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Hamanaka, Shingo

Yamagata University

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Inequality and Authoritarianism in the Developing Countries

Shingo HAMANAKA *

Abstract

This research attempts a theoretical and quantitative analysis of authoritarian regimes enduring in the developing countries. We attempt computer visualization of the model developed by Acemoglu and Robinson in order to derive an empirical hypothesis easily. There is a reason for us to accept the model that they build on the principle of dynamic stochastic general equilibrium. The numerical simulation describes a causal relationship between national income sharing and regime change, and delineates the economic impact of regime transformations. The random effects ordered probit analysis of panel data provides evidence that supports the hypothesis from the simulation. This result contributes to empirical democratization studies because of non adherence to a positive relationship between inequality and democracy among quantitative researches.

According to *The Economic Origins of Dictatorship and Democracy*, the poor have no incentive for regime transformation and authoritarian regimes are preserved in a state of equilibrium in comparatively equal societies.

What conditions democratize a dictatorship? This is an important subject in comparative politics. The modernization paradigm has already tried to answer this question. According to Lipset (1959), democracy endures in affluent society. He verified the hypothesis from correlations between cross-section aggregate indicators of wealth. Another popular work insisted not economic growth but institutionalization was a key factor. Huntington (1968) identifies that institutionalized regimes were an explicit prerequisite for economic growth independently of democracy or not in the research of many historical cases around the world.

The modernization school faced the breakdown of democratic regimes in developing countries later and was therefore thought to lose its own viability. The bureaucratic authoritarian (BA) argument explained a mechanism of conflicts between regimes and labor sector prompted a coup. The implication of BA theory was there was non liner relationship between political regimes and economic growth. O'Donnell (1979) gives an alternative explanation of the modernization theory, especially Lipset thesis.

However, the wave of democratization, or redemocratization, led to both the revival as

* Faculty of Education, Art and Science, Yamagata University

well as the reconstitution of democratization theories that contained the old paradigm. O'Donnell, Schmitter, and Whitehead (1986), an early study of this revival, make the important suggestion that it is the decision of dictators that determines the breakdown of an authoritarian regime. Previous studies dedicated efforts to specifying what conditions facilitate democratization, but did not specify the conditions that allow leaders to decide whether to renounce dictatorships. After that, several studies paid attention to the decisions and environmental conditions of leadership, the so-called "actor approach."

The finding of BA theory later turned out to be a study founded on a distant outlier sample. Przeworski's group reviews the research of the modernization theory and found several results. For us, there is three interested knowledge of them: (1) it is easy to predict whether democracy is enduring statistically, but it is almost impossible to predict it is born or abort. (2) Dictatorships are much more vulnerable under the unequal distribution of income. (3) Democracies remain stable in relatively equal societies.

Although there are valuable insights among the work of Przeworski (2000), model development to explain political-economic relationship remains an issue. The statistical researches for cross-section or time series data have measure aggregate variables, assumed that economic growth or crisis affects a political regime in whole since the work of Lipset. Therefore, a number of literatures are lacking in the idea of macro theory with micro theoretic foundations. It is that we should think a holistic social change is founded on collective behavior of individual actors. The principle emphasizes internal consistency of the model to describe how to change political regimes by interaction with explicit behavior of actors under given socio-economic situation. This is a reason to embrace formal theory approach in this paper.

This paper is composed of the following four parts. The first part let us to review the literature about formal theory as well as empirical studies for political regimes and state of the economy, especially the state of income distribution. The next step is concerned with obtaining an inference from computer simulations of the Acemoglu and Robinson model. Then we will build a hypothesis of regime enduring: low income inequality preserves the authoritarian regimes in the developing countries. The third shows that the hypothesis is tested in panel data analysis with the ordered probit model. The last part is a discussion to establish the validity and perspective of this research.

1. The Literature

1.1 Formal Models of Political Development

An epoch-making word in macroeconomics is "Lucas's Critique." Robert Lucas criticized and undermined the foundation of the Keynesian economic theory, which was the mainstream theory at that time. He claimed that the Keynesian economic theory did not assume that each household decides its consumption patterns by reckoning its own expected income in other words, the econometrics treated aggregate macroeconomic variables without microeconomic foundations. A macroeconomic variable should be the sum of the variables that describe individual behaviors in the market. Therefore,

macroeconomic theory must be established on the microeconomic level to analyze any individual decision problems. The Keynesian economic theory was forced out of the mainstream; both neoclassical economics and the new Keynesian theory came into fashion because of their model-building style based on the common micro foundation.¹

It is possible that the substance of “Lucas’s Critique” holds true for other social sciences, political science, or sociology. The macro theory of social science should be established on micro theoretical foundations that explain any individual choices as well as preferences. The modernization paradigm, bureaucratic authoritarianism, or corporatism theories are commonly devoid of a micro theory and thus cannot be applied to modern political analysis without revision. Even if a researcher employed a statistical approach, e.g. Large N studies, by using the above political theories, he would only obtain an empirical rule on the data as the result. He would lapse into “measurement without theory.”

The rise of the “actor approach” was referred to above. In most cases, authoritarian breakdowns and the emergence of democratization have been triggered by the decisions of political leaders and are not associated with revolution. Several previous studies, including that of O’Donnell et.al. (1986) or Przeworski (1991), have micro foundations owing to the focus on the interaction between incumbents and oppositions. However their works did not overcome an analogy, it was Weingast (1997) who produced the first work on the model with an explicit description of the player’s preferences and behaviors. The game theory is convenient for depicting decision-making processes under uncertainty. Therefore, democratization studies are increasingly adopting a game theoretic framework. For example, we can point to Geddes (1999) who formalized different robustness of authoritarian regimes to democratization, and Boix and Storks (2003) who described democratization and political decay in the game theoretic form, thus avoiding this common fallacy.

Macro level studies of comparative politics with micro foundations are getting more influenced by the modern macroeconomics, regardless of one’s wishes. At the least, political economists cannot discuss the economic influence over politics without acknowledging economic theory. This fact forced us to decide whether to accommodate an assumption — the optimization by individual actors — or not. This assumption implies that a person decides for the future; this enables us to weigh individual political decisions under the utility maximization principle common to modern economic theories. Without it, we would encounter a large obstacle to conducting a coherent analysis because of an unclear presumption about the behavior behind the model. The accommodation of the optimal decision rule by actors involves a theory of political economy based on dynamic stochastic general equilibrium models (DSGE). It is the only work of Acemoglu and Robinson that set up the democratization theory based on the foundation of DSGE. This is the reason that we embrace their model.

1 See Kato (2007) and Saito (2006).

1.2 Empirical studies on the relationship between inequality and political regimes

The literature of the relationship between inequality and political regimes exhibited three patterns of empirical evidence, (1) income inequality destabilizes democracy, (2) there is no statistical significance between inequality and political regimes, and (3) democratization initially increases the income gap between the rich and the poor but subsequently political elites try to reduce it.

Muller (1985, 1988, 1995) supports the first result. His studies statistically show the negative relationship between political stability and economic inequality, within democracies. According to Muller (1995), inequality has a significantly negative effect on democracy in his regression analysis, resulting in the conclusion “income inequality hinders democratization, and this negative effect explains the paradoxical trend among countries at intermediate levels of economic development for democracy to decrease instead of increase.”² His conclusion concurs with a major theoretical implication: democratization or enfranchising people provides the chance of decreasing inequality through higher redistributive taxes.³ Muller’s explanation predicts that political decay will appear under nonfunctional democracy.

The statistical analysis of Bollen and Jackman (1985) adheres to the second result. Bollen and Jackman pay attention to the procedure of the model specification, lest they get trapped into both specification and measurement problems from previous studies. Their simultaneous-equations model provides empirical evidence that inequality cannot explain variance of political regimes. The major conclusion is “political democracy and economic inequality do not seem linked in any meaningful way. It is possible that future studies with better measures, a larger sample, an alternative specification, or some combination of the above, might provide evidence of a democracy-inequality linkage.”⁴ Gasiorowski (1997) is another study that supports the second result. His main conclusion is that industrial wage growth i.e., the index of inequality, has no significant relationship with specific political regimes.

Simpson (1990) is a unique study that backs up the third result. He regards the inequality-political regime relation as a nonlinear form and builds up the polynomial function model for his empirical test. Simpson hypothesizes that a small minority will use their political rights for their own interests during the early stages of democracy and hence, the political process will increase inequality or expand income gaps between the rich and the poor. Since an enlarged constituency appears to participate in politics, economic inequality will gradually decline. This gives us an image of political democracy as having an inverted-U curve relationship with inequality. His regression model proves that the effect of democracy on income inequality is statistically significant.

The statistical approach of the literature has a common problem of the methodological

2 Muller (1995, 975).

3 Meltzer and Richard (1981) exhibit the implication from their formal model of election politics and optimal redistribution.

4 Bollen and Jackman (1985, 450).

limitation of applying cross-section data analysis. This research cannot assist in analyzing unsystematic and low quality data-sets containing several missing values. However, we can benefit from a systematic collection of data on comparative political economy. Some high quality data-sets enable researchers to analyze the effect of income inequality on political regime dynamics, not only in cross-section but also in a time-series direction. Boix (2003) applies pooling estimations from his own panel dataset and gets the opposite result to us: equality promotes democracy.⁵ The basic data of economic equality is Deininger and Squire (D&S) in the study of Boix. D&S is a milestone research project that produced a dataset of economic inequality in cross-country comparison. D&S data is widely used for empirical studies in comparative politics or econometrics. This data, however, contains many missing values as well as duplicate indices due to the complications of research units, urban or rural, personal or family. Adam Przeworski cautions the hypotheses between economic inequality and democracy are almost impossible to test because of the data deficiency.⁶ Consequently, our empirical research approach is subject to the following procedure for the utilization of panel data.

2. Model and Simulation

2.1 The Basic Model

We first introduce the model of political economics developed by Acemoglu and Robinson (2006). This model builds a society with n citizens. The notation y^i refers to income of person $i = 1, 2, \dots, n$. Let us use the superscript i to denote social classes with $i = p$ or r .

The rich have a fixed income y^r and the income of the poor is $y^p < y^r$. The notation θ is the share of total income accruing to the rich. The poor are the majority, so their portion represents $1 - \delta > 1/2$ in the normalized population.

$$y^p = \frac{(1 - \theta)\bar{y}}{1 - \delta} \quad \text{and} \quad y^r = \frac{\theta\bar{y}}{\delta} \quad (1)$$

where $0 < \theta < 1$. The magnitude of θ indicates the degree of income inequality. \bar{y} is the mean income. It is easy for us to recognize $y^p < \bar{y} < y^r$.

We begin under a dictatorship. Political leaders are able to carry out discretionary fiscal policy, tax, and redistribution without the approval of a constituency. The rich carry weight in public policy decision making, many of them being in the inner circle of power. They tend to enjoy lower tax rate as well as little redistribution, the optimal tax rate being zero for the rich.

The feasibility of a revolution depends on the following constraints; $\mu < \theta$. μ denotes a lost fraction of income due to a revolution, $0 \leq \mu < 1$. If the poor attempted a revolution with the binding constraint and succeeded, they would get $V^p(R, \mu)$. Following

5 Both Feng and Zak (1999) and Reuveny and Li (2003) support this opinion.

6 Przeworski et al. (2000, 117).

the victory, the poor would have the average national income divided equally among them. The rich would lose all their property.

$$V^p(R, \mu) = \frac{(1 - \mu)\bar{y}}{1 - \delta} \quad (2)$$

Both politicians as well as the rich hope to avert such a disastrous outcome and thus, there is an incentive to increase the payoff of the poor through an income redistribution policy. The poor would not plan a revolution if they enjoy a sufficient quantity of income over $V^p(R, \mu)$. Notating $\hat{\tau}$ means a high enough tax rate to avoid a revolution. Thus, a poor citizen gets private and public redistribution under a dictatorship with the value function $V^p(y^p | \hat{\tau}^N = \hat{\tau})$.

$$V^p(y^p | \tau^N = \hat{\tau}) = (1 - \hat{\tau})y^p + (\hat{\tau} - C(\hat{\tau}))\bar{y} \quad (3)$$

The first term on the right side in equation (3) suggests income after tax; the second term represents a redistribution part. $C(\hat{\tau})$ is the cost of government. Politicians would decide on a tax rate to maximize their own value functions. In the original model, Acemoglu and Robinson show the value function of the rich, as having the same form as that of politicians. However, there are no specific expressions of the cost of government as well as the tax rate. In this article, the specific tax formula and the cost function of the government are written to avoid a revolution catastrophe where the value function of the rich is not taken into account. This manipulation is indispensable for resolving the computer simulation.

The government cost is a twice continuously differentiable function of tax. Acemoglu and Robinson (2006) assume that there are no costs when there is no taxation. In this game, authoritarian leaders try to abort a revolution attempt using taxation. They calculate revolution probability from the size of μ , so that both the cost function and the tax formula are specified as follows:

$$C(\tau) = \frac{\tau^{1-\eta}}{1-\eta} \quad \text{and} \quad \tau^N = d(1 - \mu) \quad (4)$$

The parameter η is a non negative real number, not greater than one. This type of cost function is usually called CRRA — constant relative risk aversion. We set $\eta = -3/2$ for the numerical analysis. The parameter d is also defined as non negative real, given $d = 5/6$.

The model proposes to represent the strategies of the poor as a dynamic process. Such an approach would give us a situation where a player chooses an optimal game among many strategies in thinking about a previous play. It is a so-called Dynamic Game, that can be solved in the form of Markov Perfect Equilibria (MPE).⁷ To characterize the pure strategy MPE of this game, $\hat{\sigma}^p$, we write a Bellman equation of the value function of

⁷ See Fudenberg and Tirole (1991), chapter 13.

the poor.

The Bellman equation is a method for solving a sequential problem. Let $\beta \in (0,1)$ be a discount factor. The utility of the poor is written with the discounted sum of income after tax in an infinite sequence. Formally, consider the following Bellman equations from the utility function of the poor:

$$U^p = \sum_{t=0}^{\infty} \beta [(1 - \rho_t)((1 - \tau_t)y^p + (\tau_t - C(\tau_t))\bar{y}) + \rho_t y_R^p] \quad (5)$$

$$\begin{aligned} V^p(R, \mu_t) &= \frac{(1 - \mu_t)\bar{y}}{(1 - \delta)} + \beta V^p(R, \mu_{t+1}) \\ V^p(N, \mu_t, \tau_t^N) &= y^p + (\tau_t^N(\bar{y} - y^p) - C(\tau_t^N)\bar{y}) + \beta V^p(N, \mu_{t+1}, \tau_{t+1}^N) \\ s.t. \quad \mu_{t+1} &= g(\tau_t^N, \mu_t) \end{aligned} \quad (6)$$

Poor agents can choose one of two policy options — a revolution or enduring life under the dictatorship. $\rho_t=1$ means that the revolution happened before t , and $\rho_t=0$ implies the contrary. y^p_R is the income of the poor after the revolution, usually identical to $V^p(R, \mu_t)$. “If revolution is attempted, it always succeeds, but a fraction μ_t of the productive capacity of the economy is destroyed forever in the process.”(Acemoglu and Robinson 2006,152.) We do not have to think about the problem of collective action in the game.

To optimize their own value function, citizens choose feasible policy options assuming about both μ and τ with the constrained condition $g(\tau_t^N, \mu_t)$. We can easily obtain the specified form of $g(\cdot, \cdot)$ from the tax formula (4). If a possible fraction of lost income μ , were larger, the poor would avoid the choice of revolution and would welcome an authoritarian rule with enough redistribution to improve their quality of life.

2.2 Computer Simulation

We propose to investigate whether income inequality effects political stability. This example compares two cases where $\theta^L=0.35$ and $\theta^H=0.65$. All the simulations have common parameter sets following $\beta = 0.9$, $\delta = 0.2$ and $\bar{y} = \$5000$ (per capita income). This computation is the numerical analysis of a dynamic programming in discrete time, discrete state Markov decision model. Therefore, the strategy profile of a player is subject to a deterministic state transition function.⁸ Figure 1 displays the results of the simulation. The case of an equitable society θ^L is expressed in the upper diagrams. The other case i.e., of social inequality θ^H , represented in the lower ones. The left-hand diagrams of Figure 1 indicate that the threat of a revolution influences the payoff of the poor. The right-hand ones imply that taxation and the fiscal policy prevent a revolution from impacting an authoritarian government. The poor agents attempt the revolution with small μ in both

8 This study prepared two MATLAB programs, NDP1.m and NPD2.m (<http://www.e.yamagata-u.ac.jp/~oshiro/replication4.htm>). They need the CompEcon toolbox developed by Mario Miranda and Paul Fackler. See Mirand and Fackler (2002), especially chapter 7.

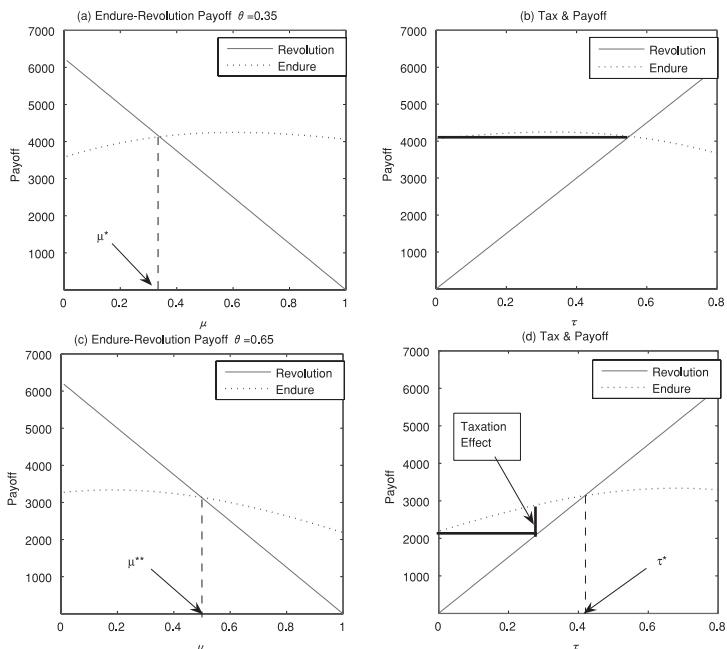


Figure 1 Revolution or Enduring Dictatorship

parts (a) and (c). Revolution is a rare event, however, as it is deemed to be very costly for a society. It is not realistic to assume that the income lost during a revolution is only a small fraction of the total.

Both μ^* and μ^{**} show that there is no difference between the value of enduring dictatorship and revolution on the left of Figure 1. We know that a comparatively equal society will be more capable of resisting disturbance than an unequal one from $\mu^* < \mu^{**}$. The revolution constraint does not bind $\theta \leq \mu$, citizens never rise in revolt and authoritarian regimes survive. μ^* is located adjacent to $\theta^L = 0.35$ at part (a). This suggests that the probability of a revolution is low in a society with equal distribution. On the other hand, there is a distance between μ^{**} and $\theta^H = 0.65$ at part (c). The dictatorship with θ^H is vulnerable to the threat of a revolution attempt by the citizens. In other words, the taxation policy has a greater effect on the endurance of a dictatorship under the circumstance θ^H than θ^L in parts (b) and (d).

A successful revolution will benefit the poor financially and punish the political elite (the rich). The poor have an incentive to rebel and bring down the dictatorial government that imposes such a brutal inequality. The solution produced by this dynamic model offers sound advice to authoritarian political leaders who, in order to avert a catastrophic outcome and also retain their dictatorship, must impose levies on the rich and redistribute to the poor.

2.3 The Extended Model

The basic model of non-democratic politics regards only revolution as a means

towards political change. Let us extend the model of dictatorship to think about democratization. This extended model introduces the value functions of the rich and involves a choice that is faced by politicians. The theories of the democratization game form a premise that political leaders have the initiative to decide political liberalization and enfranchise people in free and fair election, in future. Naturally, the elite have another political option i.e., repression. What factors influence the decision of politicians in the democratization game?

Acemoglu and Robinson (2006) provide a simple game tree on democratization or repression. An important factor in this game is whether the revolutionary threat from the poor is credible or not. If the threat were serious for the elite, dictators would choose to repress violent movements before the revolution succeeds. Another feasible action for the rich is that leaders promise to impose levies and carry out redistribution in the near future. However, this promise must be credible enough for the citizens to back down.

Democratization is a feasible event with the binding condition $V^p(D) > V^p(R|\mu)$. The condition — $V^r(D) > V^r(R|\mu)$ is also obvious, because the rich will lose all their property after the revolution $V^r(R|\mu) = 0$. We take into account the value functions of the rich because of their influence over political decisions. The value function of the rich is defined under democracy as follows:

$$V^r(D) = V(y^r|\tau^D = \tau^p) = y^r + \tau^p(\bar{y} - y^r) - C(\tau^p)\bar{y} \quad (7)$$

The tax rate under democracy τ^D is most advantageous for the poor τ^p by the median voter theorem. The median voter, a citizen belonging to the poor because of $1 - \delta > 1/2$, will choose τ to maximize $V(y^p|\tau)$ in every election. In a democratic polity, the rich bear the burden of governmental costs as well as transfers of income.

Let us now attempt to expand the model into a more realistic world. A society has a simple economic structure with the aggregate production function, $Y = F(K, L, N)$. Y is the aggregate output, usually national income; K is the capital stock, L is the land, and N is the labor force as a production factor. This aggregate function can be specified in the Cobb-Douglas form:

$$\begin{aligned} Y &= (K + \sigma L)^\theta N^{1-\theta} \\ &= (K + \sigma L)^\theta (1 - \delta)^{1-\theta} \end{aligned} \quad (8)$$

The notation σ is the productive efficiency of the land relative to the capital stock, $\sigma > 0$. Acemoglu and Robinson regard the income distribution rate of labor as $1 - \theta$, $0 < \theta < 1$. The labor force, N is deemed to be wage earners. They are identified with the poor, $1 - \delta$ part of the citizens without the capital stock and land.

Then national income Y divided by total population gives average income \bar{y} . Now, we can rewrite it:

$$\bar{y} = (K + \sigma L)^\theta (1 - \delta)^{1-\theta} \quad (9)$$

From equations (1), (7), and (9), we can derive a new expression for the value function of the elite under democracy as follows:

$$V^r(D) = \frac{1}{\delta}(\theta + \tau^p(\delta - \theta) - \delta C(\tau^p))(K + \sigma L)^\theta (1 - \delta)^{1-\theta} \quad (10)$$

In the following section, we deal with the value function of the elite under authoritarian regimes. The dictator is able to repress citizens who support democratization or revolution. However, it is necessary to allow for a cost when using repression policy. The cost of repression is deducted from the payoffs of both the poor and the rich. In other words, the citizens have to bear the cost of repression, κ . The expression of this situation is:

$$V^p(O|\kappa) = (1 - \kappa)y^p \quad \text{and} \quad V^r(O|\kappa) = (1 - \kappa)y^r \quad (11)$$

The letter O denotes “oppression” and κ refers to the fraction of income destroyed by repression. The rich own the capital stock or the land — or both to earn their income in the world with a simple economic structure. It is easy to imagine that the capital stock is more fragile when subjected to repression and conflict than the land. Capital is a fluid asset. Therefore war, turmoil, and political violence induce capital exodus. We have assumed that $\kappa_K \geq \kappa_L$.

It is necessary, at this point, to assemble notations and simplify $\kappa_L = \kappa$. Then we can introduce a parameter ϱ , $\kappa_K = \varrho\kappa$. This leads us to express the value function of the rich under dictatorship with repression. From the equations (1), (9), and (11):

$$V^r(O|\kappa) = \frac{\theta}{\delta}((1 - \varrho\kappa)K + \sigma(1 - \kappa)L)^\theta (1 - \delta)^{1-\theta} \quad (12)$$

The derived equations (10) and (12) provide some results of a computation of democratization. They show the factors that influence the decisions of the political elite under a dictatorship to enfranchise the citizens and give them political rights, otherwise a demonstration or social movement for democracy will be mobilized involving armies, police, and security forces.

2.4 Computation of the Extended Model

Numerical computation provides an easily understandable visual solution to the extended model. We set specific numbers on some parameters: $\delta = 0.2$, $\tau^p = 0.45$, $\varrho = 1.5$, and $\sigma = 1$. θ and κ are variables with a range from zero to one. The simulation model can be derived from equations (10) and (12), simplified in terms of the capital land ratio $k = K/L$. We give it a specific number for simulation $k = 5$. The rewritten formula is:

$$\theta + \tau^p(\delta - \theta) - \delta C(\tau^p) < \theta \left(\frac{(1 - \varrho\kappa)k + \sigma(1 - k)}{k + \sigma} \right)^\theta \quad (13)$$

9 My MATLAB program, ARch9.m (<http://www.e.yamagata-u.ac.jp/~oshiro/replication4.htm>), draws Figure 2 and 3.

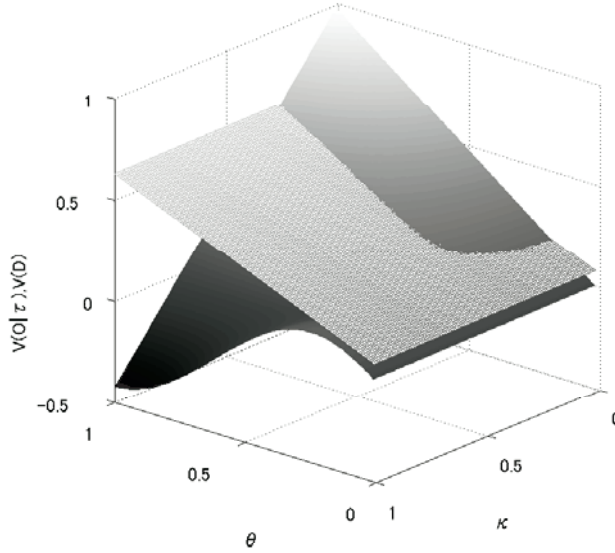


Figure 2 Democratization or Enduring Dictatorship

If the formula (13) holds, it means the elite use repression to preserve an authoritarian regime. Otherwise, the elite give up the survival of their regime and promise democratization to the poor.⁹ This proposal is a credible commitment to encourage the poor to believe in future redistribution.

Both Figures 2 and 3 describe a solution for the simulation model in (13). Figure 3 is a two-dimensional diagram of Figure 2. The light-colored area expresses the value of the rich under democracy. The area with dark coloring is the visualized value of the rich under dictatorship. The large light-colored area is over the dark-colored area in Figure 2. This means that the rich prefer democratization to dictatorship if κ is higher, regardless of θ . With the lower cost of repression, income inequality affects the selection of a political regime.

Figure 3 clearly shows us some interesting cases. For example, the political elites depend on θ to decide whether or not to go for democratization with κ adjacent to 0.35. Authoritarian governance is better for the rich than democracy at θ with a range of about 0.3 to 0.51. Otherwise, democratization is better. In addition, θ is always larger than 0.2 because of $\theta > \delta$ and $\delta = 0.2$.

This solution presents two implications with a binding condition that the cost of repression is low. First, an unequal society under a dictatorship is susceptible to pressure for democratization. The poor have an incentive to undermine a regime under which economic policies do not result in the reform of crucial inequality. The rich also have a reason for alienating an incompetent dictatorship in order to placate the angry citizens who are subjected to hardship. With a credible commitment to redistribute, the citizens have a tendency to choose democratization in a society with a severe economic divide.

Second, it is more important that dictators have a policy option for their own regime

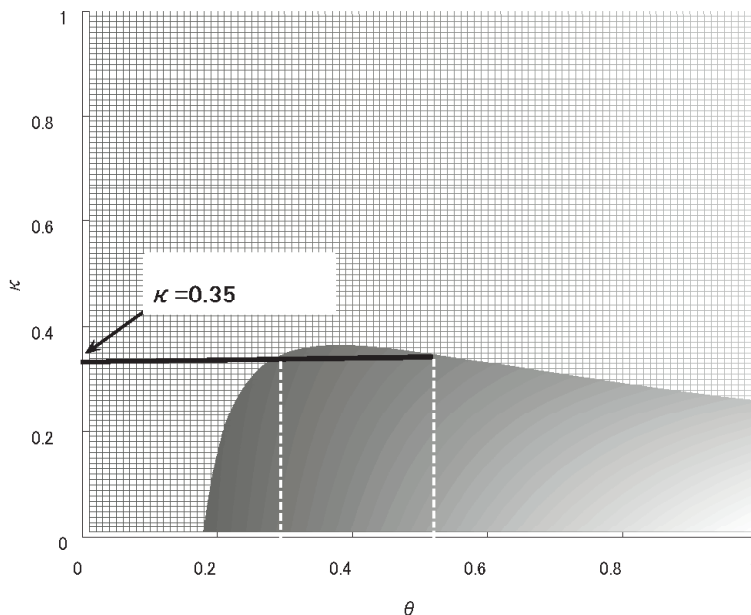


Figure 3 Democratization or Enduring Dictatorship

survival. This option is to increase public expenditure to minimize income inequality. If they succeeded in controlling θ , the life of the regime would be prolonged.

These implications from the simulation provide a hypothesis for political scientists who study the robustness of authoritarian regimes, for example politics in the Middle East.¹⁰ The hypothesis is that societies with less inequality do not suffer from a threat of regime change.¹¹ However, we should note whether the cost of repression is low enough to endure a dictatorship. It follows that, in this section, computer simulations have produced the above hypothesis. Let us start the empirical analysis in the next section.

3. Empirical Analysis

3.1 Research Procedure

We employ cross-section and time-series panel data analysis. The sample includes 136 countries for the period 1970–1999. The data fits the requirements for the volume of information for the number of countries as well as time-series period. We design the data-set for the purpose of containing as many developing countries as possible.¹²

Our research aim is to measure the effect of income inequality on democratization.

10 World Bank (1995), Page (1998), Adams and Page (2003) discuss income distribution of the countries in the Middle East and North Africa.

11 Acemoglu and Robinson comment on an inverted U-shaped relationship between democracy and inequality because new democracy would not consolidate itself without equalizing the society. However, we regard only democratization process in the model by the lack of experience of democracy in the Middle East.

12 The data-set is available at <http://www.e.yamagata-u.ac.jp/~oshiro/replication4.htm>.

We use the estimated household income inequality data produced by the University of Texas Inequality Project (UTIP). The major index of income inequality is the Gini coefficient, which is calculated using a survey research on personal income in a country. However, governments of developing countries do not have budgets or incentives for carrying out income surveys every year. There is also a difference in the methods of aggregation between countries. In certain countries, the Gini index is calculated not based on personal income but on family expenditure. This prevents us from collecting a comparable international dataset of income distribution.

The UTIP data is designed to measure global pay inequality — the project pays attention to cross-national comparison. James Galbraith, the project leader, has decided to apply Theil's T statistics from income data on quintile shares to conduct measurements across sectors within each country. UTIP staffs collate the data from industrial statistics of UNIDO covering 3,200 country-year observations. We adopt the UTIP data in accordance with the following criteria: a scarcity of missing values and a unique identification.

We use the Civil Liberties data compiled by the Freedom House as the index of repression cost; κ is an opportunity cost not measurable directly. However, the citizen may be subjected to surveillance or interrogation by security units of an authoritarian government at low repression cost. Such society lacks any sense of human rights as well as the protection of individual rights from public authority. The lower the repression cost, the wider is the degree of freedom of repressive measures under a dictatorship. The high Civil Liberties index means that there is no freedom of assembly, demonstration, open public discussion, or political or civic organization. It also means that there is no protection from political terror, unjustified imprisonment, exile, torture, or a breach of property rights by government officials.

The dependent variable is the competitiveness of political participation PARCOMP, produced by the Polity IV project. The reason for employing PARCOMP is that Acemoglu and Robinson (2006) set a competitive election for tax policy and redistribution at the core of their democratic politics model. They regard non-democratic politics as restricted competition for taxation at the stochastic risk of a revolution. It is deemed appropriate that we treat democratization as an ordered categorical variable.

Marshall and Jagers (2002) define PARCOMP is measured on a five-category scale. The least competitive category is "repressed" which contains totalitarian party systems, authoritarian military dictatorships, and despotic monarchies. The "suppressed" category permits some organized political participation outside the government. The regime prohibits some kinds of political organization or action, and frequently harasses political oppositions. In the "factional" category, parochial or ethnic-based factions can compete for political influence to encourage specific issues for their own interests.

The "competitive" category denotes free political participation in a democracy. The regime institutionalized elections as the formal channel to influence politics at the national level. Political parties or groups are not basically restricted or excluded from participation in the elections. Additionally, there is the "transitional" state between the factional

and competitive in PARCOMP.

This type of dependent variable i.e., ordered categorical scale, requires ordered choice models of panel data analysis. The acceptance is the random effects model of the ordered probit because our computation results describe that democratic transition, not consolidation, has a linear relationship with inequality. We reject other methods for the following reasons: assumptions of each country with inherent heterogeneity and dynamism exclude pooling estimations. However, panel data analysis with the large-N case encounters difficulty with estimation in the fixed effects model, when it loses degrees of freedom.

We set up income inequality and repression cost as two independent variables in the ordered probit model. Control variables are log transformed gross domestic products, economic growth rate, religious fractionalization, ethnic fractionalization, and dummy variable of developed countries. The sample is 136 countries with thirty-year periods.

3.2 Empirical Results

Table 1 reports the result of both the pooling estimation and the random effects model of the ordered probit analysis. We can observe from the chi-squared test that this empirical model is significant. A couple of independent variables such as income inequality and civil liberty, are also significant.¹³ The left side of Table 1 i.e., the pooling estimation, presents the negative relationship between inequality and political liberalization. The result is contrary to the hypothesis deduced from the model. The signs of both coefficients on the right side are in accordance with the Acemoglu and Robinson model. The result of the random effects model satisfies the outputs of the numerical simulation.

The impact of repression cost is considerably strong in Table 1. This is to be expected from the Acemoglu and Robinson model as well as from historical knowledge about democratization. We are interested in the effect of inequality on political liberalization under the control of repression cost, in accordance with theoretical inference. The statistical result supports the hypothesis from the simulation in Section 2.4.

It is not easy to interpret the coefficient of income inequality on the right in Table 1. An additional calculation will facilitate the interpretation of the result. The marginal effect of the variable shows an intuitive understanding of the impact of the income gap on political regimes. Judging from the cross-tabulation of predictions in Table 2, the model fits a set of observations.

Table 3 reports the marginal effects of income inequality. But we must take it into consideration that the Gini index is transformed in the estimations. We assume that inequality became worse, increasing from forty-five to fifty-five points of the Gini index. This deterioration, *ceteris paribus*, decreases the probability of “repressed” or “suppressed” competition and increases the probability of “competitive” participation in a democracy. The marginal effect of inequality has the following influence on the political

13 The quantitative models adapt the formula for income inequality in Reuveny and Li(2003): $\log[\text{Gini}/(100-\text{Gini})]$.

Table 1 The Effects of Inequality and Repression on Political Liberalization

Variables	Pooling estimation		Random Effects	
	Coefficient	S.E.	Coefficient	S.E.
Gini(log)	-0.443**	0.106	0.351**	0.104
GDP(log)	0.219**	0.041	1.134**	0.058
Growth	-0.003	0.005	-0.006	0.006
Civil Liberty	-0.964**	0.024	-1.025**	0.019
Religious Fraction	-0.198	0.131	0.157	0.283
Ethnolinguistic Fraction	0.548**	0.114	0.760**	0.215
OECD dummy	1.325**	0.118	1.252**	0.190
$\mu 1$	1.064**	0.040	1.291**	0.027
$\mu 2$	2.127**	0.045	2.555**	0.036
$\mu 3$	3.431**	0.064	4.544**	0.058
N	2125		2125	
Log Likelihood Function	-1729.524		-1507.166	

**p<0.01; *p<0.05.

Table 2 Frequencies of actual and predicted outcomes

Actual	Predicted					Total
	0	1	2	3	4	
0	294	128	40	22	1	485
1	87	137	63	50	0	337
2	19	60	95	123	15	312
3	4	22	50	182	64	322
4	0	0	5	67	597	669
Total	404	347	253	444	677	2,125

Table 3 Marginal Effects of Inequality

	Repressed	Suppressed	Factional	Transitional	Competitive
Gini (log)	-0.0146	-0.0334	-0.0348	0.0215	0.0564

competition: the probability of “repressed” is predicted to decrease by 0.58 and “suppressed” by 1.33 percent. “Factional” competition also falls by 1.39, however, the “transitional” category is expected to increase by 0.86 and “competitive” participation by 2.25 percent.

4. Discussion

This research undertakes a theoretical and quantitative analysis of enduring authoritarian regimes in the developing countries. The numerical simulation of the Acemoglu and Robinson model describes a causal relationship between national income sharing and political regimes, and exhibits the visualizations of the economic impact on regime transformations (Figures 1–3). The random effects ordered probit analysis with the

panel data provides evidence supporting the hypothesis from the simulation (Table 1). This result makes a meaningful contribution to empirical democratization studies because of non-adherence to a positive relationship between inequality and democracy among quantitative researchers.

The authors of *Economic Origins of Dictatorship and Democracy* remark that an empirical investigation is an area for future research.¹⁴ This study is an empirical quantitative analysis under the framework of the Acemoglu and Robinson model. We employ not the pooling estimation but the random effects model because of a proposition that each country has its own inherence and dynamism. The result of the pooling estimation suggests there is a tendency to advance political liberty in a small income gap society. It does not, however, support the logic that “redistribution policy narrows the gap between the rich and the poor under democracy.” The pooling estimation can be regarded as a kind of cross-section analysis with an increasing sample in the direction of time series. This method cannot utilize the volume of affluent information from panel data. Therefore, it is reasonable and proper to employ the random effects ordered probit estimation for the above reasons.

Let us think about the implication of the study. If authoritarian regimes are thought to be in a state of equilibrium, it is useful for an explanation of developing-country politics to inquire what mechanisms determine a political regime. Geddes (1999) produces one recent influential approach for equilibrium analysis. This work has common interests with us and insists that each regime type has a different tolerance to transformation shock. A certain type of political regimes is durable to shock because the follower benefits more from the strategy of supporting the dictator than from abandonment.

However, this approach remains within regime level arguments and only mentions that some types of politics have more vitality than others. There is also a technical problem in categorizing governments among them: the approach of Geddes is not free to face the difficulty of classification.

If the origins of transition shocks go back to economy, we should build a coherent theory on the assumption of an explicit principle about individual behavior behind a political choice: the utility maximization principle. This style paves the way to theorize comparative democratization studies from the political economic approach. The process of coherent model building contributes to the richness and accumulation of democratization theories. The advance of science, as recognized in other disciplines, will be seen in comparative politics. In addition, the political economic approach is free from the trouble of the polity classification problem.

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14 Acemoglu and Robinson (2006, 318).

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