Democracy as a Middle Ground: A Unified Theory of Development and Political Regimes*

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Abstract

We put forth a theory to explain the rather puzzling observation that while no long-lived autocratic country is currently among the rich industrial leaders and every long-lived democratic country is, democratic countries have not grown any faster than autocratic countries in the postwar period. Our theory builds on Mancur Olson's key insight that democratic regimes do not prevent growth inhibiting policies from being enacted because the benefits of such policies typically are concentrated within small groups whereas the costs are spread out over society. Thus, only the group wanting the bad policy will lobby the government. A benevolent autocrat, in contrast, will realize that the social costs of such policies exceed the social benefits, and hence will not allow such policies to be implemented. Hence, a country ruled by a good autocrat will grow faster than a democratic one starting with the same level of income. The problem with autocracy, however, is that a benevolent autocrat's successor might not be benevolent, and will expropriate the wealth of its citizens. For a poor country with little capital to expropriate, the optimal regime is autocracy for the reason that the cost of a drawing a self-interested autocrat is small compared to the benefit of drawing a benevolent one. However, as a country becomes rich and accumulates capital, these costs increase relative to the benefit, and at some point, the country switches to a democratic political regime. We illustrate our theory in a model of development and growth and relate its predictions to the empirical literature on economic performance and political regimes.

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1 Introduction

It is now generally recognized that democratic regimes have not outperformed autocratic ones over the post World War II period (Barro 1996). In fact, the best performances in this period tend to associated with autocratic regimes as the vast majority of growth miracle countries were autocratic at the time their miracles began. And yet, every long-lived democracy currently belongs to the set of the rich industrial countries and no long-lived autocratic country does (Persson and Tabellini 2007). Thus, it appears that autocratic rule is better on average than democratic rule for an economy's performance in the short-run, but worse in the long-run.

In this paper we put forth a theory to explain this rather puzzling set of observations. The theory rests on three main ideas. The first idea is that economic development does not benefit everyone in society. Some groups, particularly those with specialized factor inputs to the current technology, will suffer in the form of lower earnings as the economy develops. The second idea is that autocrats are not all alike. Autocrats differ in their preferences and objectives, and so will implement different policies, with very different consequences for development and growth. The third main idea is that democracy is not a panacea for growth as it does not guarantee that no barriers to development will be erected. Groups that stand to lose from industrialization are able to lobby a democratic regime to erect barriers to development on their behalf.

When combined, these three ingredients imply that democracy is a middle ground for development. A country ruled by a good autocrat will outperform a democracy, as a good autocrat both understands the negative effect that barriers that protect groups with interests vested to the status quo have on aggregate welfare, and because his political existence does not depend on the support of lobbies. A country ruled by an elite autocrat, or a kleptocratic one, however, will fare worse than a democratic one as both types of autocrats will implement policies that are worse for industrialization and growth.

Moreover, these three ingredients imply that as a country's living standard increases, the likelihood that it switches to a democratic system increases. The reason for this is that with development and the accumulation of wealth, the potential losses associated with a kleptocratic regime that accrue to individuals in a society, including the landed elite, who have the power

to decide whether the country should remain autocratic, increase. While the ideal autocrat for a member of the landed elite is an individual who shares their preferences and thus would prevent development, nevertheless, they may opt for a democracy so as to avoid the chance that a kleptocrat comes to power. While the income accruing to a member of the landed elite under democracy is lower than the income they earn under their ideal autocrat, it is higher than what they earn under a kleptocrat.

We illustrate our theory in a model that combines elements from the political economy literature and the growth and development literature. On the growth and development side, we use the model of Hansen and Prescott (2002). This model gives rise to a period of stagnant living standards, followed by an industrial revolution, followed by a period of modern economic growth. The era of constant living standards is associated with the use of a traditional technology that uses land as well as capital and labor inputs. The industrial revolutions correspond to the first period in which it is profitable to use a modern technology to produce goods and services. In contrast to the traditional technology, the modern one only employs capital and labor. The Hansen and Prescott (2002) model is well suited to study the issues at hand because it implies that the rental rate on land declines as the economy industrializes and moves more capital and labor into the modern technology. Thus, within this model, the group of landowners have an incentive to prevent industrialization.[1]

On the political economy side, we assume the class of landowners has the power to determine the country's political regime of the economy, namely autocracy or democracy. More specifically, as long as the country has maintained an autocratic regime in the past, this group at the start of the period decides whether the autocracy should be maintained or be abandoned in favor of a democracy. In both democratic and autocratic regimes, the leader may choose to erect barriers to the modern technology, block migration to urban areas and confiscate a share of bequests between generations.

Autocrats are randomly drawn from the population and differ in their preferences. There are three types: a kleptocrat whose utility depends only on his own consumption; a landed

[1] While we identify landowners as the group with vested interests in the status quo, none of our conclusions would change if we followed something along the lines of Krusell and Rios-Rull (1996) where workers who acquired capital in the old technology comprise the group that tries to prevent technological change.

elite who shares the preferences of the landowners; and a benevolent autocrat who cares about the utility of everyone in society. By assumption, an autocrat's reign is only a single period so he chooses policy with the sole objective of maximizing his utility. Moreover, in contrast to the selectorate framework of Besley and Kudamatsu (2007), the political elite cannot replace the autocrat in the period should he turn out to have preferences that differ from them, and thus wants to implement a policy that harms landowners. This happens if the autocrat turns out to be a kleptocrat, in which case capital is expropriated, or if the autocrat turns out to be benevolent in which case some barriers to the new technology are erected. In contrast, when the autocrat belongs to the class of landowners, he will block the new technology and delay industrialization.

Democratization is an irreversible decision. In the case the political elite make the irreversible decision to democratize, lobbying along the lines of Persson and Tabellini (2000) takes place. In the spirit of Olson (1982), we assume that only the landowner class constitute a lobby and thus are the only ones to make campaign contributions. Theses assumptions imply that the democratic leader will assign a greater weight to the lobbying group than a benevolent autocrat.

Within this framework, we explore how the economy's performance depends on the type of political regime and how the choice of the policy regime depends on the economy's wealth. We begin by fixing the political regime and in the case of autocracy, the autocratic type, and trace the economy's performance under the assumption that the regime does not change over time in order to show that democracy is a middle ground. Next, we endogenize the political regime and show that the economy democratizes at some date once its accumulates enough wealth. We then explore how such factors as the relative size of the landed elite affect a country's economic and political development.

Sokoloff and Engermann (2000) have argued that landed elites, particularly in Latin America, stood to lose with industrialization as it implied higher wages to be paid to farm workers. Some autocrats may have preferences that are in line with the country's landed elite, and thus maximize the welfare of that group by implementing growth retarding policy; others may have preferences that are entirely self-centered, and thus maximize their own consumption by im-

plementing dramatic growth inhibiting policy; and still others may have preferences that are egalitarian, and thus maximize the welfare of society by not imposing any distortionary policy. While groups that would benefit from growth could also lobby the government, they are less likely to do so. As argued by Olson (1982), the costs of industrialization will be more likely concentrated in a small subset of society whereas the benefits are spread out among society as a whole. Consequently, individuals belonging to a group that stands to lose from industrialization have a greater incentive to lobby the government. Democracy, thus, is inherently susceptible to the erection of barriers that retard development.

Our theory implies both a feedback from political regime to income as well as from income to regime. The causation from democracy to income is not simple as a good autocratic regime in our theory is better for a country's income. Thus, our theory is not inconsistent with Aghion et al. (2007) who find that democracy does not lead to higher growth. Our theory does imply a causation from income to democracy, and thus is inconsistent with the findings of Acemoglu et al. (2007), who find in a fixed effect model that income does not cause democracy over the postwar period, or twentieth century, but this result is controversial, and indeed puzzling, and even more so in light of the histories of democratic movements in several growth miracle countries. For instance, the political dialogue in several of the countries that experienced rapid increases in per capita income in the postwar period that transitioned to more democratic systems refers to the fear of expropriation of gains by future autocrats. Such dialogues were present in the democratization movements of Spain and Portugal in the late 1970's as well as in Taiwan. In Taiwan for example, rising living standard in the postwar period caused the GMD to include more people in the political process (Mau-Kei 2004).

The political and economic events in Argentina in the first half of the twentieth century perhaps best support our theory. As documented by Alston and Gallo (2007), Argentina began a transition to democracy as its per capita income level rose in the later part of the nineteenth century and first part of the twentieth century. In 1912, Argentina ended its autocratic tradition and adopted free elections with secret ballots. Between 1912 and 1930, democracy evolved and strengthened. This abruptly halted with the downturn in the world economy associated with the *Great Depression*. Given this shock and its adverse effect on Argentina's output, the

Conservatives who had controlled the political arena before 1912 resorted to fraud in order to wrestle power away from the Radical party.[2]

The paper is organized as follows. Section 2 documents the relation between political regime and development in the long-run and short run. Section 3 describes the model economy's structure. Section 4 characterizes the equilibrium for the model economy. Numerical experiments are reported in Section 5. Finally, Section 6 concludes the paper.

2 Empirical Observations

In this section we document some of the puzzling observations concerning the relation between political regime and development. We begin with an examination of the relation between income levels and stability. The relevant data is summarized in Figures 1 and 2. Figure 1 pertains to those countries that were listed as being democratic in 2000 according to the Polity indices from the Polity IV Project and is a reproduction of Persson and Tabellini (2007, Figure 1). Figure 2 pertains to those countries that were listed as being autocratic according to the Polity Indices from the Polity IV Project. Each figure plots a country's 2000 level of per capita GDP as reported by the PWT 6.2 against the number of years its 2000 regime has been in place. A country is identified as being democratic if its polity index is positive in the Polity IV data base and autocratic if it is negative. Figure 1 shows that no country with a long history of democratic rule is poor. Figure 2 shows that no country (outside the oil producers) with a long history of autocratic rule is rich.

Figures 1 and 2 here

While the long-run advantage of democracy is clear, the same cannot be said of the short run. In terms of levels, Figure 1 shows that living standards vary substantially for democratic regimes less than 50 years old. For autocracies that have existed for less than 50 years, incomes likewise vary substantially, although the fraction of autocratic countries that are rich is lower than the fraction of rich democratic countries. The advantage of short-lived democracy is far

[2] The discussion of the time indicates that the motivation behind the fraud was a belief by the Conservatives that they could do a better job of minimizing the effects of the Great Depression. We thank Andres Gallo for providing this historical information.

less clear. In terms of growth rates, several authors including Barro (1996) have found no significant positive effect of democracy on growth rates in the post war period at the aggregate level.

At the same time, the majority of countries that experienced a growth miracle, namely, a doubling of per capita output in a decade or less, was characterized by autocratic regimes at the time their miracle began. Out of the 16 countries that satisfy this definition of a growth miracle in the PWT6.2, nine were clearly autocratic according to the Polity Data Base when the miracle began. The set of countries includes Singapore, Taiwan, S. Korea, Botswana, Thailand, Cyprus, Japan, Romania, China, Malaysia, Indonesia, Portugal, Mauritius, and Ireland. Moreover, of the five fastest miracles, Singapore, Taiwan, S. Korea, Botswana, and Thailand, four started the miracle phase with autocratic polity measures; Botswana is the only democratic country. Additionally, all of these countries became more democratic as their income realized, except for Singapore that has maintained an iron-clad dictator since 1965. Figure 3 shows the polity measures for these five countries over the 1950-2004 period.

Figure 3 here

3 The Model - Economic Structure

We start by describing the economic structure and maximization problems of the private agents in the model. Later, we describe the political structure of the economy. In effect, this section treats policy parametrically and examines the response of private agents given that a certain policy is in place. The next section effectively endogenizes these policies. The economic side of the model is essentially the development and growth model of Hansen and Prescott (2002) but households are heterogenous with respect to their endowments. We also assume that the economy consists of rural areas, denoted r and urban areas, denoted u.

Households live for a single period. At the start of each period, there is a measure of elite households, rural household and urban households. The measure of rural household and the measure of urban households is determined by the measure of households that worked in each sector in the previous period and the fertility rate of households in that location. Rural and

urban households decide if they want to supply labor in the location that are born, or migrate to a different sector. Wages are the only source of income for these types of household. There is a time cost in terms of moving between the two locations. Each household values consumption and leisure.

Elite households own the economy's stock of land and capital. They derive utility from consumption and bequests to their children. Bequests made in period t by parents become the capital for the economy in period $t+1$. An elite household must determine how much of the bequest he receives should be invested in the form of Solow capital and in the form of Malthus capital. Because of policy, a unit of bequest may not generate the same amount of Solow and Malthus capital.

We now describe in detail the economic structure of the model.

3.1 Business Sector

The business sector is perfectly competitive, and produce a single composite commodity by one of two Cobb-Douglas technologies that differ in their mix of inputs and rates of technological change.

3.1.1 Malthus

The traditional Malthus technology uses land, labor and capital to produce the economy's final good. Let Y_{mt} denote the output produced with this technology, K_{mt} denote the capital input, H_{mt} denote the labor input, and L_{mt} denote the land input. Then

$$Y_{mt} = A_{mt} K_{mt}^{\psi} H_{mt}^{\phi} L_{mt}^{1-\psi-\phi} \tag{1}$$

TFP, A_{mt}, in the traditional technology grows exogenously at rate $\gamma_m \geq 0$. Thus, $A_{mt+1} = (1+\gamma_m)A_{mt}$. The Malthus technology is used in rural areas of the economy.

3.1.2 Solow

The modern Solow technology uses labor and capital to produce the economy's final good. Let Y_{st} denote the output produced with this technology, K_{st} denote the capital input, and H_{st}

denote the labor input. Then

$$Y_{st} = A_{st} K_{st}^{\theta} H_{st}^{1-\theta} \tag{2}$$

TFP, A_{st}, in the modern technology grows exogenously at rate $\gamma_s \geq 0$. Thus, $A_{st+1} = (1 + \gamma_s) A_{st}$. The Solow technology is used in urban areas of the economy.

3.2 Household Sector

Households live for a single period. There are three types of households in the model, which we distinguish by the letter $j = e, r, u$. Type e households represent the landed elite. Type r households represent rural households and type u households represent urban households. The latter two types constitute the working class of society. The measure of elite households is denoted by N_{et}, the measure of rural workers is denoted by N_{rt} and the measure of urban workers is denoted by N_{ut}. The total population at time t is denoted $N_t = N_{et} + N_{rt} + N_{ut}$. It is important to note that N_{rt} and N_{ut} are these are the measures of working households that start the period in the rural and urban sectors. On account of migration, the measure of households employed in the modern sector, N_{st}, will not necessarily equal the number of of households that begin in the urban sector, N_{ut}. The same is true for the measure of households employed in the traditional sector, N_{mt} and the measure of households who start in the rural sector, For future reference, let p denote the working class and N_{pt} denote the measure of such agents, i.e.$N_{pt} = N_{rt} + N_{ut}$.

3.2.1 Preferences

The preferences of the landed elite are defined over consumption and bequests to offspring. In particular, utility is given by

$$U(c_{et}, b_t) = c_{et}^{\mu} \left(n_{et} b_t\right)^{1-\mu}$$

where c_{et} is household consumption, n_{et} is the number of children, and b_t are bequests per child of the household. We do not write the number of children as an argument in the utility function because it is exogenous from the standpoint of the household.

Preferences of rural and urban households are identical and defined only over its consumption of the final good in the period. Without loss of generality, we assume that the utility is

equal to consumption. .

3.2.2 Endowments

Elite Households Elite households are endowed with the economy's stock of land, L. Thus, each elite household alive in period t has $l_t = L/N_{et}$ units of land which it can rent out to firms using the Malthusian technology. Land is passed on from parents to children. For now we rule out a primogeniture inheritance system, and assume that a family's land is divided equally among its offspring. Elite households are also endowed with a bequest from his parent that is in the form of an investment good. Upon receiving this bequest, an elite household is subject to a tax or an expropriation amount imposed by the government. We denote the expropriation rate by π_{bt}. The household then determines how much of the bequests he has left to to invest in Solow capital, k_{st} or Malthus capital, k_{mt}. On account of policy, which for now we treat parametrically, one unit of the bequest invested in Solow capital generates $1/\pi_{st}$ units of Solow capital. Namely,

$$k_{st} = \frac{x_{st}}{\pi_{st}}$$

We do not allow policy makers to put in place a similar barrier to Malthus capital. Thus,

$$k_{mt} = x_{mt}$$

Investment between the two types of capital cannot exceed the household's bequest that has not been expropriated, namely, $x_{st} + x_{mt} = (1 - \pi_{bt})b_{t-1}$.

Worker Households Worker households are endowed with a single unit of time.

3.2.3 Demographics

Demographics are affected by migration of workers between rural and urban areas as well as population growth.

Migration Let σ_t^udenote the fraction of urban households that remain in the urban sector and let σ_t^rdenote the fraction of rural households that remain in the rural sector in the period.

There is a time cost with moving from one sector to another in the period that is determined by policy. For a rural household who moves to the urban sector, this time cost is π_{rt} and for a urban household that moves to the rural sector, this time cost is π_{ut}. Thus, a rural household who migrates only can supply $1-\pi_{rt}$ units of labor to Solow firms whereas an urban household that migrates can only supply $1-\pi_{ut}$ units of labor to Malthus firms.

Population Growth In the spirit of Hansen and Prescott (2002), population growth rate is treated as a function of the average level of consumption in the economy. $\overline{c}_t$. On account that we have household heterogeneity, we allow for a different population growth for each segment of the population. Let $g_i(\overline{c}_t)$ denote the function that gives the number of children of an elite household, a household that work in the Solow technology, and a household that work in the Malthusian technology, $i = e, s, m$. The population growth function must have a positive slope for low average consumption levels and a zero slope for high average levels of consumption. Such a growth rate function is displayed in Figure 4. The first property is necessary for the model to display Malthusian properties whereas the second property is necessary so that the economy in the limit displays the balanced growth path properties of the Solow model.

Given that N_{rt} households begin the period in the rural sector, N_{ut} households begin the period in the urban sector, and σ_t^u and σ_t^r are the fraction of households that migrate out of the urban and rural sectors, the number of households in the next period that start out in the rural sector is

$$N_{rt+1} = g_m\left(\overline{c}_t\right)\left[(1-\sigma_t^u)N_{ut} + \sigma_t^r N_{rt}\right] \tag{3}$$

Similarly, the number of households that start in the urban sector the next period is

$$N_{ut+1} = g_s\left(\overline{c}_t\right)\left[(1-\sigma_t^r)N_{rt} + \sigma_t^u N_{ut}\right] \tag{4}$$

The number of elite households in the next period is just

$$N_{et+1} = g_e\left(\overline{c}_t\right) N_{et} \tag{5}$$

Next period's population is thus,

$$N_{t+1} = N_{rt+1} + N_{ut+1} + N_{et+1} \tag{6}$$

3.3 Profit Maximization

Let r_{st} and w_{st} denote the rental price of capital and labor in the modern sector; and let r_{mt}, w_{mt}, and r_{lt} denote the rental prices of capital, labor and land in the traditional sector. Because land is only used in the traditional sector (and because it has no alternative use), the Malthusian technology will be used in every period. The profit maximizing conditions of Malthusian firms are

$$r_{mt} = \psi A_{mt} K_{mt}^{\psi-1} H_{mt}^{\phi} L_{mt}^{1-\psi-\phi} \tag{7}$$

$$w_{mt} = \phi A_{mt} K_{mt}^{\psi} H_{mt}^{\phi-1} L_{mt}^{1-\psi-\phi} \tag{8}$$

and

$$r_{lt} = (1-\phi-\psi) A_{mt} K_{mt}^{\psi} H_{mt}^{\phi} L_{mt}^{-\psi-\phi} \tag{9}$$

The Solow technology, in contrast, need not be operated in a given period. If it is operated, it must be the case that firms using it make non-negative profits. The profits of a firm operating the Solow technology are

$$A_{st} K_{st}^{\theta} H_{st}^{1-\theta} - w_{st} H_{st} - r_{st} K_{st} \tag{10}$$

The profit maximizing conditions are

$$r_{st} \geq \theta A_{st} K_{st}^{\theta-1} H_{st}^{1-\theta} \tag{11}$$

$$w_{st} \geq (1-\theta) A_{st} K_{st}^{\theta} H_{st}^{-\theta} \tag{12}$$

The condition under which the Solow technology is profitable to operate is essentially the same as the one derived in Hansen and Prescott (2002). Recall, that Hansen and Prescott (2002) derive this condition by first using (11), to solve for the optimal capital input as a function of H_{st}. This is

$$K_{st} = \left(\frac{\theta A_{st}}{r_{st}} \right)^{1/(1-\theta)} H_{st} \tag{13}$$

Substituting (13) back into (10), profits are equal to

$$A_{st} \left[\frac{\theta A_{st}}{r_{st}} \right]^{\theta/(1-\theta)} H_{st} - w_{st} H_{st} - r_{st} \left[\frac{\theta A_{st}}{r_{st}} \right]^{1/(1-\theta)} H_{st}$$

This is linear in H_{st}, so a necessary condition for the modern technology to not be used is

$$A_{st} \leq \left[\frac{w_{st}}{1-\theta}\right]^{(1-\theta)} \left[\frac{r_{st}}{\theta}\right]^{\theta} \tag{14}$$

This is the condition derived in Hansen and Prescott (2002), which amounts to the condition that the minimum cost of producing one unit of output is above one.

Since there is perfect capital mobility in the model a unit invested in Malthus must yield the same return as a unit invested in Solow, i.e.

$$\frac{r_{st}}{\pi_{st}} = r_{mt}$$

Plugging in the expression for r_{mt}:

$$r_{st} = \pi_{st}\psi A_{mt} K_{mt}^{\psi-1} H_{mt}^{\phi} L_{mt}^{1-\psi-\phi}$$

When workers are migrating across sectors, the return to labour net of the cost of commuting to the urban area must be the same:

$$w_{mt} = (1-\pi_{ut})\, w_{st}$$

Plugging in the expression for w_{mt} implies:

$$w_{st} = \frac{\phi}{1-\pi_{ut}} A_{mt} K_{mt}^{\psi} H_{mt}^{\phi-1} L_{mt}^{1-\psi-\phi}$$

Substituting these expressions into (14) implies:

$$A_{st} \leq (1-\pi_{ut})^{-(1-\theta)} \pi_{st}^{\theta} \left(\frac{\phi}{1-\theta}\right)^{(1-\theta)} \left(\frac{\psi}{\theta}\right)^{\theta} A_{mt} K_{mt}^{\psi-\theta} H_{mt}^{\phi-(1-\theta)} L_{mt}^{1-\psi-\phi}$$

Now if Solow is not profitable, then all the economy's capital and labor are employed in Malthus. The non-use of the Solow technology condition becomes

$$A_{st} \leq A_{mt} (1-\pi_{ut})^{-(1-\theta)} \pi_{st}^{\theta} \left[\frac{\phi}{1-\theta}\right]^{(1-\theta)} \left[\frac{\psi}{\theta}\right]^{\theta} K_t^{\psi-\theta} N_{pt}^{\phi-(1-\theta)} L_t^{1-\psi-\phi} \tag{15}$$

As (15) shows, a higher Solow TFP or a lower Malthus TFP hastens the switch to the Solow technology. The switch to Solow is also impacted by the size of the capital stock. If $\theta > \psi$, so that production in the modern sector is more capital-intensive than production in the traditional sector, a larger capital stock increases the incentives for using the modern technology.

The policy maker can delay the switch to Solow by increasing π_{ut}, the cost of commuting to the urban area or by increasing the barriers to Solow capital accumulation, i.e. by increasing π_{st}.

3.4 Utility Maximization

Worker Households The utility maximization problem of a worker type household is trivial. Each eats their entire wage income less any fixed lobbying costs that they incur as part of their worker group, f_{it}, $i = s, m$. Let c_t^{rm}, c_t^{rs}, c_t^{us}, and c_t^{um}denote the consumption of a rural household that does not migrate, the consumption of a rural household that migrates, the consumption of an urban household that does not migrate, and the consumption of an urban household that migrates. Then

$$c_t^{rm} = w_{mt} - f_{mt}$$

$$c_t^{rs} = (1 - \pi_{rt})w_{st} - f_{st}$$

$$c_t^{us} = w_{st} - f_{st}$$

$$c_t^{um} = w_{mt}(1 - \pi_{ut}) - f_{mt}$$

In the equilibrium, worker households must be indifferent between staying and migrating. Thus $c_t^{rm} = c_t^{rs} = W_t^r$, and $c_t^{um} = c_t^{us} = W_t^u$.

Landed Elite Landed elites earn income from renting capital to Solow firms, and renting capital and land to Malthus firms. They, likewise, are subject to a fixed lobbying cost, which for now is treated parametrically, f_{et}. As the utility of the elite is Cobb-Douglas, the optimal choices of the elite solve the following conditions:

$$c_{et} = \mu_{et}(r_{lt}l_t + r_{mt}k_{mt} + r_{st}k_{st} - f_{et}) \quad (16)$$

$$b_t n_{et} = (1 - \mu)(r_{lt}l_t + r_{mt}k_{mt} + r_{st}k_{st} - f_{et}) \quad (17)$$

Substituting (16) and (17) into the utility function we obtain the following indirect utility for the landowners:

$$W_t^e = \mu^{\mu}(1 - \mu)^{1-\mu}[r_{lt}l_t + r_{mt}k_{mt} + r_{st}k_{st} - f_{et}] \quad (18)$$

3.5 Equilibrium Prices and Quantities

The relevant initial conditions for the economy are the capital stocks of landowners x_0 and the measure of each household type, N_{e0}, N_{r0} and N_{u0}. The policy, which at this stage is treated parametrically, consists of $\pi_{st}, \pi_{ut}, \pi_{rt}$,$\pi_{bt}$ and lobbying costs, f_{st}, f_{mt} and f_{et}. In addition, the policy may entail some government consumption, g_t.

In terms of prices and allocations, the equilibrium path for the economy constitutes a sequence of household variables $\{W_t^e, c_{et}, x_{st}, x_{mt}, k_{mt}, k_{st}, b_t, c_t^{us}, c_t^{um}, c_t^{rs}, c_t^{rm}, \sigma_t^u, \sigma_t^r\}$, a sequence of firm allocations, $\{Y_{mt}, K_{mt}, H_{mt}, Y_{st}$,$K_{st}, H_{st}\}$, a sequence of prices $\{w_{st}, w_{mt}, r_{mt}, r_{st}, r_{lt}\}$ and a sequence of laws of motions for $\{N_{et+1}, N_{rt+1}, N_{ut+1}, x_{t+1}, l_{t+1}\}$, which satisfy

1. Utility maximization of the elite. Given the policy, prices and endowments, $(c_{et}, x_{st}, x_{mt}, k_{mt}, k_{st}, b_t)$ maximizes the utility of the elite subject to its budget constraint.

2. Utility maximization of workers. Given the policy and consumption choices (c_t^{rm}, c_t^{rs}, c_t^{us}, c_t^{um}) a household that starts in sector $i = s, m$ determines whether to migrate or not.

3. Profit maximization of Malthusian firms. Given prices, Y_{mt}, K_{mt}, and H_{mt} maximize profits of Malthusian firms

4. Profit maximization of Solow firms: Given prices, Y_{st}, K_{st}, and H_{st} maximize profits of Solow firms

5. Market clearing

    a. Goods market: $N_{et}(c_{et} + f_{et}) + \sigma_t^r N_{rt}(c_t^{rm} + f_{mt}) + (1 - \sigma_t^r)N_{rt}(c_t^{rs} + f_{st})$
    $+(1 - \sigma_t^u)N_{ut}(c_t^{um} + f_{mt}) + \sigma_t^u N_{ut}(c_t^{us} + f_{st}) + g_t = Y_{st} + Y_{mt}$

    b. Land rental market: $L_t = N_{et} l_{et}$

    c. Capital rental market: $K_{mt} + K_{st} = N_{et} k_{et}$

    d. Labor market: $\sigma_t^r N_{rt}+(1-\sigma_t^r)N_{rt}(1-\pi_{rt})+(1-\sigma_t^u)N_{ut}(1-\pi_{ut})+\sigma_t^u N_{ut} = H_{mt}+H_{st}$

5. Laws of motion

    a. $N_{rt+1} = g_m\left(\overline{c}_t\right)\left[(1 - \sigma_t^u)N_{ut} + \sigma_t^r N_{rt}\right]$

b. $N_{ut+1} = g_s(\overline{c}_t)\left[(1-\sigma_t^r)N_{rt} + \sigma_t^u N_{ut}\right]$

c. $N_{et+1} = g_e(\overline{c}_t)\, N_{et}$

d. $l_{t+1} = L/N_{et+1}$

4 Political Equilibrium

Having described the market side of the model, we not turn to its political side. There are two levels to the political economy. At the top, there is the decision of the elite over the polity for the economy. More specifically, at the beginning of each period, the political elite, which is comprised of the landed households, chooses between autocracy and democracy for the economy's polity. At the bottom, the ruler chooses the policy. Autocratic rulers are heterogeneous with respect to their preferences, and hence objectives, with three possible types: a good autocrat who cares about the welfare of all households; an elite autocrat who cares only about the welfare of the landed class; and a bad autocrat who only cares about his own consumption. The type of autocrat is a random variable.

In contrast, there is no randomness with respect to democratic rulers. In a democracy, there is an election between a candidate from the class of landed elites and one from the urban working class. The class of landowners are assumed to be more politically powerful in the sense that they are able make campaign contributions thereby affecting the relative popularity of the candidates and election outcomes. In addition to paying campaign contributions, we assume that there is an exogenous fixed cost of lobbying that each member of a class must pay in units of the final good.

We begin with the lower level of the political economy, namely, describing how policy is determined under autocracy and democracy. This is followed by a description of the choice of polity by the economy's elites.

4.1 Policy Determination

We denote the political regime in period t by the letter R_t, where R can either be A for autocracy or D for democracy.

4.1.1 Autocracy

There are three autocrat types, which we refer to as *Good*, *Elite*, and *Bad*. We denote an autocrat's type by the letter $a \in \{G, E, B\}$. Regardless of his type, an autocrat must decide on barriers to Solow capital, π_{st}, and the barriers to migrating, π^a_{ut}, and π^a_{rt}. Additionally, he much determine how much of the bequests to expropriate, π_{bt}. Expropriated goods are privately consumed by the autocrat. Thus, the policy choice of an autocrat is a four dimensional vector, $\Omega^a = (\pi^a_{st}, \pi^a_{ut}, \pi^a_{rt}, \pi^a_{bt}, g^a_t)$, where

$$g^a_t = \pi^a_{bt} N_{et} b_t$$

The welfare of an autocrat is a function of his own consumption and the indirect utility of elite households, and the utility of workers. Let V^a denote the welfare of autocrat a. The welfare of a type a autocrat is:

$$V^a = \rho^a g^a_t + (1 - \rho^a)[\lambda^a_t W^e_t + (1 - \lambda^a_t)\,[\frac{N_{rt}}{N_{pt}} W^r_t + \frac{N_{ut}}{N_{pt}} W^u_t] \tag{19}$$

where ρ^a is the weight an autocrat places on his welfare versus society's, and $\lambda^a_t$is the weight he places on the welfare of the elite class versus the working class. The weight he places on the welfare of the elite class versus the working class is time dependent to allow for changes in the demographic structure among workers and elites over the development process.

Autocrats are heterogenous in these weights. For the good autocrat, $a = G$, $\rho^G = 0$ and $\lambda^G_t = N_{et}/N_t$. Thus, autocrat G is essentially a social planner who maximizes a weighted average of household welfare, where the weights are equal to the share of each household type in the population. For the elite autocrat, $a = E$, $\rho^E = 0$ and $\lambda^E_t = 1$. Thus, the elite autocrat maximizes the indirect utility of a member of the elite class, i.e., $V^E = W^e_t$. Given this objective, the elite autocrat may want to impose barriers to Solow. For the bad autocrat, $a = B$, $\rho^B = 1$. Thus, the bad autocrat expropriates bequests and uses the receipts for his own consumption.

4.1.2 Democracy

The policy instruments that are available in a democracy are the same as in an autocracy, namely, $\Omega^d = (\pi^d_{st}, \pi^d_{ut}, \pi^d_{rt}, \pi^d_{bt}, g^d_t)$. However, a democratic ruler does not derive utility from

consumption of the economy's good, and hence $g_t^d = \pi_{bt}^d = 0$. Moreover, unlike an autocratic ruler who weighs the welfare of elite household versus worker households, the democratic leader weighs the welfare of urban households versus non-urban households, where non-urban households constitute both the elite class and rural laborers. The welfare of the democratic ruler is given by:

$$V^D = \eta W_t^e + (1-\eta)\left[\frac{N_{ut}}{N_{ut}+N_{rt}}W_t^u + \frac{N_{rt}}{N_{ut}+N_{rt}}W_t^r\right] \tag{20}$$

where η is the weight that the democrat assigns to the lobbying urban workers relative to rural workers and the landed elite. The objective of the democratic leader is to choose a policy, $\Omega^d = (\pi_{st}^d, \pi_{ut}^d, \pi_{rt}^d, \pi_{bt}^d, g_t^d)$, that maximizes (20).

Microfoundations for this objective function are provided by Persson and Tabellini (2001). The basic idea is that interest groups who are able to organize themselves in lobbies can tilt policy in their favor by making campaign contributions to their preferred candidate. The setting is a probabilistic voting framework with two democratic candidates, each committed to a policy platform. After the platforms have been announced, lobbies make campaign contributions to one of the two candidates in order to affect the relative popularity of the candidates. Once contributions have been made, relative popularity is realized and elections are held, and the elected candidate implements the policy he committed to. A key result of this framework is that since both candidates internalize the contributions made by lobbies and only seek to win the election, they converge to the same policy platform. Moreover, because campaign contributions are a function of the distance between the announced platforms and since policies converge, equilibrium contributions will be zero.[3] The setting of Persson and Tabellini (2001) thus provides a rationale for why a democratic leader would assign greater weight to a lobbying group than to non-lobbying groups.

Implicitly, in the above equation, the landed elite are the only group in the society that is able to organize itself and lobby the democratic candidates. This is handled in the parameterization that follows by assuming that the weight on the elite is greater than its share

[3] However, Persson and Tabellini stress that in a less symmetric setting equilibrium contributions may well be positive. Our cost of lobbying, f_{jt}, may therefore be interpreted as either a fixed cost of lobbying, for instance a coordination cost, or as campaign contributions deriving from a more elaborate setting where the policy platforms of the two political candidates diverge in equilibrium.

of the population, and by assuming that only they incur a fixed lobbying cost (i.e., $f_{et} > 0$, $f_{st} = f_{mt} = 0$). Subsequently, we will alter the political landscape so that urban workers are the lobbying group in society under democracy.

4.2 The Decision of the Elite

Having described the objectives of autocratic rulers and democratic rulers, we next turn to the decision of the elites over the nation's political regime. This decision is made at the start of each period. We assume that democratization is a final decision. Thus, once the elite choose to democratize, the economy stays with that political regime in all future periods.

Let Π^a denote the probability of drawing an autocrat of type a. The elites choose democracy if:

$$W_t^e\left(\Omega_t^d\right) > \sum_a \Pi^a W_t^e\left(\Omega_t^a\right) \tag{21}$$

where W_t^e is determined by (18).

5 Equilibrium

With the extra layer to the economy, we must add the following elements to the definition of an equilibrium for our economy: polity type and lobbying cost per member of elite $\{R_t, f_{et}\}$, autocrat type a_t in the case when $R_t = A_t$ and a policy sequence $\{(\pi_{st}^z, \pi_{ut}^z, \pi_{bt}^z, g_t^z)_{z\in Z}\}$. Here we use Z to denote the set of all possible rulers, namely, a good, elite, and bad autocrat, and an elite democrat and a worker democrat. Additionally, we must add the following two conditions to the equilibrium conditions stated earlier regarding the market side of the economy. These two conditions are:

1. Provided that $R_{t-1} = A_t$, the elite choose political regime R_t according to (21).
2. The policy $(\pi_{st}^z, \pi_{ut}^z, \pi_{bt}^z, g_t^z)$ maximizes the objective of the policy maker implied by the elites' choice of political regime.

6 Numerical Experiments

We now illustrate the equilibrium properties of the model via a set of numerical experiments. Since individuals have one-period lives, the solution reduces to a sequence of static problems. We conduct two sets of experiments. In the first, we assume that the political regime is given and is the same in every period. Hence, autocratic type is not stochastic and the landed elite do not choose the type of political regime. The point of shutting down these elements is to illustrate how polity affects economic performance. The second experiment reintroduces these elements so that the political regime is chosen by the landed elite and autocratic type is a random variable. The point of this second set of experiments is to examine how economic development feedbacks to political development.

6.1 Parameters

As we solve the equilibrium numerically, we first assign values for the parameters. For the technology parameters, we use the values assigned by Hansen and Prescott (2002). The Hansen and Prescott Malthusian capital share value ψ is .10, the Malthusian technology labor share parameter ϕ is .60. We set the calibrated Solow technology capital share θ to .275. We normalize TFP for the Malthus technology in the initial period to 1.0. For Solow TFP, we assign a value so that when polity is fixed, each economy starts out in a state where it is unprofitable to employ it. We set the value of the growth rate of TFP in the Solow technology, γ_s, to match the average annual growth rate of US per capita GDP of 2 percent, and the value of the growth rate of TFP in the Malthus technology γ_m, to match the average annual growth rate of the population of the world prior to 1700 of .3 percent per year. The value of γ_m can be tied down from this observation because the growth rate of the population in the model where only the Malthus technology is used is equal to $\gamma_m^{1/(1-\phi-\psi)}$.

The additional parameters of the model are the initial population that belongs to the class of landed elites, N_{e0}, the initial working population that lives in the urban and rural regions, N_{ut} and N_{st}, initial capital stock for the elite, k_{e0}, the income share preference parameter on consumption and bequests in household utility, μ, and the political economy variables η, Π^G, Π^B and f_e. Without loss of generality we set the total initial population to 1.0 and

assign 5 percent of the population to the set of the ruling landed class. This percent is in line with estimates on land holdings in Latin America prior to its independence. We assign the rest of the population to the rural sector as our choice of Solow TFP ensures that operating the modern technology is unproductive in the first period. The initial capital stock is chosen so that the each economy effectively starts in Malthusian steady state so that the capital stock per household is the same between periods 1 and 2. The weight on consumption in elite household preferences, μ, is set to .95. The fixed cost of lobbying per landed elite is set equal to .25. For the bad autocrat, we assume that the probability is constant and equal to that of drawing a good autocrat: $\Pi^B = \Pi^G = .10$. In the benchmark experiments we assume that the relative weight that the democrat assigns to the lobbying elite, η is .10. Since the population share of the elite is .05 this assumption ensures that the democratic leader assigns a larger weight to the elite than the good autocrat who weights the different groups according to their relative size in the population.

Lastly for the population growth functions we assume that $g_e(\overline{c}_t) = g_p(\overline{c}_t)$. Thus, the fraction of the population that is part of the elite class and the worker class is constant in these experiments. The exact population growth function is shown in Figure 4.

6.2 The Effect of Polity on Performance

We begin by removing the randomness over autocrat type and the choice of political regime by the landed elite. What we do is determine the equilibrium path for four economies, each with a different ruler type that does not change over time. Each economy starts out with the same amount of aggregate capital. While the landed elite do not choose the political regime for the economy, they do in the case of democracy lobby the candidates to affect the outcome of the election and hence incur the fixed cost f_{et}.

Figures 5 and 6 document the paths of per capita capital and GDP, respectively, for each of the four economies over the first 10 periods.

Figures 5 and 6 here

In terms of per capita capital, democracy is clearly a middle ground. A good autocracy is by far the polity that is associated with the greatest wealth. The capital stock in the elite

autocracy economy is slightly higher than the capital stock in the democratic economy in the first six periods, but thereafter is lower. The bad autocracy is by far the worst in every period. In terms of per capita output, Figure 6 suggests that good autocracy is clearly the best regime and that democracy again represents a middle ground.

To better understand these results, we report the optimal policies chosen in each period under the four separate types of policy makers. These are reported in Table 1 along with the equilibrium allocations to the Malthus sector. We also indicate whether the Solow technology is used in a period in each of the four economies. We also report in Table 2 the income of each household type, worker migration from rural to urban areas and the evolution of capital and GDP.

Tables 1 and 2 here

As shown in column 1 of Table 1, each economy starts out in the Malthusian era, i.e. in a state where only the Malthusian technology is used. During this era, every worker resides in the rural area. Recall that the profitability of the Solow technology is increasing in the aggregate capital stock and even without any intervention from policy makers, each economy will modernize eventually as the capital stock grows. However, the policy maker in power may affect the profitability of the modern technology and may therefore delay industrialization by erecting barriers to urban migration and barriers to Solow capital conversion.

The results that pertain to an economy ruled by a good autocrat and bad autocrat are easy to understand. As Table 1 shows the good autocrat never erects any barriers to the modern technology. This is not surprising as his objective is to maximize aggregate welfare in the economy. In period four, the capital stock and Solow TFP are sufficiently large for the modern technology to be used. As shown in Table 2, the modernization is accompanied by rural workers migrating to the urban sector.

In contrast, the bad autocrat seeks to maximize his own consumption and so expropriates bequests at the maximum rate .60 in every period. The bad autocrat does not erect any barriers, however. The reason for this is that in absolute terms the amount that can be expropriated is larger if output is larger. Modernization does occur later in the bad democracy, as the capital stock is lower in bad autocracy than in good autocracy.

The outcomes under good and bad autocracy, and in particular the timing of industrialization in the absence of barriers to modernization, serve as useful benchmarks against which to evaluate the performance of the elite autocracy and democracy. Contrary to the good and bad autocracies, the elite autocrat and the democrat raise barriers to Solow capital conversion and/or urban migration.

Not surprisingly, the elite autocrat seeks to postpone industrialization as he cares only about landowners's welfare, and industrialization hurts landowners on account that their rental income from land decreases as labor and capital move into the modern sector. The elite autocrat therefore delays the implementation of the modern technology by putting up barriers to urban migration in periods $1-4$. As a consequence, modernization does not occur until period 5. Throughout the modern era, the elite autocrat maintains the migration barrier and also erects a barriers to capital conversion by setting π_{st} to 1.5. This is done in order to keep as much capital as possible in the Malthus sector as this increases the rate of return on land.

The democrat, who cares more about the welfare of landowners than the good autocrat but less than the elite autocrat, does not erect any barriers to urban migration. Modernization therefore occurs in period 4, just as in the good autocracy. However, subsequent to industrialization, the democrat sets π_{st} to 1.3 in an attempt to prevent too much capital from exiting the traditional sector, and driving down land rents. As the capital stock grows even more, the democrat lowers this rate to 1.2 throughout the modern era.

Having characterized the policy and technology over time, let us revisit the performance of these economies in terms of wealth, income and equality as reported in Table 2 and Figures 5 and 6. As mentioned above, the good autocracy outperforms the democracy and the elite autocracy both in terms of capital and GDP per capita. Although the elite autocracy and the democracy evolve similarly, the elite autocracy ends up on a less beneficial path of development as industrialization starts later on account of the barriers to migration. Bad autocracy is by far the worst polity on all accounts. Democracy is therefore clearly a middle ground for growth and development in an economy with vested interests groups that successfully lobby their preferred policy.

6.3 The Effect of Performance on Polity

6.3.1 The Importance of the Autocrat Draw

We now allow for autocrat type to be a random variable and let the landed elite choose whether to democratize. Recall that if the expected utility of democracy is greater than the expected utility of autocracy in the period, the political elite will democratize the country. The main finding of these experiments is that regardless of the history of autocrats in the country, the economy will democratize eventually once it has become sufficiently rich. However, whether the country has been lucky or unlucky in terms of past autocrats matters not only for the timing of modernization as described in the previous section, but also for the timing of democratization. Specifically, we show that a country with a history of bad autocrats democratizes later than an autocracy where the draw has been more fortunate.

Tables 3a-c here

Figures 7a-c here

Tables 3a-c report the outcomes in three economies associated with three different realizations of autocrats. In the experiment in Table 3a, the economy draws an elite autocrat in each period prior to democratization. In this experiment, the economy industrializes in period 5 and the political elite then democratizes in period 6 when the cost associated with the risk of drawing a bad autocrat has become sufficiently large. The country now enters a stable democratic regime with modern growth. To understand this political development, we report the expected utility of a member of the elite group in each period associated with democracy and autocracy in Table 3a and graph these statistics in Figure 7a. As can be seen, democracy is not beneficial to the elite prior to industrialization. The elite have not accumulated enough capital, and hence capital income is still small relative to rental income early on. They risk drawing a bad autocrat, which will reduce their capital stock and hence capital income. However, since capital income is not very important, the potential reduction in this income source is not large enough to democratize society. However, once capital becomes a sufficiently large source of revenue to the elite class the loss of such income associated with the bad autocrat is sufficiently large, that the elite choose to democratize.

Table 3b reports the outcome in an economy that draws a benevolent autocrat in every period during the autocratic era. Following the discussion in the previous section, we see that the good autocracy is modernized one period earlier than the elite autocracy in Table 3a, namely in period 4. Once modernized, the economy is governed by the good autocrat for two more generations until the risk of drawing a bad autocrat has become sufficiently costly, and the political elite choose to democratize in period 6. The expected utility of the elite of autocracy and democracy, respectively, are plotted in Figure 7b. In terms of the timing of democratization, the economy drawing elite autocrats in Table 3a and the economy drawing good autocrats in Table 3b are thus identical. They only differ in the timing of modernization since the elite autocrat retards development by erecting barriers to urban migration in periods 4 and 5.

Finally, Table 3c reports the outcome in an economy that repeatedly draws bad autocrats. The results show that, due to the lower capital stock that follows from expropriation, this economy will not be democratized until period 7. The bad autocrat does not erect any barriers to development but since he confiscates as much of bequests as he can, the capital stock will be much lower in the economy. Modernization will thus not occur until period 5. The economy then keeps drawing bad autocrats for two generations of modern growth but is democratized in period 7. At this point, the economy has grown sufficiently rich for the elite capital holders to prefer the democratic regime and they choose to exit autocracy.

The results suggest that the history of autocrats matters for the timing of democracy. The theory thus describes how economies plagued by a history of bad autocrats may end up on a development path with low growth which in turn may lead to late democratization.

6.3.2 More Equitable Distribution of Land

What happens as we increase α, the fraction of the population that own the economy's stock of land? To be completed

6.3.3 Democracy and Urban workers

What happens if the elite are no longer the politically influential group under democracy? Would they be less likely to democratize? To answer this question, we change the objective function of the democrat, and assume that only those worker households who are born to urban parents incur the lobbying costs. Thus, the objective of the democrat is

$$V^D = \eta W_t^u + (1-\eta)\left[\frac{N_{et}}{N_{et}+N_{rt}} W_t^e + \frac{N_{rt}}{N_{et}+N_{rt}} W_t^r\right] \tag{22}$$

and where $f_{st} > 0$, $f_{et} = f_{mt} = 0$. To be Completed

7 Conclusions

We have presented a theoretical model consistent with key empirical observations on the relationship between political regimes and economic performance. The model accounts for the coevolution of development and political regimes as the choice of polity is endogenous. By introducing an explicit political equilibrium into the framework of Hansen and Prescott (2002) we are able to study the incentives of the political elite during different stages of development. Specifically, we study how the incentives to modernize the economy differ across political regimes and, simultaneously, how industrialization affects the process of democratization.

The model rests on the following ideas. First, we allow for autocrats to differ in their objectives and are thereby able to address the heterogeneous performance of autocracies. Second, special interest groups striving to keep new technologies from being implemented are able to lobby such an outcome in a democracy. Third, the incentives to adopt a democratic regime grow stronger as the economy develops since the cost of drawing a bad autocrat, seeking to expropriate wealth, is increasing in the capital stock.

We show that democracy is a middle ground for growth and development. In the presence of vested interest groups able to organize themselves in a lobby, democracy constitutes an environment that is detrimental to development by preventing the implementation of new technologies. A good autocrat who maximizes aggregate welfare can therefore outperform a democracy, but democracy is by far a better polity than bad autocracy or an autocratic regime where the policy maker is acting in accordance with the interests of the landed elite. This result

is consistent with the heterogenous performance of autocracies present in the data: while old autocracies tend to be poor and underdeveloped, the majority of the growth miracles were in fact non-democratic at the time they began to prosper.

A key implication of the model is that the incentives to democratize are contingent on the level of development. When the cost associated with the prospect of drawing a bad dictator becomes sufficiently large, the political elite will choose democracy although this regime is costly to them.

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Figures

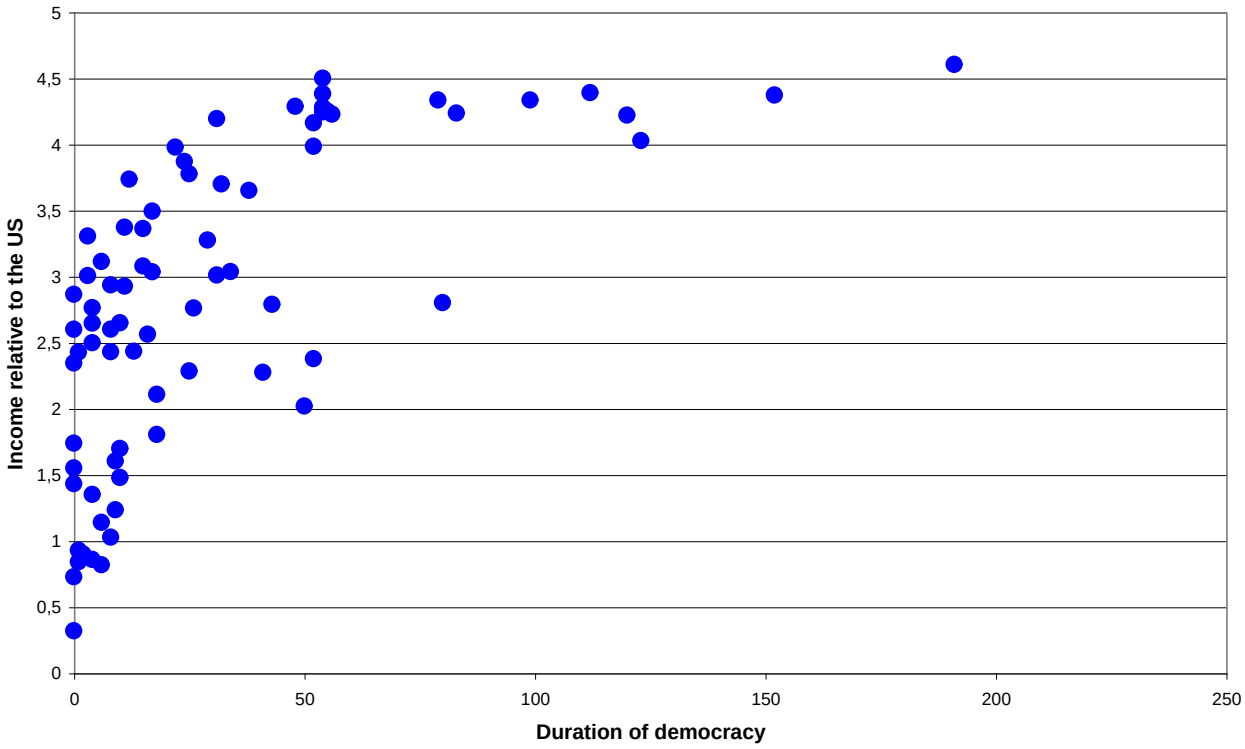

Figure 1: 2000 CGDP vs length of democracy.

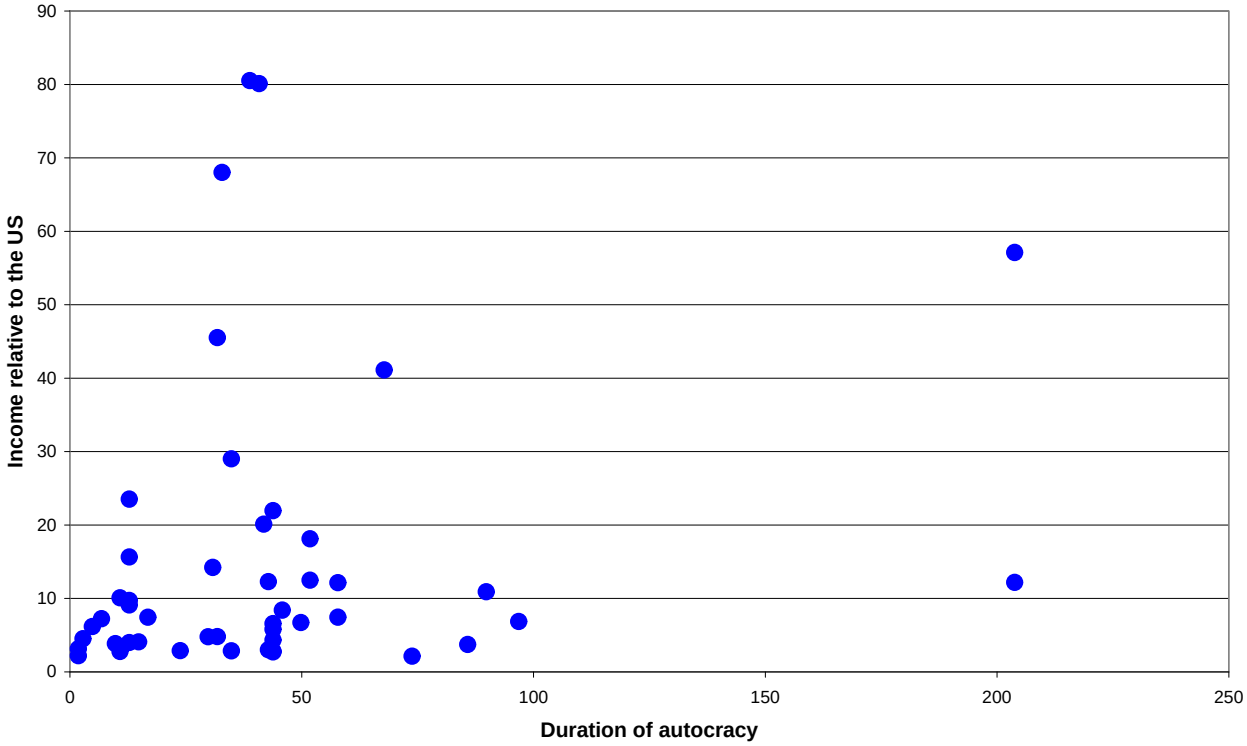

Figure 2: 2000 CGDP vs length of autocracy.

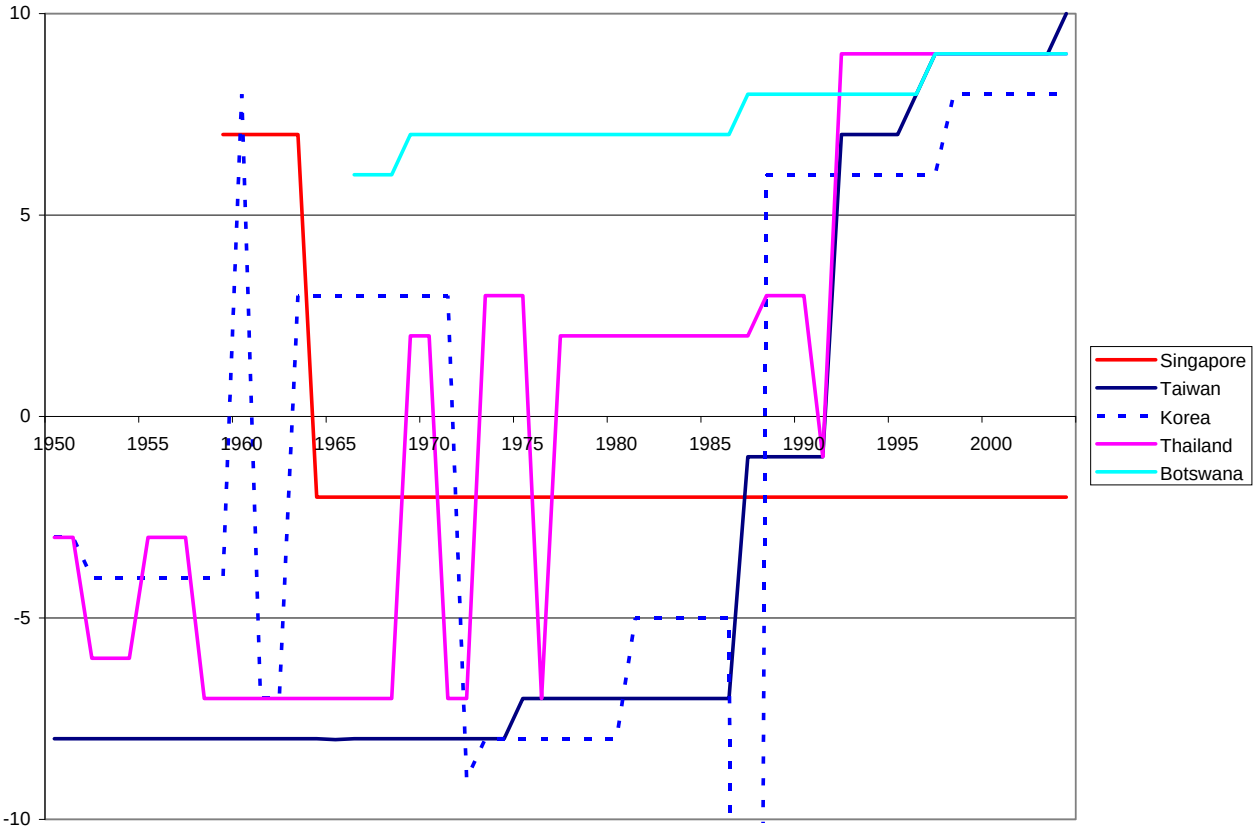

Figure 3: Polity indices of the five fastest growing economies 1960-2004.

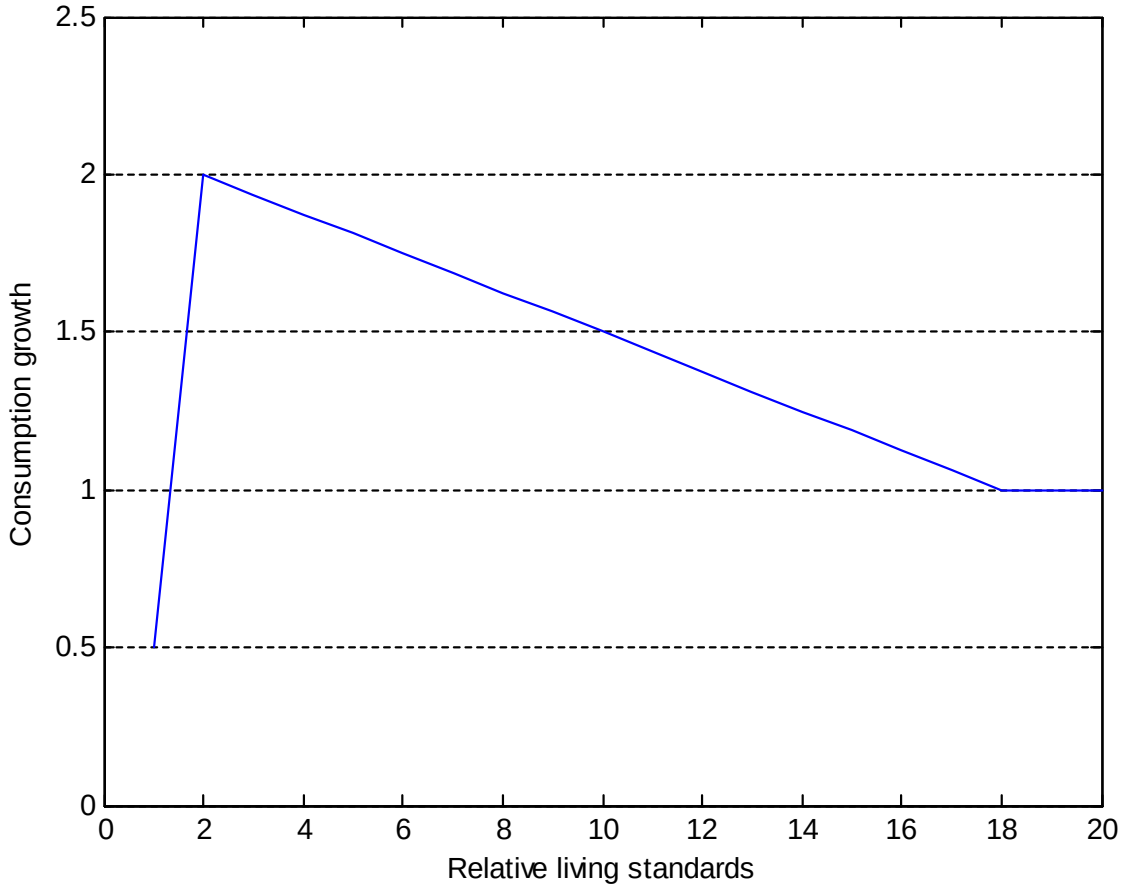

Figure 4: The Hansen-Prescott population growth function.

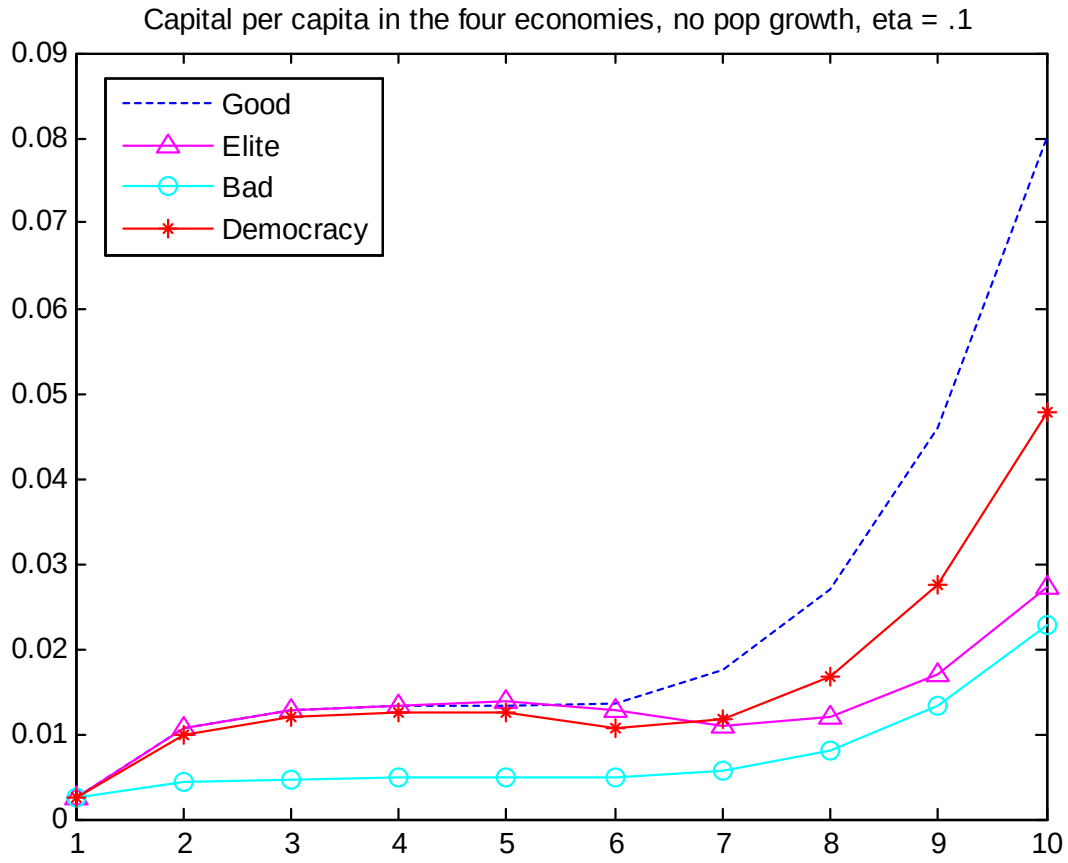

Figure 5: The evolution of capital per capita under alternative political regimes.

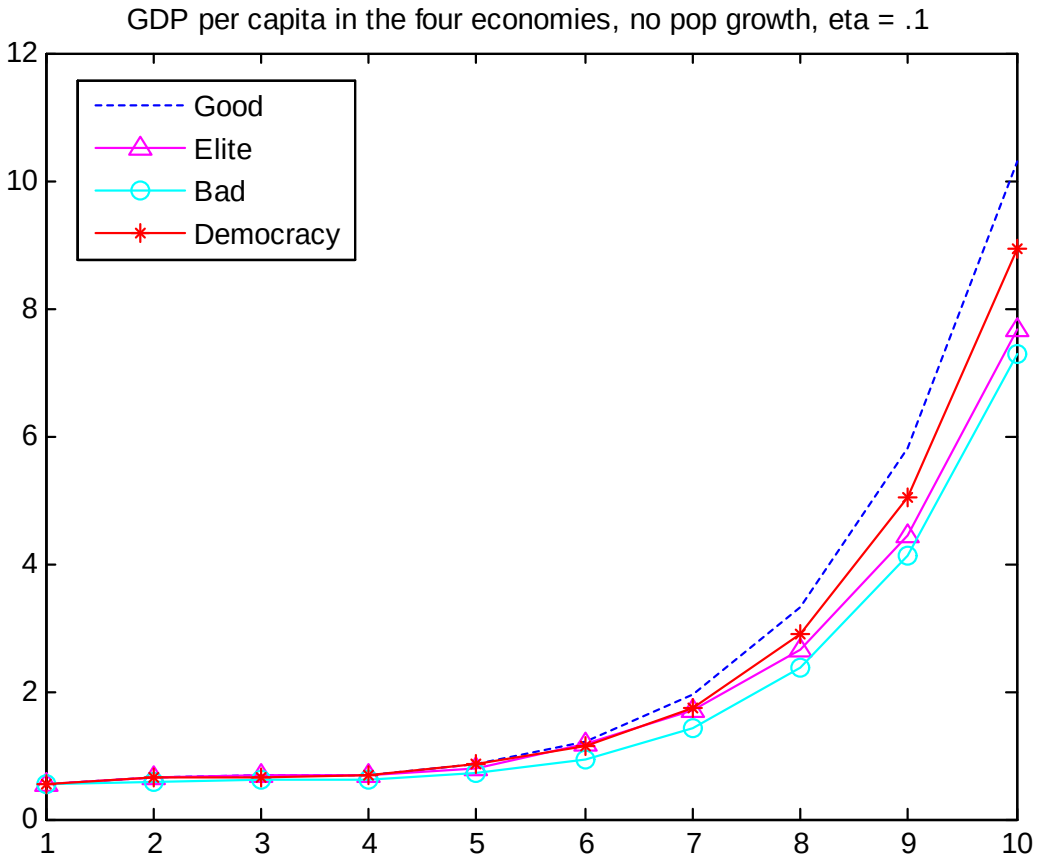

Figure 6: The evolution of GDP per capita under alternative political regimes.

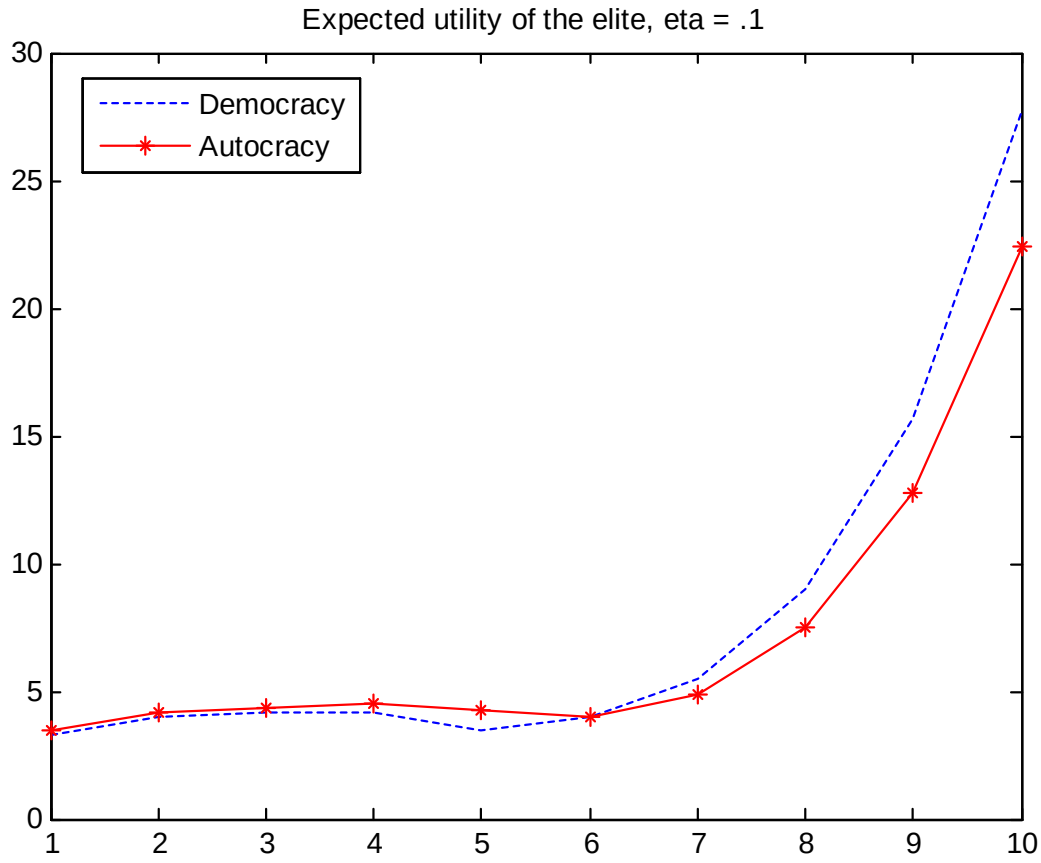

Figure 7a: Expected utility of the elite in autocracy and democracy. Autocrat draw as in Table 3a.

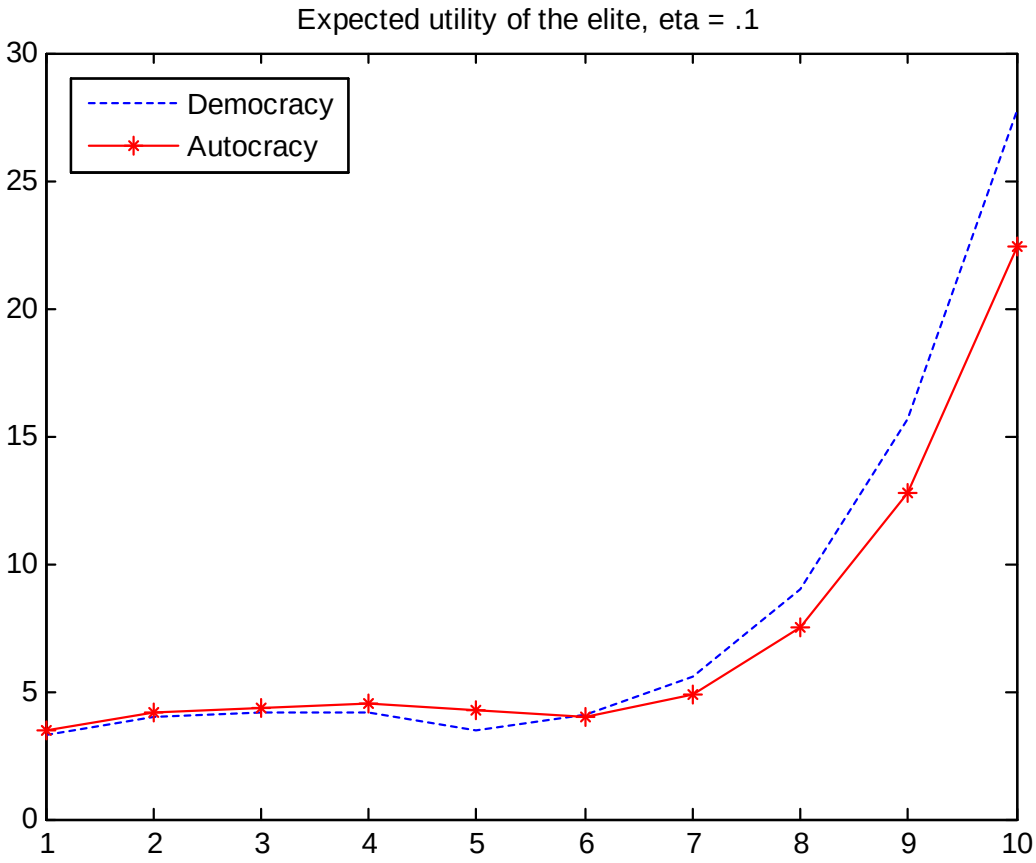

Figure 7b: Expected utility of the elite in autocracy and democracy. Autocrat draw as in Table 3b.

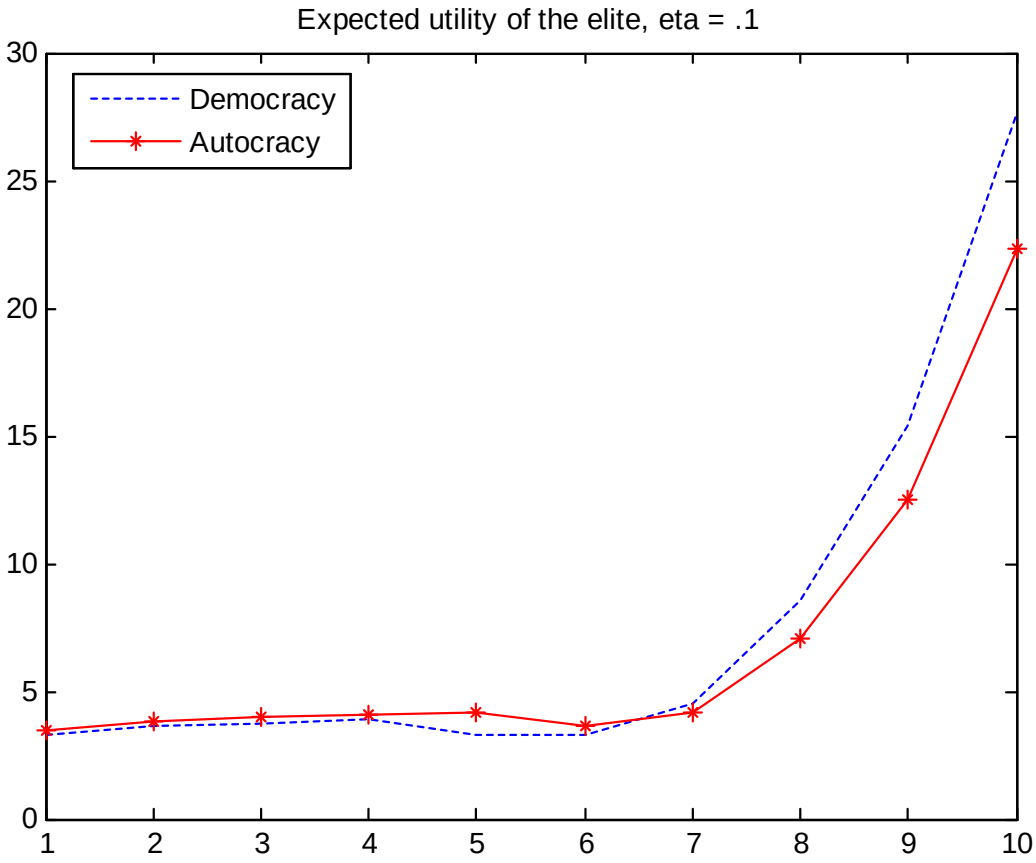

Figure 7c: Expected utility of the elite in autocracy and democracy. Autocrat draw as in Table 3c.

Tables

Table 1: Optimal policy and equilibrium allocations under alternative political regimes.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Good										
π_{ut}	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
π_{st}	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
π_{bt}	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
K_{mt}	.00025	.0107	.0127	.0081	.0019	.0005	.0002	.0001	.0000	.0000
H_{mt}	.9500	.9500	.9500	.7405	.2614	.0763	.0185	.0040	.0008	.0002
r_{mt}	21.3053	5.9649	5.2519	6.9852	14.3815	23.3767	30.1217	33.5632	34.9126	35.3675
w_{mt}	.3364	.4013	.4215	.4596	.6215	.9192	1.4849	2.5345	4.4405	7.8582
r_{lt}	.1598	.1906	.2002	.1701	.0812	.0351	.0137	.0050	.0018	.0006
Solow	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Elite										
π_{ut}	.0000	.0000	.0000	.2000	.3000	.3000	.3000	.3000	.3000	.3000
π_{st}	1.0000	1.0000	1.0000	1.0000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000
π_{bt}	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
K_{mt}	.0025	.0107	.0127	.0133	.0077	.0018	.0004	.0001	.0000	.0000
H_{mt}	.9500	.9500	.9500	.9500	.6969	.2484	.0799	.0212	.0048	.0010
r_{mt}	21.3053	5.9649	5.2519	5.1854	7.2518	15.1062	27.6829	39.9356	47.8105	51.4106
w_{mt}	.3364	.4013	.4215	.4372	.4836	.6511	.9202	1.4242	2.3656	4.0927
r_{lt}	.1598	.1906	.2002	.2077	.1685	.0809	.0367	.0151	.0057	.0021
Solow	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Bad										
π_{ut}	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
π_{st}	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
π_{bt}	.6000	.6000	.6000	.6000	.6000	.6000	.6000	.6000	.6000	.6000
K_{mt}	.0025	.0043	.0046	.0048	.0013	.0003	.0001	.0000	.0000	.0000
H_{mt}	.9500	.9500	.9500	.9500	.4279	.1372	.0359	.0081	.0017	.0003
r_{mt}	21.3053	13.6065	13.0099	12.9517	26.5300	48.4760	68.7236	80.8798	86.1682	88.0565
w_{mt}	.3364	.3662	.3811	.3949	.4927	.6971	1.0859	1.8155	3.1521	5.5598
r_{lt}	.1598	.1739	.1810	.1876	.1054	.0478	.0195	.0073	.0026	.0009
Solow	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Democrat										
π_{ut}	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
π_{st}	1.0000	1.0000	1.0000	1.3000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000
π_{bt}	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
K_{mt}	.0025	.0100	0120	.0109	.0023	.0006	.0002	.0001	.0000	.0000
H_{mt}	.9500	.9500	.9500	.8712	.2867	.0935	.0248	.0056	.0012	.0002
r_{mt}	21.3053	6.2985	5.5273	5.8989	12.4630	23.2650	33.5710	39.8035	42.2661	42.9088
w_{mt}	.3364	.3989	.4191	.4436	.6123	.8593	1.3298	2.2170	3.8540	6.8148
r_{lt}	.1598	.1895	.1991	.1932	.0878	.0402	.0165	.0062	.0022	.0008
Solow	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2: Income, migration, capital and output under alternative political regimes.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Good										
I_e	4.2611	5.08330	5.3394	5.2677	5.4125	7.0278	10.8589	18.3238	32.0227	56.6409
I_u	.3364	.4013	.4215	.4596	.6215	.9192	1.4849	2.5345	4.4405	7.8582
I_r	.3364	.4013	.4215	.4596	.6215	.9192	1.4849	2.5345	4.4405	7.8582
N_e	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500
N_u	.0000	.0000	.0000	.2095	.6886	.8737	.9315	.9460	.9492	.9498
N_r	.9500	.9500	.9500	.7405	.2614	.0763	.0185	.0040	.0008	.0002
k_e	.0500	.2131	.2542	.2670	.2634	.2706	.3514	.5429	.9162	1.6011
K/N	.0025	.0107	.0127	.0133	.0132	.0135	.0176	.0271	.0458	.0801
Y/N	.5326	.6354	.6674	.7000	.8610	1.2246	1.9536	3.3240	5.8196	10.2974
Elite										
I_e	4.2611	5.0833	5.3394	5.5374	5.0835	4.3566	4.8366	6.7735	10.9219	18.7628
I_u	.3364	.4013	.4215	.4372	.4836	.6511	.9202	1.4242	2.3656	4.0927
I_r	.3364	.4013	.4215	.4372	.4836	.6511	.9202	1.4242	2.3656	4.0927
N_e	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500
N_u	.0000	.0000	.0000	.0000	.2531	.7016	.8701	.9288	.9452	.9490
N_r	.9500	.9500	.9500	.9500	.6969	.2484	.0799	.0212	.0048	.0010
k_e	.0500	.2131	.2542	.2670	.2769	.2542	.2178	.2418	.3387	.5461
K/N	.0025	.0107	.0127	.0133	.0138	.0127	.0109	.0121	.0169	.0273
Y/N	.5326	.6354	.6674	.6922	.8029	1.1697	1.7003	2.6568	4.4247	7.6600
Bad										
I_e	4.2611	4.6383	4.8275	5.0019	4.7619	5.5734	8.0502	13.1686	22.7473	40.0797
I_u	.3364	.3662	.3811	.3949	.4927	.6971	1.0859	1.8155	3.1521	5.5598
I_r	.3364	.3662	.3811	.3949	.4927	.6971	1.0859	1.8155	3.1521	5.5598
N_e	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500
N_u	.0000	.0000	.0000	.0000	.5221	.8128	.9141	.9419	.9483	.9497
N_r	.9500	.9500	.9500	.9500	.4279	.1372	.0359	.0081	.0017	.0003
k_e	.0500	.0852	.0928	.0965	.1000	.0952	.1115	.1610	.2634	.4549
K/N	.0025	.0043	.0046	.0048	.0050	.0048	.0056	.0081	.0132	.0227
Y/N	.5326	.5798	.6034	.6252	.7061	.9409	1.4341	2.3832	4.1319	7.2858
Democrat										
I_e	4.0111	4.8027	5.0592	5.0593	4.2302	4.6992	6.6715	10.9461	19.0745	33.8693
I_u	.3364	.3989	.4194	.4436	.6123	.8593	1.3298	2.2170	3.8540	6.8148
I_r	.3364	.3989	.4191	.4436	.6123	.8593	1.3298	2.2170	3.8540	6.8148
N_e	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500
N_u	.0000	.0000	.0000	.0788	.6633	.8565	.9252	.9444	.9488	.9498
N_r	.9500	.9500	.9500	.8712	.2867	.0935	.0248	.0056	.0012	.0002
k_e	.0500	.2006	.2401	.2530	.2530	.2115	.2350	.3336	.5473	.9537
K/N	.0025	.0100	.0120	.0126	.0126	.0106	.0117	.0167	.0274	.0477
Y/N	.5326	.6316	.6636	.6923	.8528	1.1491	1.7520	2.9086	5.0513	8.9302

Table 3a: The decision of the elite. Elite autocrat draw.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
π_{ut}	.0000	.0000	.0000	.2000	.3000	.0000	.0000	.0000	.0000	.0000
π_{st}	1.0000	1.0000	1.0000	1.0000	1.5000	1.2000	1.2000	1.2000	1.2000	1.2000
π_{bt}	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
I_e	4.2611	5.0833	5.3394	5.5374	5.0835	4.8813	6.7379	10.9760	19.0889	33.8764
I_u	.3364	.4013	.4215	.4372	.4836	.9027	1.3437	2.2230	3.8569	6.8162
I_r	.3364	.4013	.4215	.4372	.4836	.9027	1.3437	2.2230	3.8569	6.8162
K/N	.0025	.0107	.0127	.0133	.0138	.0127	.0122	.0168	.0274	.0477
Y/N	.5326	.6354	.6674	.6922	.8029	1.2047	1.7701	2.9165	5.0551	8.9320
Expected utility of the political elite										
autocracy	3.4938	4.1681	4.3780	4.4961	4.2292	3.9934	4.8618	7.4708	12.7242	22.3992
democracy	3.2889	3.9631	4.1730	4.1314	3.4970	4.0024	5.5247	8.9998	15.6519	27.7769
Regime	E	E	E	E	E	D	D	D	D	D
Solow	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes

Table 3b: The decision of the elite. Good autocrat draw.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
π_{ut}	.0000	.0000	.0000	.2000	.3000	.0000	.0000	.0000	.0000	.0000
π_{st}	1.0000	1.0000	1.0000	1.0000	1.0000	1.2000	1.2000	1.2000	1.2000	1.2000
π_{bt}	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
I_e	4.2611	5.0833	5.3394	5.2677	5.4125	4.9465	6.7612	10.9865	19.0940	33.8789
I_u	.3364	.4013	.4215	.4596	.6215	.9180	1.3486	2.2251	3.8579	6.8167
I_r	.3364	.4013	.4215	.4596	.6215	.9180	1.3486	2.2251	3.8579	6.8167
K/N	.0025	.0107	.0127	.0133	.0132	.0135	.0124	.0169	.0275	.0477
Y/N	.5326	.6354	.6674	.7000	.8610	1.2244	1.7764	2.9193	5.0564	8.9327
Expected utility of the political elite										
autocracy	3.4938	4.1681	4.3780	4.4961	4.2288	4.0255	4.8760	7.4775	12.7275	22.4008
democracy	3.2889	3.9631	4.1730	4.1314	3.4810	4.0559	5.5439	9.0083	15.6560	27.7789
Regime	G	G	G	G	G	D	D	D	D	D
Solow	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3c: The decision of the elite. Bad autocrat draw.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
π_{ut}	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
π_{st}	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.2000	1.2000	1.2000	1.2000
π_{bt}	.6000	.6000	.6000	.6000	.6000	.6000	.0000	.0000	.0000	.0000
I_e	4.2611	4.6383	4.8275	5.0019	4.7619	5.5734	5.5158	10.3876	18.7993	33.7334
I_u	.3364	.3662	.3811	.3949	.4927	.6971	1.0853	2.1042	3.7989	6.7876
I_r	.3364	.3662	.3811	.3949	.4927	.6971	1.0853	2.1042	3.7989	6.7876
K/N	.0025	.0043	.0046	.0048	.0050	.0048	.0056	.0138	.0260	.0470
Y/N	.5326	.5798	.6034	.6252	.7061	.9409	1.4340	2.7610	4.9791	8.8946
Expected utility of the political elite										
autocracy	3.4938	3.8031	3.9583	4.1013	4.1790	3.6340	4.1327	7.0915	12.5349	22.3054
democracy	3.2889	3.5981	3.7533	3.8963	3.2952	3.3227	4.5227	8.5173	15.4145	27.6596
Regime	B	B	B	B	B	B	D	D	D	D
Solow	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes