idea that expropriation is the key property of the dictatorship. The dictator has to expropriate the citizens because she holds all political power. Any promise to reduce the expropriation level is incredible with regard to the citizens. This concept constitutes the basis 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.

We assume a perfect capital market with zero interest rate to finance all possible expenditures before production. With this crucial assumption the democratization process in the current model depends on the expected future income. The more the expropriated income in dictatorship compared to that in democracy is, the greater the incentive to democratize is. Thus, the current model is consistent with the Lipset/Aristotle hypothesis. For simplicity, we assume that all debts should be cleared at the end of each period. The rest of income is eaten, thus, there is no saving.

All agents are risk neutral. Hence, utility can be measured by net income, which is totally consumed by agents within the period. Without taking the weapon expenditure into consideration, the net income of citizen i at the end of period t is:

$$Y_{it} = y_{it}(1-\tau_t) + s_{it} - I_{it}eA_t \qquad (2)$$

And the ruler's net income is:

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

In the following sections, we solve for the sub-game perfect equilibrium and analyze behavioral determinants of the dictator. According to backward induction, we first discuss the economic decision of agents and solve for the income of individuals in each political institution. In section 4, we study the political decision whether or not to revolt.

3. The exogenous growth model

3.1 The dictatorship

The initial political institution is dictatorship. We assume that the technology level A_t grows exogenously. In section 4 we will know that the life time of the ruler depends on A_t (see equation 20 and 23), which is the single state variable in this simple model. Since this is a

repeated game with finite periods and the tax rate is set after production, the dictator chooses $\tau^{dic} = \bar{\tau}$ regardless of whether she is good or bad. Although the good dictator is willing to encourage the citizen to invest, she cannot use the tax rate as the policy tool. As long as she holds all political power in her hand and taxation takes place after production, citizens are never convinced by the commitment of tax reduction and increase their investment.

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 ($\varepsilon_i = 0$) does not invest regardless of the tax rate. We assume that the citizen with the highest ability ($\varepsilon_i = 1$) invests under the highest tax rate. We then make the following assumption:[13]

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

This assumption states that the net benefit of investment for the individual with $\varepsilon_i = 1$ ($N(\lambda - 1)(1 - \bar{\tau})$) is greater than the cost (e), even if she gets no transfer from the dictator. I.e., her net return rate of private investment $\frac{N(\lambda - 1)(1 - \bar{\tau})}{e}$ is greater than 1. Hence, there is a citizen with ability $0 < \hat{\varepsilon} < 1$, who is indifferent between investing and not investing. The ruler would like to give the social transfer to citizens if and only if she could encourage private investment. It is obvious that the ruler is only willing to pass on the positive social transfer to citizens who will invest after receiving this social transfer, 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, we model this public investment as the group-specific social transfer implemented before the private investment decision, i.e. $s_{it} = 0 \; if \; i < \hat{\varepsilon}$ and $s_{it} = s_t > 0 \; if \; i \geq \hat{\varepsilon}$. We define $s_t \equiv A_t S$, where S is the steady state ratio of social transfer to technology level. This leads to:[14]

[13] If she invests, her income is $A_t N\lambda(1 - \bar{\tau}) - eA_t$. If she doesn't invest, her income is $A_t N(1 - \bar{\tau})$. Hence, she invests if and only if $A_t N\lambda(1 - \bar{\tau}) - eA_t > N(1 - \bar{\tau})A_t$. After simplifying this condition, we have (A.1).

[14] For individual $\hat{\varepsilon}$, her income is $A_t N\lambda(1 - \bar{\tau})\hat{\varepsilon} + s_t - eA_t$, if she invests. Otherwise, her income is $A_t N(1 - \bar{\tau})\hat{\varepsilon}$. Indifference between investing and not investing implies $A_t N\lambda(1 - \bar{\tau})\hat{\varepsilon} + s_t - eA_t = A_t N(1 - \bar{\tau})\hat{\varepsilon}$. Rearranging this equation, we have (4).

$$\hat{\varepsilon} = \frac{e - S}{N(\lambda - 1)(1 - \bar{\tau})} \qquad (4)$$

The ruler chooses the optimal transfer S in order to maximize her income:

$$\begin{aligned} \underset{S}{Max} \quad Y_{ruler,t} &= \bar{\tau} \int_0^1 y_{i,t} di - (1 - \hat{\varepsilon}) s_t \\ &= A_t \left\{ \frac{1}{2} \bar{\tau} N \left[\lambda + (1 - \lambda) \hat{\varepsilon}^2 \right] - (1 - \hat{\varepsilon}) S \right\} \equiv A_t \tilde{Y}_{ruler} \end{aligned}$$

Substitute (4) and recall the assumption that the social transfer is non-negative, we get S^{exg} from the first-order condition. The second-order condition for a maximum is satisfied.

$$S^{exg} = \begin{cases} S^{bad} = 0 & \text{if} \quad (1 - \bar{\tau})^2 \geq \dfrac{e}{N(\lambda - 1)} \\ S^{good} = \dfrac{e - N(\lambda - 1)(1 - \bar{\tau})^2}{2 - \bar{\tau}} & \text{if} \quad (1 - \bar{\tau})^2 < \dfrac{e}{N(\lambda - 1)} \end{cases} \qquad (5)$$

Proposition 1

If assumption (A.1) holds and A_t grows exogenously, the dictator will be bad if $(1 - \bar{\tau})^2 \geq \dfrac{e}{N(\lambda - 1)}$; she will be good if $(1 - \bar{\tau})^2 < \dfrac{e}{N(\lambda - 1)}$. The dictator is better the higher $\bar{\tau}$, the lower the level of natural resources and the lower the return rate of private investment.

As we assumed previously, the bad ruler consumes all tax income and sets the social transfer at $s_i = 0 \; \forall i$. $\hat{\varepsilon}^{bad}$, reflecting this threshold in a bad dictatorship, equals to $\dfrac{e}{N(\lambda - 1)(1 - \bar{\tau})}$.

Rearranging the condition of a good dictator $(1 - \bar{\tau})^2 < \dfrac{e}{N(\lambda - 1)}$ and substituting from $\hat{\varepsilon}^{bad}$, we have $1 - \hat{\varepsilon}^{bad} < \bar{\tau}$. $1 - \hat{\varepsilon}^{bad}$ is the investment ratio in the bad dictatorship, and $\bar{\tau}$ represents the expropriation level. If private investment is not attractive to citizens, i.e., $1 - \hat{\varepsilon}^{bad}$ is very low, the ruler has the incentive to be good encouraging citizens to invest. As expected, if the expropriation level declines, the ruler is less likely to be good. Because $1 - \hat{\varepsilon}^{bad}$ strictly

decreases in $\bar{\tau}$, we have a unique $\bar{\tau}^*$, so that $1-\hat{\varepsilon}^{bad}(\bar{\tau}^*)=\bar{\tau}^*$. For all $\bar{\tau} \le \bar{\tau}^*$, the dictator is bad, and for all $\bar{\tau} > \bar{\tau}^*$ she is good. This result implies that the dictator wants to encourage private investment, if $\bar{\tau}$ is high enough, i.e., she can expropriate enough after production. For the dictator, the social transfer is similar to an investment, constituting the tax rate as her rate of return.

If the condition for being good is satisfied, the good dictator pays a positive social transfer S^{good} to the citizen who will invest. Substituting positive S^{good} in (4), we obtain:

$$\hat{\varepsilon}^{good} = \frac{e + N(\lambda-1)(1-\bar{\tau})}{N(\lambda-1)(2-\bar{\tau})} \qquad (6)$$

The good dictator has two effects for citizens: first, the individual who invests can earn more due to the positive social transfer; second, the positive social transfer decreases the entry barrier investment, hence, more citizens will invest. (It is easy to see that $\hat{\varepsilon}^{good} < \hat{\varepsilon}^{bad}$) Of course the citizen who does not invest can not increase her income in the good dictatorship.

Proposition 2:

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

The proposition is easy to prove, since S^{good} is the optimal choice for the ruler given $(1-\bar{\tau})^2 < \dfrac{e}{N(\lambda-1)}$, and citizens receive a positive social transfer from the ruler. The Pareto-improving process is achieved, because the transition ensures the income of the good dictator to exceed that of the bad dictator. The incomes of the ruler and citizens in the bad and good dictatorship in period t are given as follows, respectively:

$$Y_{ruler}^{bad} = \frac{1}{2}\bar{\tau}A_t N\left(\lambda - \frac{e^2}{N^2(\lambda-1)(1-\bar{\tau})^2}\right) \qquad (7)$$

$$Y_i^{bad} = \begin{cases} A_t N i(1-\bar{\tau}) & i < \hat{\varepsilon}^{bad} \\ A_t N\lambda i(1-\bar{\tau}) - eA_t & i \ge \hat{\varepsilon}^{bad} \end{cases} \qquad (8)$$

$$Y_{ruler}^{good} = \frac{A_t N\bar{\tau}}{2} + \frac{A_t(N(\lambda-1)-e)^2}{2N(\lambda-1)(2-\bar{\tau})} \quad (9)$$

$$Y_i^{good} = \begin{cases} A_t Ni(1-\bar{\tau}) & i < \hat{\varepsilon}^{good} \\ A_t N\lambda i(1-\bar{\tau}) - eA_t + s^{good} & i \geq \hat{\varepsilon}^{good} \end{cases} \quad (10)$$

From (7) to (10) we can easily see that $Y_{ruler}^{good} > Y_{ruler}^{bad}$ and $Y_i^{good} \geq Y_i^{bad}$.

3.2 Democracy:

In a democratic society, the tax rate is determined by all citizens through a "one-person-one-vote" majority voting system. The tax revenue is equally distributed to every citizen.[15] Hence, the median voter is the deciding person. She maximizes her income $Y_{0.5,t}$, subject to the budget constraint of redistribution:

$$\underset{\tau}{Max}\, Y_{0.5,t} = 0.5A_t N\lambda^{I_{0.5}}(1-\tau) + s - I_{0.5}eA_t$$

$$s.t. \quad s = \tau\int_0^1 y_{i,t}di = 0.5\tau A_t N\left(\hat{\varepsilon}^2 + \lambda - \lambda\hat{\varepsilon}^2\right)$$

There are two cases:

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

$$\underset{\tau}{Max}\, Y_{0.5,t} = 0.5A_t N(1-\tau) + 0.5\tau A_t N\left(\hat{\varepsilon}^2 + \lambda - \lambda\hat{\varepsilon}^2\right)$$

The first order condition is:

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

Hence $\tau^{dem,1} = \bar{\tau}$. In order to solve $\hat{\varepsilon}^{dem,1}$, we have:

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

We get: $$\hat{\varepsilon}^{dem,1} = \frac{e}{N(\lambda-1)(1-\bar{\tau})} \quad (11)$$

[15] In Appendix 2, I will show the case where the tax revenue is only given to the individual who invests.

And: $$s^{dem,1}=\frac{1}{2}\bar{\tau}A_tN\left(\lambda-\frac{e^2}{N^2(\lambda-1)(1-\bar{\tau})^2}\right) \quad (12)$$

Hence, $$Y_{i,t}^{dem,1}=\begin{cases}A_tNi(1-\bar{\tau})+s^{dem,1} & i<\hat{\varepsilon}^{dem,1}\\ A_tN\lambda i(1-\bar{\tau})-eA_t+s^{dem,1} & i\geq\hat{\varepsilon}^{dem,1}\end{cases} \quad (13)$$

If condition $\hat{\varepsilon}^{dem,1}=\frac{e}{N(\lambda-1)(1-\bar{\tau})}>\frac{1}{2}$ holds, democracy decreases inequality (comparing (13) and (10)). However, the aggregate output is the same as that of the bad dictatorship.

2) If $\hat{\varepsilon}\leq 0.5$, the median voter invests. Her maximization problem then becomes:

$$\underset{\tau}{Max}\,Y_{0.5,t}=0.5A_tN\lambda(1-\tau)+0.5\tau A_tN\left(\hat{\varepsilon}^2+\lambda-\lambda\hat{\varepsilon}^2\right)-eA_t$$

The first order condition is:

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

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

We get: $$\hat{\varepsilon}^{dem,2}=\frac{e}{N(\lambda-1)} \quad (14)$$

$$Y_{i,t}^{dem,2}=\begin{cases}A_tNi & i<\hat{\varepsilon}^{dem,2}\\ A_tN\lambda i-eA_t & i\geq\hat{\varepsilon}^{dem,2}\end{cases} \quad (15)$$

The aggregate output is as follows:

$$Y_t^{dem,2}=A_t\left(\frac{N\lambda}{2}-e+\frac{e^2}{2N(\lambda-1)}\right) \quad (16)$$

If condition $\hat{\varepsilon}^{dem,2}=\frac{e}{N(\lambda-1)}\leq\frac{1}{2}$ holds, democracy is capable of increasing aggregate output. This is because the tax rate is set at the lowest level. Individuals are encouraged to invest.

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 investing (this is the case $\frac{e}{N(\lambda-1)}>\frac{1}{2}$), then she supports a higher tax rate (here, $\tau^{dem,1}=\bar{\tau}$). Therefore, the democratic society suffers also from a lower investment ratio, which is as same as in the bad dictatorship. If $\frac{e}{N(\lambda-1)}\leq\frac{1-\bar{\tau}}{2}$, i.e., the investment is attractive enough to the median voter, then she would support a lower tax rate (here, $\tau=0$). Consequently, the economy enjoys a higher output level due to a higher

investment ratio. If $\frac{1-\bar{\tau}}{2} < \frac{e}{N(\lambda-1)} \leq \frac{1}{2}$, 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 also knows that 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: $(\hat{\varepsilon}^{dem,1}, \bar{\tau}, s^{dem,1})$, $(\hat{\varepsilon}^{dem,2}, 0, 0)$. Which one is actually chosen by the median voter depends on the parameter constellation.

Proposition 3:

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

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 $(\hat{\varepsilon}^{dem,2}, 0, 0)$, if it generates higher income for her. I.e., $Y_{0.5}^{dem,2} - Y_{0.5}^{dem,1} \geq 0 \Leftrightarrow \bar{\tau} \geq \frac{2\hat{\varepsilon}^{dem,1} - 1}{(1+\hat{\varepsilon}^{dem,1})^2 - 2}$. Unfortunately, $\frac{2\hat{\varepsilon}^{dem,1} - 1}{(1+\hat{\varepsilon}^{dem,1})^2 - 2}$ depends on $\bar{\tau}$. Hence, the economic meaning of this condition is not very intuitive. However, notice that $\frac{2\hat{\varepsilon}^{dem,1} - 1}{(1+\hat{\varepsilon}^{dem,1})^2 - 2} < \frac{1}{2}$. Thus, the sufficient condition is $\bar{\tau} \geq \frac{1}{2}$, i.e., the median voter will choose $(\hat{\varepsilon}^{dem}, 0, 0)$ if the highest tax rate is high enough. Q.E.D.

The existence of multiple effects is consistent with the literature of political economy, which emphasizes the different effects of democracy on the economic performance. By assuming that the majority in a democracy is poor, this literature often argues that democracy hinders economic investment due to a higher level of redistribution. On the other hand, democracy

also protects against expropriation through the strong rule of law, which is good for economic performance. In the current model we argue that both could occur under different circumstances. The case of $(\hat{\varepsilon}^{dem,2},0,0)$ indicates the positive impact of democracy on economic performance, because democracy protects private investments from expropriation. On the other hand, the case of $(\hat{\varepsilon}^{dem,1},\bar{\tau},s^{dem,1})$ reflects the negative impact of democracy on economic growth owing to the high tax rate. However, this negative effect has a different economic meaning compared to that of the bad dictatorship $(\hat{\varepsilon}^{bad},\bar{\tau},0)$. Whereas the former is pure redistribution, the latter is pure expropriation. Proposition 3 shows that which case occurs in the moderate case depends on parameters, in particular, the highest level of the tax rate, $\bar{\tau}$. It reflects to what extent the political power is able to influence economic performance. If it is large enough ($\bar{\tau} \geq \frac{1}{2}$), individuals try to avoid redistribution and choose the lower tax rate. Hence, democracy has an aggregate effect on economic performance. For our purpose, it is more interesting to restrict attention to this case, i.e. $(\hat{\varepsilon}^{dem,2},0,0)$. Hence, we assume $\frac{e}{N(\lambda-1)} \leq \frac{1}{2}$ and $\bar{\tau} \geq \frac{1}{2}$ for simplicity. Combining the above (A.1), we need to make the following assumption:

$$\frac{e}{N(\lambda-1)} \leq 1-\bar{\tau} \leq \frac{1}{2} \qquad \text{(A.2)}$$

We focus on the case where democracy has an aggregate effect on economic performance, because only in this case democratization is possible. The pure redistributive democracy $(\hat{\varepsilon}^{dem,1},\bar{\tau},s^{dem,1})$ means that the expenditure of the ruler on weapons is more than that of the citizen net of the democratization cost.[16] Hence, such "democratization" is impossible.

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

The "goodness" ASSUMPTION: $(1-\bar{\tau})^2 < \frac{e}{N(\lambda-1)} \leq 1-\bar{\tau} \leq \frac{1}{2}$ (A.3)

[16] For more details, see section 4.

This assumption is the sufficient condition of a good democracy in the sense that it has the aggregate effect on economic performance, and it also constitutes the condition of a good dictatorship. That is why we call it the "goodness" assumption. Since $\hat{\varepsilon}^{dem,2} < \hat{\varepsilon}^{good}$, 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.

4. Democratization:

In the present paper the process of democratization is modeled as a two stage sequential game with perfect information. First the citizen decides whether to revolt, then the ruler decides whether to repress. Both revolution and repression require weapons. The citizen attempts to undertake a revolution, if she expects a higher level of income could be earned in a democratic society. Hence, if necessary, the citizen will offer the difference of her income 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 both are willing to offer the whole life-time income, they cannot do so because we assume that the perfect financial 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 their ruler to invest more than their highest payments in weapons net of the revolutionary 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 only need to compare the highest payments of both players for weapons, which are named the incentive of political transition. Revolution is the best choice for the citizen if and only if the citizens' incentive to revolt net of the revolutionary 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.

We will consider two possible democratization processes: from the bad dictatorship directly to democracy, and from the bad dictatorship indirectly to democracy via the good dictatorship.

4.1 The incentive of political transition in the bad dictatorship

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

$$P_{i,t}^{bad} = \begin{cases} A_t N\lambda\varepsilon_i\bar{\tau} & \varepsilon_i \geq \hat{\varepsilon}^{bad} \\ A_t N(\lambda-1)\varepsilon_i - eA_t + A_t N\varepsilon_i\bar{\tau} & \varepsilon_i \in (\hat{\varepsilon}^{dem}, \hat{\varepsilon}^{bad}) \\ A_t N\varepsilon_i\bar{\tau} & \varepsilon_i \leq \hat{\varepsilon}^{dem} \end{cases} \quad (17)$$

The first part ($A_t N\lambda\varepsilon_i\bar{\tau}$) is the expropriated income of the citizen who invests in both political states. The second difference of incomes ($A_t N(\lambda-1)\varepsilon_i - eA_t + A_t N\varepsilon_i\bar{\tau}$) 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 ($A_t N\varepsilon_i\bar{\tau}$), and the investment return ($A_t N(\lambda-1)\varepsilon_i - eA_t$). Finally, the citizen, who invests neither in democracy nor the bad dictatorship, saves the tax in democracy ($A_t N\varepsilon_i\bar{\tau}$). The sum of individual offers net of the revolutionary cost is the citizens' highest net expenditure on weapons.

$$P_{citizen,t}^{bad} = \int_0^1 P_{i,t}^{bad} di - c = \frac{A_t N\lambda\bar{\tau}}{2} - \frac{A_t e^2\bar{\tau}}{2N(\lambda-1)(1-\bar{\tau})} - c \quad (18)$$

For the ruler: $$P_{ruler,t}^{bad} = Y_{ruler,t}^{bad} = \frac{1}{2}\bar{\tau}A_t N\left(\lambda - \frac{e^2}{N^2(\lambda-1)(1-\bar{\tau})^2}\right) \quad (19)$$

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

$$\Delta_t^{bad} = P_{citizen,t}^{bad} - P_{ruler,t}^{bad} = \frac{A_t e^2\bar{\tau}^2}{2N(\lambda-1)(1-\bar{\tau})^2} - c \quad (20)$$

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 ($t=1$), Δ_1^{bad} is negative. We have the following assumption:

The "status quo" ASSUMPTION: $$\frac{A_1 e^2 \bar{\tau}^2}{2N(\lambda-1)(1-\bar{\tau})^2} < c \qquad (A.4)$$

Equation (20) has the following important indications. First, $\bar{\tau}$ reflects the expropriation level. Put differently, the higher $\bar{\tau}$, the greater the incentive for citizens to seek democratization. Second, as most of the political economy literature argues, e.g. the Lipset/Aristotle hypothesis, democracy follows the good economic performance. Here, the economic growth rate is given by the exogenous growth rate of the aggregate technology 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 N and λ, e. The more beneficial the project (i.e. the lower e and/or the higher λ and N), the lower the incentive to democratize. The first part of equation (20) is from the investment return of the "middle class", who invests in democracy but not in dictatorship, i.e., $A_t \int_{\hat{\varepsilon}^{dem}}^{\hat{\varepsilon}^{bad}} (N(\lambda-1)\varepsilon_i - e)di$. The citizen of "middle class" has a higher incentive to revolt, if λ and N increases and/or e declines. However, the size ($\hat{\varepsilon}^{bad} - \hat{\varepsilon}^{dem}$) of this group decreases in N and 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 fact that oil impedes democratization(e.g., Ross 2001). In this framework, we can argue that a country's oil wealth increases the average return rate of the private investment ($\frac{N(\lambda-1)}{2e}$). 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 technology level A_t, and decreases in the natural resource N. 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 e.

Comparing this result to Proposition 1, we find that the impact of $\bar{\tau}$, N and the return rate of the private investment on democratization is similar to that on the behavior of the bad dictator. If the highest tax rate increases, the bad dictator faces an increasing risk of revolution according to Proposition 4, and intuitively, she also has a larger incentive to become good according to Proposition 1.

4.2 The incentive of political transition in the good dictatorship

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

$$P_{ruler,t}^{good} = \frac{A_t N\bar{\tau}}{2} + \frac{A_t(N(\lambda-1)-e)^2}{2N(\lambda-1)(2-\bar{\tau})} \qquad (21)$$

The democratization incentive of citizens is as follows:

$$P_{i,t}^{good} = \begin{cases} A_t N\lambda\varepsilon_i\bar{\tau} - s^{good} & i \geq \hat{\varepsilon}^{good} \\ A_t N(\lambda-1)\varepsilon_i - eA_t + A_t N\varepsilon_i\bar{\tau} & i \in (\hat{\varepsilon}^{dem}, \hat{\varepsilon}^{good}) \\ A_t N\varepsilon_i\bar{\tau} & i \leq \hat{\varepsilon}^{dem} \end{cases} \qquad (22)$$

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 $A_t N\varepsilon_i\bar{\tau}$ 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 society[17]. 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 $A_t N\lambda\varepsilon_i\bar{\tau} - s^{good}$ is negative, they can earn more in the good dictatorship and become the supporter of this political institution.

[17] $A_t N(\lambda-1)\varepsilon_i - eA_t + A_t N\varepsilon_i\bar{\tau} = A_t[N(\lambda-1+\bar{\tau})\varepsilon_i - e] > A_t[N(\lambda-1+\bar{\tau})\hat{\varepsilon}^{dem} - e] > 0$

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 1.

This Proposition indicates that the dictator can extend the social support of the regime by means of a positive social transfer. Surprisingly, the group which possibly supports the regime is not the one with the highest ability, but a group with a relatively lower ability, although their ability great enough to let them invest in both dictatorship and democracy. In this sense, the "top rich" do not sympathize with the good dictator.

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

$$\begin{aligned} \Delta_t^{good} &= P_{citizen,t}^{good} - P_{ruler,t}^{good} \\ &= A_t \frac{(N(\lambda-1)-e)^2(1-\bar{\tau})^2}{2N(\lambda-1)(2-\bar{\tau})^2} - c \end{aligned} \qquad (23)$$

Proposition 6:

1) In the good dictatorship, the incentive of democratization increases in the aggregate technology level. The higher the expropriation level, the less the incentive of revolution is. The net social incentive of democratization increases in natural resources and 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 in the bad one.

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

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

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

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

Comparing to Proposition 4, it is of interest to see that the effects of investment and the tax rate on the incentive to revolt differ between the bad and good dictatorship. Analogously, the first term of (23) is also from the investment return of the "middle class", i.e., $A_t \int_{\hat{\varepsilon}^{dem}}^{\hat{\varepsilon}^{good}} (N(\lambda-1)\varepsilon_i - e)di$. The size ($\hat{\varepsilon}^{good} - \hat{\varepsilon}^{dem}$) of this group increases, if N and λ increases and/or e declines. Hence, the net social incentive (Δ_t^{good}) increases. In other words, this model predicts that natural resources accelerate democratization in the good dictatorship. This, however, requires future empirical evidence. In the good dictatorship, taxation is the mixture of redistribution and expropriation. The increase of the highest tax rate implies that social support of the dictatorship could widen. Hence, the incentive for democratization declines.

Proposition 6 strengthens Proposition 1. An increase in the highest tax rate gives rise to a higher incentive for the dictator to be good, because she can expropriate more. Furthermore, the good dictator faces a smaller danger of revolution if the highest tax rate increases. Analogously, if the private investment is more profitable, the dictator has less incentive to be good, and the good dictator faces a larger possibility of revolution.

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 technology 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 technology 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 technology level and demonstrate that the technology progress enlarges the income difference between dictatorship and democracy.

5. External Effect and Endogenous Growth

So far we have assumed that the aggregate technology level, as well as the long run economic growth, is given exogenously. The dictator is good if she finds that the positive social transfer can increase her instantaneous income. In other words, we have assumed that the behavior of

the dictator can affect short run economic performance, but not long run economic growth. Now we introduce endogenous technological progress to our simple model. As is standard in endogenous growth theory,[18] the aggregate technology level and, in turn, the economic growth rate, increases in the investment ratio $1-\hat{\varepsilon}$. We assume for simplicity that private investment has a positive externality on the aggregate technology level, i.e., $A_t = A_{t-1}(1+G(\hat{\varepsilon}_{t-1}))$, where $G(\hat{\varepsilon}_{t-1})$ is the growth rate of the aggregate technology level, $G'(\hat{\varepsilon}_{t-1}) < 0$. Because of (4), we know $\hat{\varepsilon}_t = \frac{e - S_t}{N(\lambda-1)(1-\bar{\tau})}$. Hence, the growth rate of A_t is the increasing function of the social transfer in period $t-1$, denoted by $G(\hat{\varepsilon}_{t-1}(S_{t-1})) \equiv g(S_{t-1})$, where $g'(S_{t-1}) > 0$. This is the single linkage across periods. According to the assumption that financial markets are perfect only within a period, no income can be transferred across periods. From equations (20) and (23) we know that the higher growth rate of technology 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. From now on, we standardize $N=1$ for simplicity.

As the growth rate is endogenous, all individuals know the life-time of the dictator, which is the first period with a non-negative Δ_t. The dictator sets the tax rate on $\bar{\tau}$. As we know from (20) and (23),

$$\Delta_t = A_t \int_{\hat{\varepsilon}^{dem}}^{\hat{\varepsilon}^{dic}} ((\lambda-1)\varepsilon_i - e)di - c \qquad (24)$$

In order to make the analysis tractable, we consider a three-period model in this section. We assume that the revolution takes place in the third period. According to (24), it implies $\Delta_3 > 0$ for any S_1 and S_2. Hence, the sufficient and necessary condition for $\Delta_3 > 0$ is:

$$(1+g(0))^2 \int_{\hat{\varepsilon}^{dem}}^{\hat{\varepsilon}^{dic}} ((\lambda-1)\varepsilon_i - e)di > \frac{c}{A_1} \qquad (A.5)$$

[18] 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 accept new technology.

where $\hat{\varepsilon}^{dic} = \dfrac{e - S^{exg}}{(\lambda - 1)(1 - \bar{\tau})}$ and S^{exg} is the optimal social transfer in the exogenous growth model, as shown in (5). This condition means that revolution will take place in the third period, even if the ruler sets the social transfer at the lowest level (i.e., $S = 0$) in the first two periods. Hence, the dictator knows that the second period is her last period. Then she acts the same as in the exogenous growth model, i.e., she maximizes her instantaneous income. Thus, $S_2 = S^{exg}$. What we want to show here is the social transfer in the first period S_1. This is the social transfer in the endogenous growth model. In period 1, the dictator is aware of two effects of her social transfer policy. First, her transfer can encourage more citizens to invest, and in turn, increase her income in period 1. Secondly, more investment implies the higher technology level in the second period, and in turn, will render the revolution more likely in period 2. If the revolution takes place in the second period, then the first period is the last period for the dictator. Hence, the life-time income of the ruler is given as follows:

$$V_1 = \begin{cases} Y_{ruler}(S_1) + \rho Y_{ruler}(A_2(S_1), S^{exg}) & if \quad \Delta_2(S_1) \le 0 \\ Y_{ruler}(S_1) & if \quad \Delta_2(S_1) > 0 \end{cases} \qquad (25)$$

where $0 \le \rho \le 1$ is the discount factor. We define a threshold value S_1^r so that $\Delta_2(S_1^r) = 0$, i.e.,

$$(1 + g(S_1^r)) \int_{\hat{\varepsilon}^{dem}}^{\hat{\varepsilon}^{dic}} ((\lambda - 1)\varepsilon_i - e) di = \frac{c}{A_1} \qquad (26)$$

Hence, for all $S_1 > S_1^r$, revolution occur in the second period. The ruler knows that. Hence, she chooses S^{exg} in the first period. For all $S_1 \le S_1^r$, the dictator can live for two periods. Hence, she chooses $S_1^* = \arg\max V_1 = \arg\max Y_{ruler,1}(S_1) + \rho Y_{ruler,2}(A_2(S_1), S^{exg})$, subject to $S_1 \le S_1^r$. We define $\hat{S}_1$ as the unconstrained optimal social transfer, so that $\left.\dfrac{d\widetilde{Y}_{ruler}}{dS_1}\right|_{S_1 = \hat{S}_1} + \left.\dfrac{dg}{dS_1}\right|_{S_1 = \hat{S}_1} \rho \widetilde{Y}_{ruler}(S^{exg}) = 0$. Sum up, $S_1^* = \min\{S_1^r, \hat{S}_1\}$. Because S^{exg} is the optimal social transfer in the exogenous growth model, we have $\left.\dfrac{d\widetilde{Y}_{ruler}}{dS_1}\right|_{S_1 = S^{exg}} = 0$. Hence, $\hat{S}_1 > S^{exg}$.

We define $\widetilde{S}_1$ so that $\widetilde{Y}(\widetilde{S}_1) = (1 - \rho - \rho g(\widetilde{S}_1))\widetilde{Y}(S^{exg})$. Hence, if $S_1^r < \widetilde{S}_1$, then the dictator sets

$S_1 = S^{exg}$ and lives for one period. This social transfer decision of the dictator in the endogenous growth model is shown in Figure 1 and summarized in Proposition 7.

Proposition 7

In the endogenous growth model, the dictator chooses the social transfer as follows:

1) *In the last period of her life-time, the dictator acts the same as in the exogenous growth model.*
2) *In the period before, the dictator sets* $S^* = \min\{S^r, \hat{S}\}$. S^r *increases in the revolution cost* c *and decreases in the initial technology level* A_1.
3) $S^* = \min\{S^r, \hat{S}\}$ *could be smaller than* S^{exg}.

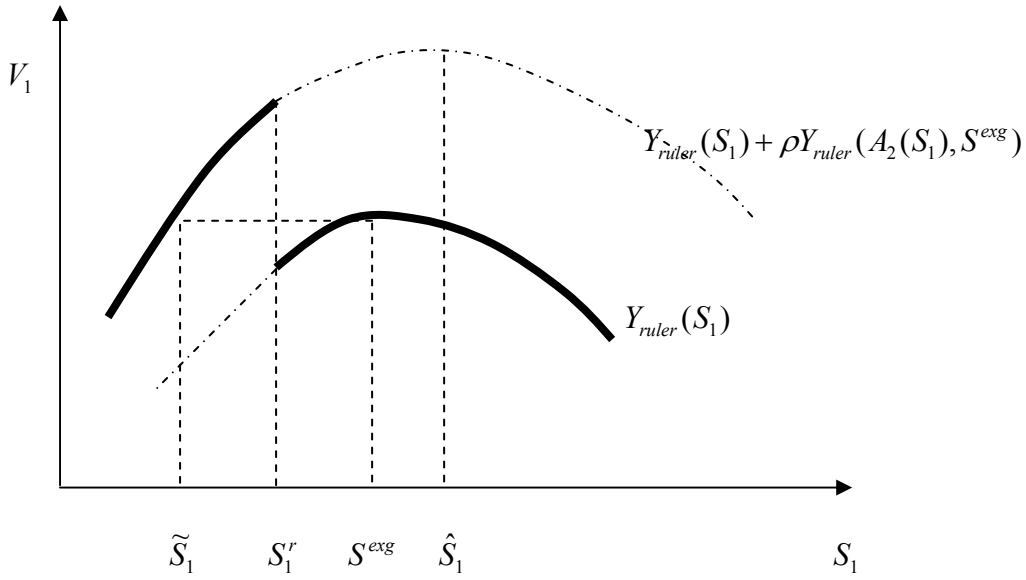

Figure 1 Social transfer in relation to the life-time income of the dictator

The effect of $\frac{c}{A_1}$ on the social transfer S_1 is non-linear. Assuming a sufficiently small value of $\frac{c}{A_1}$, i.e., $\frac{c}{A_1} < (1+g(0))\int_{\hat{\varepsilon}^{dem}}^{\hat{\varepsilon}^{dic}} ((\lambda-1)\varepsilon_i - e)di$, the first period is the last period for the dictator, thus, $S_1 = S^{exg}$. When $\frac{c}{A_1}$ exceeds this threshold value, the dictator could live for two periods. However, she isn't willing to live such a long time as long as $S_1^r < \tilde{S}_1$, because living for two periods implies that she has to set the social transfer so low that her life-time income of two periods is even smaller than that of one period. In this case, the dictator would

like to transfer more to citizens, although it leads to a sooner revolution. When $\frac{c}{A_1}$ increases further so that $S_1^r \geq \widetilde{S}_1$, the ruler can and is willing to live for two periods. Then she chooses $S^* = \min\{S^r, \hat{S}\}$. However, it does not mean directly that her social transfer is greater than S^{exg}. Whether S^* is greater than S^{exg} depends on $\frac{c}{A_1}$. If $\frac{c}{A_1}$ is not so big, S^r could be smaller than S^{exg}. According to McGuire and Olson (1996), the longer the ruler's life-time is, the higher is her incentive to be good. Here, we show that it is also possible for the ruler to be worse, when her life-time increases. The reason is that she wants to keep her longer life-time, and is concerned more with the negative effect of her social transfer policy in the long run. This relationship is shown in the following figure.

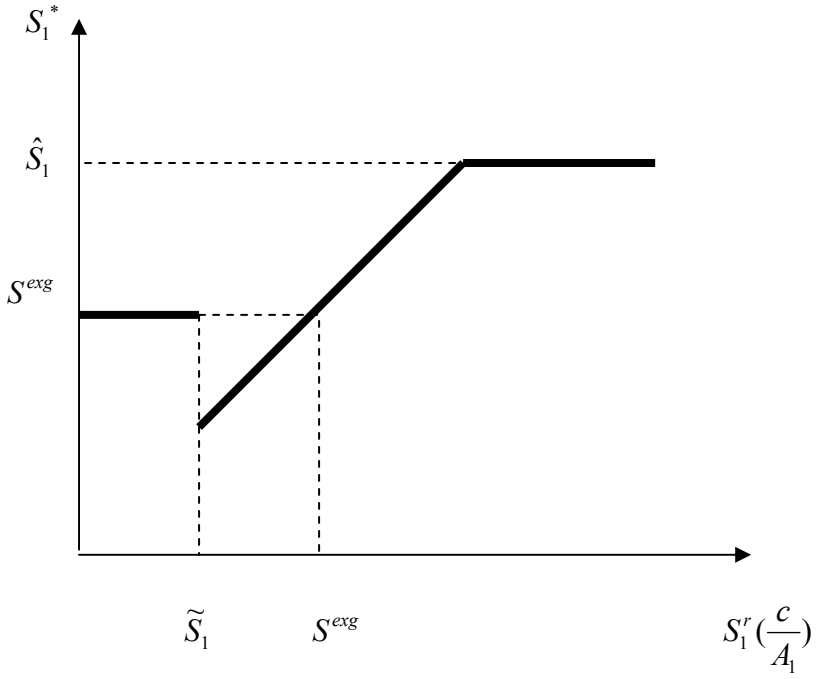

Figure 2: Effect of S_1^r, $\frac{c}{A_1}$ on optimal social transfers

6. Summary

In the current paper we discussed 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 emphasized two important effects of private investment in production: the individual effect which improves private output, and the positive externality on the aggregate technological level. We find that

the dictator is more likely to 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. Possible evidence is the gradual process of Chinese reform, in which regions and sectors reform one after another. For the local government, the investment from the central government in its region could be seen as a "natural resource", because the local government can use it free of charge. The less it is, the lower is the return rate of private investment, in turn, the lower the investment ratio. Hence, the local government, who is far away from the economic center in the old system, has a higher incentive to encourage private investment. Chinese reform began from the agricultural sector, where the central government invested nothing in the command economy. Moreover, the agriculture reform began from the poor province, Anhui. The nowadays fast growing provinces, e.g., Zhejiang, Fujian, Guangdong, are all less developed areas in the old system. Northeast China, where is the economic center of the old system and attracted the most investment from the central government, is in recession now. Our finding does not directly contradict the study of Laffont and Qian (1999), where they argued that the necessary condition of reform in one sector is that the private return of investment in this sector is large enough to compensate the rent of government in the old system. We argue that the ruler would prefer to choose the sector with a lower private rate of return, if there are several sectors satisfying the necessary condition.

After endogenizing the growth rate, we find two different effects of economic performance on democratization. The good dictatorship is capable of reducing the incentive of a revolution through increasing the citizens' investment ratio and their income, but it is also possible to lead to an earlier democratization given higher economic growth rates. The effect of the revolutionary costs on the behavior of the ruler is non-linear. As a consequence long life-time does not always lead to a good dictator.

Appendix

Appendix 1:

The payments of citizens whose ability over $\hat{\varepsilon}^{good}$ are:

$$P_{i,t}^{good} = \mathrm{A}_t N\lambda\bar{\tau}\varepsilon_i - s^{good} = A_t(N\lambda\bar{\tau}i - \frac{e - N(\lambda-1)(1-\bar{\tau})^2}{2-\bar{\tau}})$$

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

For the person with ability 1, the payment is:

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

Hence, the citizen with ability 1 always supports democracy.

For the person with ability $\hat{\varepsilon}^{good}$, the payment is:

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

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

Appendix 2:

One reason to assume an equally distributed social transfer in democracy is that, we cannot know *a priori* who constitutes the majority. Theoretically, 50% of the population plus one individual could make up the majority, who support the social transfer policy only benefiting them. However, some may doubt whether the result of this paper is sensitive to the assumption of equally distributed social transfer in a democracy. This appendix shows us that the result of my paper doesn't change qualitatively, if we assume that the social transfer

policy in a democracy is same as that in dictatorship, i.e., the individual who invests gets social transfer.

Since my model is based on a trade-off between the short run benefit and long run costs for the dictator, we need to show that citizens, in the aggregate, still have incentives to revolt under the new group-sepecific social transfer policy. I.e., democracy is still better than a dictatorship.

Analogously, the median vote maxmizes her income.

$$\underset{\tau}{Max}\, Y_{0.5,t} = 0.5A_t N\lambda^{I_{0.5}}(1-\tau) + I_{0.5}(s - eA_t)$$

$$s.t. \quad s = \frac{\tau\int_0^1 y_{i,t}di}{1-\hat{\varepsilon}} = \frac{0.5\tau A_t N\left(\hat{\varepsilon}^2 + \lambda - \lambda\hat{\varepsilon}^2\right)}{1-\hat{\varepsilon}}$$

If $\hat{\varepsilon} > 0.5$, i.e., the median voter doesn't invest, her maximization problem reduces to:

$$\underset{\tau}{Max}\, Y_{0.5,t} = 0.5A_t N(1-\tau)$$

The first order condition is: $\frac{\partial Y_{0.5,t}}{\partial \tau} = -0.5A_t N < 0$

Hence $\tau^{dem,1} = 0$, $s^{dem,1} = 0$ and $\hat{\varepsilon}^{dem,1} = \frac{e}{N(\lambda - 1)} < \hat{\varepsilon}^{good}$

If $\hat{\varepsilon} \le 0.5$, the median voter invests. Her maximization problem is then:

$$\underset{\tau}{Max}\, Y_{0.5,t} = 0.5A_t N\lambda(1-\tau) + \frac{\tau A_t N\left(\hat{\varepsilon}^2 + \lambda - \lambda\hat{\varepsilon}^2\right)}{2(1-\hat{\varepsilon})} - eA_t$$

The first order condition is: $\frac{\partial Y_{0.5}}{\partial \tau} > 0$

Hence, $\tau^{dem,2} = \bar{\tau}$ and $s^{dem,2} > 0$. Because there is no expropriation, the individual who invests gets more social transfer in a democracy than in a dictatorship. Thus, $\hat{\varepsilon}^{dem,2} < \hat{\varepsilon}^{good}$.

Summarizing, in a democracy the investment ratio is always greater than in a dictatorship. I.e., the citizens in aggregate can earn more in democracy. Hence, they are willing to revolt if possible. The dictator must face the trade-off between the short run economic benefit and the earlier democratization in the long run. Our result would not change qualitatively.

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), 2001, pp. 938-963.

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), 2004a, pp.162-192.

Acemoglu, Daron, Johnson, Simon and Robinson, James "Institutions as the Fundamental Cause of Long Run Growth" *NBER Working Paper* No: w10481, 2004b.

Aghion, P. and Howitt, P. "A Model of Growth through Creative Destruction", *Econometrica* 60, 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

Bénabou, 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), 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

Collins, S.M. and Bosworth, B.P. "Economic Growth in East Asia: Accumulation versus Assimilation", *Brookings Papers on Economic Activity* 2, 1996, pp.135-203.

Collier, P. "Implications of Ethnic Diversity", *Economic Policy* 32, 2001, pp. 127-166.

Cox, Gary W. *Making Votes Count*, New York: Cambridge University Press. 1997

Easterly, W. and Levine, R. "Africa's Growth Tragedy: Policies and Ethnic Divisions", *Quarterly Journal of Economics* 112, 1997, pp.1203-1250.

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

Konrad, Kai A. "Investment in the Absence of Property Rights: the Role of Incumbency Advantages", *European Economic Review* 46(8), 2002, pp. 1521-1537.

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.

Laffont, Jean-Jacques and Qian, Yingyi "The Dynamics of Reform and Development in China: a political economy perspective" *European Economic Review, Papers and Proceedings*, 43, 1999, pp. 1085-1094.

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.

McGuire, M.C. and Olson, M. "The Economics of Autocracy and Majority rule", *Journal of Economic Literature* 34, 1996, pp.72-96.

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.

Tornell, Aaron and Lane, Philip R. "The Voracity Effect", *American Economic Review*, 89(1), 1999, pp.22-46.

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.