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# Elements Of Institutional Economy Relating to An Equilibrium Between Minority and Majority in A Country Undergoing Democratic Transition

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**Abstract**

The aim of this article is to use a method based on game theory to provide an overview of the interference of economic and political phenomena in a society in democratic transition.

In this kind of country, the contradictory interests between a dominant minority and a majority dispossessed of its political rights, will most often find their outcome, either in a reversal of the established order, or in an implicit agreement between these two protagonists. To maintain a status quo that takes everyone's interests into account. The economic policy followed will depend on the outcome of this class antagonism.

**Keywords:** games theory; Nash equilibrium; minority; revolution; corruption**.**

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## INTRODUCTION

Classical economists-initiated opposition to state activism by demonstrating the ineffectiveness of its policies. It is not enough that the State wants to do good, it must above all act reasonably, because its action is constrained by economic laws. Bastiat (1850, pp. 331-332) completes the classic critique of statism by analyzing the proper functioning of the state. In the Western tradition, the state is defined by its mission: to enforce the law. Bastiat emphasizes that, whatever its mission, the state is first and foremost a social organization. In other words, there are human beings who manage the state, and these people necessarily pursue their own objectives. The result is a dynamic that tends to pervert the law.

This debate on the functioning of the state resurfaced at the end of the last century, amid the emergence of the new political economy. This is aiming to the application of neoclassical concepts and principles to markets and political behavior in order to reduce the gap between good economic analysis and good governance of economic policies (Meier, 1991, p. ix). The new economic models no longer consider the politician as a neutral and benevolent agent, concerned only with the collective well-being. Before the emergence of the public choice school, most economists represented the state as an idealized, omnipotent and benevolent being, which economic theory could not describe, because its choices would not depend on the same reasons to act as the economic agents (a notable exception being Vilfredo Pareto).

This article is part of this new theoretical trend which wishes to demystify the role of the State, by explaining the microeconomic foundations of the actions of its agents, and by stating the overall equilibriums that arise from it. More recent works, among which we can cite Acemoglu and Robinson (2006), Grossman (1991) and (1999), Roemer (1995) and Wintrobe (1998), have adopted an economic modeling approach which aims to give this theoretical prospecting field more rugged analytical tools. The idea of this article is to demonstrate that, in a non-democratic country, recourse to revolution to put an end to the reign of the least numerous social group is not inevitable; a Nash equilibrium between the ruling minority and the population can be found if these two groups of agents manage to agree on a policy of income distribution that is more aware of the interests of the majority. However, the introduction of corruption into an augmented model risks upsetting this equilibrium, or leading to a new one involving new categories of agents. The article is organized into three main parts. It begins by setting the economic model reflecting the existence of a kind of Modus Vivendi between the dominant

elite and the rest of the population and stipulating a less unequal wealth sharing. The second part introduces corruption as a disturbing element of this equilibrium; some of the minority is involved in influence peddling to expand its wealth to the detriment of other social categories. The third part of the text attempts to determine different scenarios of the impact of this new deal on the political trade-off that was initially established.

## 1- ANTAGONISMS BETWEEN MINORITY AND THE REST OF THE POPULATION IN A NON-DEMOCRACY

This analysis begins with the construction of a model of collective decision-making in a non-democracy, a field less studied and therefore more original (North et al, 2009, p. 264). Unlike a democracy where the principle of one person, one vote, is applied and relatively respected, an undemocratic regime is characterized by a situation of political inequality synonymous with increased power detained by a minority (De Mesquita and Smith, 2012, p.209). It is also characterized by two particular features: the preferences of the ruling minority and the socio-political constraints it faces. The minority strives for a policy that allows it to maximize its utility, while ensuring that no other group of agents is so disgruntled to take actions that might harm that utility. The minority should therefore beware of ignoring the interests of the rest of the population, at the risk of pushing the citizens to revolt.

Here, a non-democracy is seen as the reign of the least numerous and most influential group. To simplify, government policy is reduced to fixing a proportional income tax, as well as redistributing the amount of tax revenue among all citizens. We are referring here to Arrow's theorem (1951, p.57), which states that it is generally impossible to aggregate individual preferences, even if individuals have perfectly rational preferences. This results in a conflict of interest in the sense that different resource allocations, as well as different political and social decisions, will lead to divergent outcomes, with winners and losers.

We have chosen to formulate the collective choice as a game [(Blanchard, 2001, p.628), (Kreps, 1999, p.16)], which can take several forms. Thus, the political aspect of the economy only makes sense if we abandon the paradigm of the representative agent. Moreover, political economy consists of abandoning another paradigm, complementary to the first, which has stronger and more restrictive implications with regard to descriptive relevance. This is the paradigm of the omnipotent and benevolent social planner, considered as "a perfect judge, a perfect decision-maker and a perfect representative of the will of the people" (Laffont, 2000, p.140). The question then arises as to what are the mechanisms and

processes at work allowing collective decision-making. In a democracy, for example, the easiest way is to define a game between two political parties. In a model of non-democratic country, the object of this study, the game can be reduced to an interaction between a minority monopolizing power, and the rest of the citizens. Once we do that, the search for determinate social choices amounts to searching for the Nash equilibrium relative to the relevant game.

This analysis is based on the postulate of a political conflict and a conflict of income distribution (Breton, 1969, p.200). A model of pure redistribution is used, where the revenue from proportional taxation is paid out as a lump sum to all citizens. The main conflict therefore emerges between the winners and losers of this redistribution (Usher and Engineer, 1987, p.266). Two groups that we conceptualize as the minority in power, on the one hand, and the citizens, i.e. the rest of the population, who are deprived of political rights, on the other hand.

In this model, the utility function is considered to correspond to the single-peak preference hypothesis. Let $q$ be the choice of a given policy; $Q$ being the set of possible policy choices, with an order ">" on this set. If these choices are one-dimensional (e.g., tax rate), this order is natural, because it is easy to talk about lower and higher tax rates. We define $V^i(q)$ as the indirect utility function of individual $i$ where $V^i: Q \rightarrow R$. It represents the maximum value of the utility for particular values of the variables of a given policy. The suitable point for this individual, $q^i$, is such that $V^i(q^i) \geq V^i(q)$ for all other $q \in Q$. The strict concavity of $V^i(q)$ is a sufficient condition for it to be single-peaked.

## 2. Basic models

### 2-1 The model of the median voter relating to a redistributive policy

We consider a society made up of an odd number of $n$ individuals. The individual $i$ =1, 2, ..., $n$ has an income $y^i$. Let $\bar{y}$ be the average income in this society. So:

$$\bar{y} = \frac{1}{n}\sum_{i=1}^{n} y^i \qquad (1)$$

The political system establishes a non-negative tax rate, $1 \geq \tau \geq 0$, proportional to income, the revenue from which is returned as a lump sum to all citizens. $T$ is the amount of the resulting transfers. We also consider that the collection of tax is cost neutral and we therefore introduce a dead load of taxation, proportional to the amount of taxation. In this model, these distortions are represented by an overall cost, which results from the government budget constraint of $C(\tau)n\bar{y}$, when the tax rate is $\tau$. The total income of the economy, $n\bar{y}$, is included simply as a normalization. We

consider that $C$: [0, 1] → $R$+, where $C$ (0) = 0, and $C'(.) > 0$, and $C''(.) > 0$. This means that the costs are increasing with respect to taxation and that they are convex. It follows that the government budget constraint has the form:

$$T=\left(\sum_{i=1}^{n} \tau y^i - C(\tau) n\bar{y}\right) = (\tau - C(\tau))\,\bar{y} \qquad (2)$$

A higher $\tau$ therefore increases the amount of transfers and, since the rich and the poor receive the same amount but pay taxes according to their income, it is the rich who bear a greater share of the tax burden. All individuals in this society maximize their consumption, which is their net disposable income, $\hat{y}^i$ ($\tau$). Given the budget constraint represented by equation (2), we obtain, for a tax rate $\tau$, the indirect utility of individual $i$ and his net income as follows:

$$V\left(y^i \middle| \tau\right) = \hat{y}^i(\tau) = (1-\tau)y^i + T = (1-\tau)y^i + \left(\tau - C(\tau)\right)\bar{y} \qquad (3)$$

Therefore, the indirect utility function is conditioned only by the variables $\tau$ and $y^i$, because we have eliminated the transfers $T$. We therefore use the explicit notation of $V$ ($y^i|\tau$) instead of $V^i$ ($\tau$). It is easy to deduce from this utility function the ideal tax for each individual $i$. This is defined as the tax rate $\tau^i$ which maximizes $V$ ($y^i|\tau$). The latter is strictly concave and doubly differentiable; $\tau^i$ must satisfy the first-order condition, namely:

$$\begin{cases} -y^i + \left(1 - \acute{C}\left(\tau^i\right)\right)\bar{y} = 0 \quad \text{and} \quad \tau^i > 0 \quad \text{or} \\ -y^i + \left(1 - \acute{C}\left(\tau^i\right)\right)\bar{y} \le 0 \quad \text{and} \quad \tau^i = 0 \end{cases} \qquad (4)$$

The conditions of (4) intuitively imply that the rich prefer lower tax rates and less redistribution than the poor. For a rich person, the ratio $y^i/\bar{y}$ is higher compared to a poor person. More generally, for anyone whose income $y^i > \bar{y}$, Kuhn-Tucker type conditions imply that there is a corner solution. Thus, people with above-average income are opposed to any redistribution, while those with income $y^i < \bar{y}$ are in favour of a strictly positive tax rate (Battaglini and Coate, 2008, p. 219). To achieve these results, we assume that $\tau^i > 0$, and use the implicit function theorem to formulate the optimal tax rate of individual $i$ as a function of his own income, $\tau(y^i)$. The implicit function theorem tells us that the derivative of this function, $\tau'(y^i)$, exists and is given by: $\tau'(y^i) = -1 < 0$ (Blume and Simon, 1994, p. 479).

**2-2 A redistributive policy model with two groups of agents**

A simple but effective model is to consider only two levels of income: the minority with an income $y^r$ and the rest of the population with an income $y^p < \tau'(y^i)$. The total population is normalized to 1. A fraction $1-\delta > 1/2$ of the agents is made up of poor people, with an income $y^p$; the remainder, $\delta$, is made up of rich people, with income $y^r$. The average income is denoted $\bar{y}$. To parameterize income inequality, we introduce $\theta$ which represents the share of income that goes to the rich; so we have:

$$y^p = \frac{(1-\theta)\bar{y}}{1-\delta} \quad \text{and} \quad y^r = \frac{\theta\bar{y}}{\delta} \tag{5}$$

A higher value of $\theta$ reflects higher income inequality. Of course, $y^p < \bar{y} < y^r$, which requires:

$$\frac{(1-\theta)\bar{y}}{1-\delta} < \frac{\theta\bar{y}}{\delta} \quad \text{or} \quad \theta > \delta$$

The political system sets a non-negative income tax rate, $\tau \geq 0$, whose revenue is transferred to all citizens as a lump sum. The analysis made so far considers the principle of a simple redistribution policy where all agents receive the same amount of redistribution, which risks leading to a situation of undetermined collective choices. This problem can be solved, however, by extending the model through the introduction of targeted income transfers. It is considered that taxation costs as much as initially and, therefore, the government budget constraint is:

$$T = \tau\big((1-\delta)y^p + \delta y^r\big) - C(\tau)\bar{y} = \big(\tau - C(\tau)\big)\bar{y} \tag{6}$$

Using the budget constraint (6), and for a tax rate $\tau$, the indirect utility of individual $i$ and his after-tax income, we have:

$$V(y^i|\tau) = \hat{y}^i(\tau) = (1-\tau)y^i + \big(\tau - C(\tau)\big)\bar{y} \qquad i = r \text{ or } p \tag{7}$$

$$V^p(N,\tau^N) = y^P + (\tau^N(\bar{y}-y^p) - C(\tau^N)\bar{y}) \quad \text{and}$$

$$V^r(N,\tau^N) = y^r + (\tau^N(\bar{y}-y^r) - C(\tau^N)\bar{y})$$

Let $\tau^p$ be the equilibrium tax rate; it can be determined by the fact that it maximizes the after-tax income of a poor agent, or, which comes to the same thing, it maximizes $V(y^p|\tau)$. The first-order condition is:

$$-y^p + \Big(1 - \acute{C}(\tau^p)\Big)\bar{y} = 0 \qquad \text{avec} \quad \tau^p > 0 \tag{8}$$

because $y^p < \bar{y}$. Equation (8) implicitly defines the most preferred tax rate of a poor agent. Using the definitions from (5), we can write the equation for $\tau^p$ more conveniently:

$$\left(\frac{\theta-\delta}{1-\delta}\right) = \acute{C}(\tau^p) \tag{9}$$

Note that $d\,(\tau^p - C\,(\tau^p))\,/d\theta = (1-C'(\tau^p))\cdot d\tau^p/d\theta$. Greater inequality therefore leads to more taxes; that is, $d\tau^p/d\theta > 0$. The tax burden borne by the wealthy (the minority) increases as income inequality increases, even if

the tax rate remains unchanged. If we define the tax burden as the net redistribution provided by the rich (the minority) at a rate $\hat{\tau}$ this gives:

$$\text{tax burden} = C(\tau)\bar{y} - \left(1 - \frac{\theta}{\delta}\right)\bar{y}$$

If inequality increases (i.e., $\theta$ increases), this weight increases, which reflects the fact that with a constant average income, transfers are constant; in this case, a larger share of tax revenue is collected from the wealthy. Even at constant tax rates, the widening of income inequalities increases the burden of taxation for the rich, who are thus inclined to more opposition to taxation. Meltzer and Richard thus state that ″the higher an individual's productivity, the lower his preferred tax rate will be″ (1981, p. 921).

**3- Power and constraints in an undemocratic regime**

When it happens that the rich in a democratic country have more political power in proportion to their demographic weight, this implies that the equilibrium tax rate is $\tau$ ($\Gamma$), where $\Gamma$ can be considered as a measure of the political power of the wealthy minority in a democracy (Mulligan, and Sala-i-Martin, 2004, p. 71). In this particular case, $\Gamma$ tends to 1; in equilibrium, the policy followed will be the one preferred by the rich, which gives a tax rate $\tau^r$. Similarly, in a non-democratic country, insofar as the desires of the minority are inflicted to the majority, the equilibrium corresponds to a situation where $\Gamma \to 1$.

The control over political institutions that a non-democratic regime provides to the minority gives it the opportunity of setting a policy that maximizes its preferences. This control is necessarily done to the detriment of the majority, which calls into question the possibility for the minority to maintain the same policy and, ultimately, to keep a monopoly on political power. Because, in fact, the disparity in a non-democracy, between de jure power, held by the ruling minority, and the de facto power, held by the majority, always leaves a possibility for the latter to depose the government representing the minority by an action, violent or not, which we designate hereafter by the term *revolution*. In any non-democratic society, revolution is a recurring threat to the ruling minority (Kuran, 1989, p.44).

However, any violent action always leads to human losses and physical destruction therefore resulting in a damage to the productive capacity of the economy. We can therefore consider that a fraction $\mu$ of the resources of society will be destroyed as a result of this violence, and the rest will be distributed among the members of the majority, only. After the revolution, the members of the minority are therefore dispossessed of their

wealth. This assertion implies that, after the revolution, each citizen (poor individual) receives a net income such as:

$$V^p(R,\mu) = \frac{(1-\mu)\bar{y}}{1-\delta} \quad (10)$$

where $(1-\mu)\ \bar{y}$ is the total income to be shared among a part of the population equal to $1-\delta$. The notation $V^p(R, \mu)$ indicates the value of utility for a citizen in a post-revolution society with respect to $\mu$. We can see that the revolution is beneficial to the citizens if the payment received by each of them in (10) is greater than they receive in case of non-resort to revolution. If $\tau^N$ is the tax rate set by the minority, where N denotes a non-democracy, and assuming that the minority imposes its most preferred rate, ($\tau^r = 0$), then the result will be:

$$V^p(y^p|\tau^N = \tau^r) = y^p \quad (11)$$

We consider that the constraint of the revolution applies if (10) is greater than (11)[i], or if:

$$\frac{(1-\mu)\bar{y}}{1-\delta} > y^p \quad (12)$$

From the definitions related to (5), the risk of revolution in (12) is equivalent to:

$$\theta > \mu$$

Two essential features can emerge at this stage of the reflection. First, the risk of a revolution is more likely when inequality is higher – when $\theta$ is high. Revolution becomes a more attractive option for the masses because it allows them to capture, if not all of society's resources, at least more of them. Then, the attraction for the revolution increases as $1-\mu$, the fraction of the product remaining after deduction of the part destroyed during the revolution, is more important.

**3-1 The problem of collective action**

Before the risk of revolution becomes a real threat, citizens must first overcome the difficulties inherent to the problems of coordination of collective action [Olson (1965, p. 21) and Tullock (1971, pp. 97-98)]. To understand the problem of organizing collective action, we assume that taking part in a revolutionary activity represents a cost $\varepsilon\bar{y}$. We can also assume that the triumph of a revolution requires the involvement of at least $\xi^p \leq 1-\delta$ fraction of citizens.

Now, consider the gains of an agent who took part in revolutionary activities. These are equivalent to the payment received following this participation minus the cost incurred. It corresponds to $(1-\mu)\ \bar{y}/(1-\delta) - \varepsilon\bar{y}$ if the revolution prevails and to $y^p - \varepsilon\bar{y}$ if it fails. Conversely, the gains for a citizen who did not take part in the revolution are $(1-\mu)\ \bar{y}/(1-\delta)$ or $y^p$. In both cases, the gains of those who stand idly are greater. In a model that

comes very close to this work, Herschell I. Grossman (1991, pp. 917-918) details the actors and elements of an insurgency model which, by interacting, determine a general equilibrium reflecting the results of strategies to achieve a Pareto optimal situation.

Here, revolution is seen as a public good affecting all citizens equally. Thus, regardless the outcome, the gains for those who do not take part in the revolution are always greater. As a result, except for those whose participation in the revolution is crucial to its success, citizens prefer to behave opportunistically so that the costs of the revolution fall on others (Tullock, 1974, p. 87).

In practice, the most widespread strategy for dealing with the problem of the coordination of collective action is that of exclusion. This consists in limiting the benefits resulting from the collective action to those who took part in it (Lichbach (1995, p. 36) and Moore (1995, p. 442)).

**3-2 Modeling preferences and constraints in an undemocratic regime**

Leaving aside the problems associated with the coordination of collective action, let us examine in what follows the implications of the materialization of the risk of revolution. Here, as in the rest of the text, the minority and the majority are treated as two single players. All members of the minority are considered to be identical and the same goes for the majority, which leads to a Nash equilibrium. It is also assumed that the coordination of collective action is resolved for both groups. However, specifying the respective payments of the two categories does so at the individual level because the behavior must be rational at the individual level.

In the sequential game played by the two social groups, the minority acts first and sets the tax rate, $\tau^N$. The symbol $\hat{\tau}$ designates the specific value of $\tau^N$ which makes it possible to avoid resorting to revolution. Reacting to this, the majority then decide whether to resort to this eventuality. If they don't, the game will end with the results:

$$V(y^p|\tau^N = \hat{\tau}) = (1-\hat{\tau})y^p + \hat{T} = y^p + (\hat{\tau}(\bar{y} - y^p) - C(\hat{\tau})\bar{y}) \quad \text{and}$$
$$V(y^r|\tau^N = \hat{\tau}) = (1-\hat{\tau})y^r + \hat{T} = y^r + (\hat{\tau}(\bar{y} - y^r) - C(\hat{\tau})\bar{y}) \qquad (14)$$

Where $\hat{T} = (\bar{y} - C(\hat{\tau}))\,\bar{y}$. These payments result from the redistribution of income in an undemocratic country at the tax rate $\hat{\tau}$. The most important thing to remember from the second equality of these equations is that, $\hat{\tau}(\bar{y} - yi) - C(\hat{\tau})\bar{y}$, represents the net amount of redistribution for $i = p$ or $r$, so that $\hat{\tau}(\bar{y} - y^p) - C(\hat{\tau})\bar{y} > 0$, while $\hat{\tau}(\bar{y} - y^r) - C(\hat{\tau})\bar{y} < 0$; redistribution is therefore a source of earnings loss for the minority in power. Alternatively, citizens can be tempted by revolution, in

which case it is assumed that revolution will always triumph, and they will receive the earnings:

$$V^p(R, \mu) = (1-\mu)\,\bar{y} \text{ et } \mathrm{Vr}(R, \mu) = 0$$

To solve this game, we use a backward recurrence solution, going back from the end of the decision tree. This technique is useful because it is characteristic of a subgame perfect Nash equilibrium. Two cases are to be distinguished; in the first, the risk of revolution (13) does not exist, which implies that, even if the minority establishes the most preferred tax rate for it, $\tau^N = \tau^r$, resorting to revolution is not in the interests of citizens. In this equilibrium, the minority anticipates that the revolution will never take place, and therefore establishes its most preferred tax rate, $\tau^N = \tau^r = 0$. The second case is the most interesting because, here, the risk of revolution (13) could come to prevail. In this case, if the minority wanted to set the tax rate, $\tau^N = \tau^r$, then it would be in the interest of the majority to revolt. Knowing this, the minority might be tempted to make concessions, by pursuing, for example, a fiscal policy sufficiently close to that desired by the citizens. From the point of view of the latter, the best tax rate is, $\tau^N = \tau^p$. So, the question is whether: $y^p + (\tau^p\,(\bar{y} - y^p) - C(\tau^p)\,\bar{y}) \geq (1-\mu)\,\bar{y}$ *is* correct, or using the definition in (5), if the following equation is correct:

$$\mu \geq \theta - (\tau^p\,(\theta - \delta) - (1 - \delta)\,C(\tau^p)) \qquad (15)$$

If (15) does not apply, then even the most favorable tax rate for citizens is not sufficient to prevent a revolution. Alternatively, equation (15) may not apply in the case where tax collection is too expensive. Here, too, revolution is inevitable, because fiscal policy cannot be redistributive enough to prevent such an outcome.

The most relevant case from this point of view is the one where (15) applies. In this case, a single tax rate, $\hat{\tau}$, exists, such that $V(y^p \mid \tau N = \hat{\tau}) = V^r(R, \mu)$ and corresponds to:

$$\mu = \theta - (\hat{\tau}\,(\theta - \delta) - (1 - \delta)\,C(\hat{\tau})) \qquad (16)$$

From (15), it follows that the tax rate is such that $\hat{\tau} \leq \tau^p$. In this case, the unique equilibrium implies that the minority sets the tax $\hat{\tau}$ to prevent a revolution.

The key point here is that, despite its complete control of formal political power in a non-democracy, the minority cannot set its most preferred tax rate, $\tau^r$, because the risk of revolution constitutes another source of power that may antagonize its political agenda. Fearing a revolution, the minority resolves to make concessions and practices a more redistributive fiscal policy.

Before detailing this result, we must more formally define the strategies in action. Let $\sigma^r = \{\tau^N\}$, the actions taken by the minority, which consists of a tax rate $\tau^N \in [0, 1]$, in which the exponent $N$ refers to a non-democracy. Similarly, $\sigma^p = \{\rho\ (.)\}$, are the actions taken by citizens which consist of a decision to launch a revolution $\rho(\tau^N)$ ($\rho$=1 representing a revolution) where this decision depends on the current actions of the minority which goes first. Therefore, $\rho$ is a function $\rho$: [0, 1] → {0, 1}. Then, a perfect subgame equilibrium is a combination of strategies $\{\tilde{\sigma}^r, \tilde{\sigma}^p\}$ such that $\tilde{\sigma}^p$and $\tilde{\sigma}^r$ constitute the best responses of each protagonist in any true subgame. Tildes always represent a particular balance.

Depending on the value of the parameters, many strategies can provide an equilibrium. However, for specific values of the parameters, the equilibrium is unique (Kreps, 1999, p.116).

When $\theta \leq \mu$, the risk of revolution does not exist and the following strategies constitute an equilibrium: $\tau^N = 0$ and $\rho\ (\tau^N) = 0$ for all $\tau^N$. According to this strategy, the minority sets a tax rate equal to zero, and the majority does not revolt. No matter what the majority does (i.e., $\rho = 0$ regardless of $\tau^N$), because the minority pursues a dominant strategy.

When $\theta > \mu$ and (15) does not apply, then the following strategy constitutes a unique equilibrium: $\tau^N = \lceil\hat{\tau}$ and $\rho\ (\tau^N) = 0$, for all $\tau^N \geq \lceil\hat{\tau}$. In this case, even fixing the tax rate $\tau^p$ will not prevent citizens from revolting. Whatever the action of the minority, the revolution will take place anyway.
Finally, and most interestingly, $\theta > \mu$ and (15) applies; then, the following strategy constitutes a unique equilibrium: $\tau^N = \lceil\hat{\tau}$ and $\rho\ (\tau^N) = 0$, for all $\tau^N \geq \lceil\hat{\tau}$; also, outside the equilibrium path $\rho\ (\tau^N) = 1$ for all $\tau^N < \lceil\hat{\tau}$. Here, revolution is attractive in the case where the minority does not make concessions, but given that (15) applies, the majority can be dissuaded from revolt if it obtains concessions, precisely by fixing the rate of tax $\lceil\hat{\tau}$, such that (16) applies. Concretely, the minority fixes the tax rate $\lceil\hat{\tau}$, and the citizens do not revolt if they obtain the rate $\tau^N \geq \lceil\hat{\tau}$. However, if the offered rate is $\tau^N < \lceil\hat{\tau}$, they would revolt. It is this "threat" outside the path of balance that leads the minority to agree to redistribute part of the wealth. The concept of perfect Nash equilibrium in subgames explicitly imposes that this threat is credible.

The previous proposition ultimately reflects how, in a non-democratic regime, the equilibrium is determined both by the preferences of the minority and the constraints (risk of revolution) under which it operates. When these constraints lack determination, as in the case where (13) does

not apply, the minority has no difficulty in enforcing its interests; and the reverse is true.

To take a closer look, we need to examine an important aspect of concessions, namely their credibility, i.e., whether they are feasible or not.

## 4- AN AUGMENTED MODEL: THE EFFECT OF CORRUPTION ON THE EQUILIBRIUM

In a non-democracy, the minority holds the reins power and uses it to fulfill its preferences. However, to preserve this privilege and not run the risk of a brutal overthrow of the regime, the minority must make promises that the policies it will implement will also take into account the interests of the citizens, which raises the problem of credibility of these promises. The latter is an important aspect of the relationship that binds these two social categories. The minority possesses, de jure, the political power, and is driven to keep it by making promises that its actions will also benefit the citizens. These commitments may well turn out to be empty promises. The problem stems from the gap between those who hold the decision-making power and those who are supposed to benefit from these measures. In short, political power is not detained by the ultimate beneficiaries of the promised policies.

### 4-1 The problem of commitments in a model with corruption

We will in the rest of this article only focus on the last of the three possible strategies, the one that refers to a situation where the threat of revolution is sufficiently persuasive to force the minority to set the tax rate, $\tau^N \geq \hat{t}$. The one that provides citizens with the best possible redistribution of income. This situation doesn't refer to a single case; in many countries, these two categories have managed to avoid an outright violent conflict, thereby setting a Modus Vivendi which provides for granting the minority the exclusive exercise of power in return of a better sharing of income. However, the 'slack' and 'mining' features of most non-democratic countries, thus exposed to strong cyclical variations, makes the future of the compromise between the two groups looks bleak (Goumeziane, 2013, p. 187).

In this section, we will introduce a notable change in the behavior of certain agents to see to what extent this modifies the equilibrium described in the previous section (Burguety, et al, 2016, p.4). We are indeed going to consider the case where part of the minority in power takes advantage of its dominant position to increase its wealth through corruption.

No definition of corruption is fully complete. However, a common definition of corruption is the improper use of public authority for own purposes (Becker and Stigler, 1974, p. 12). Misuse, of course, usually

involves the application of a legal standard. Corruption defined in this way would encompass, example, the sale of public property by officials, bribery in public procurement, embezzling public funds (Svensson, 2005, p.20).

The phenomenon, due to the extent of its consequences on the politico-economic sphere, has become an important subject of the new political economy. Corruption is considered here as the fruit of the embezzlement of funds operated by the most influential members of the minority when public contracts are concluded; it also includes the sums unduly deducted by this new actor on the income of citizens (only) in exchange for access to public benefits and services. The introduction of this new element makes it possible, among other things, to give income inequality a more endogenous character (Dabla-Norris and Wade, 2001, p. 17).

**4-2 Restrictive assumptions**

We therefore consider that only part of the minority is in a position to carry out in this influence peddling. This group will be symbolized by the letter *o*. First, we assume that no member of the citizens group has enough influence to increase their income through corruption. Though tricky, we also retain the hypothesis of the stability of the behavior of groups of agents regarding the use of corruption (Barr and Serra, 2010, p. 867). For moral and religious reasons, the group of citizens, as well as the honest part of the minority, do not follow the example of the corrupt group of the minority.

We therefore generalize in this section the two-actor model to include a third group of agents: following the denominations used so far, we designate this group by the term corrupt minority. Now there are three groups of agents: the wealthy of size $\delta^r$, a corrupt elite of size $\delta^o$, and the citizen group of size $\delta^p$. We consider that $\delta^p > \delta^r + \delta^o$; the size of the group of citizens is greater than that of the other two combined, which explains their opposition in principle to a process of democratization that risks stripping them of the essential of their wealth (Glaeser, Scheinkman, and Shleifer, 2003, p.200). The total population is normalized to 1, so:

$$\sum_i \delta^i = 1 \qquad \text{avec } \delta^p > \delta^r > \delta^o$$

We still note, $\bar{y}$, the average income, and we introduce the notation relative to the income of each of the three categories:

$$y^p = \frac{\theta^p(1-\lambda)\bar{y}}{\delta^p} \;\; ; \;\; y^r = \frac{\theta^p(1-\gamma)\bar{y}}{\delta^r} \;\; ; \;\; y^o = \frac{\theta^o(1+\lambda+\gamma)\bar{y}}{\delta^o} \qquad (17)$$

$\theta^o$ is the share in the national income of the corrupt minority and $\theta^r$ and $\theta^p$ remain unchanged. This implies that group *i* gets a share $\theta^i$ (before malfeasance by corrupt minority), and $\sum i\, \theta^i = 1$. In addition, we assume that:

$$\frac{\theta^o}{\delta^o} > \frac{\theta^r}{\delta^r} > \frac{\theta^p}{\delta^p} \qquad (18)$$

$\lambda$ and $\gamma$ are the rates of illegal extraction by corrupt members of the minority on the income of the other two groups of agents; $\lambda$ being much greater than $\gamma$. We consider that, given the size of the rich group, as well as the indirect way in which it is the victim of corruption, the incidence of corruption on this group will be limited (Kaufmann et al. 2005, p.12). The rich, fearing the consequences of a revolution on their level of income, are therefore not tempted by an alliance with the group of citizens to participate in a radical change of regime. In the end, the citizens' group will remain the main victim of corruption. For simplicity, we consider that the sums raised by corruption are invested in financial markets closed to the eyes of public authorities and, therefore, are not taxed [(De Willebois, Halter, Harrison, Park and Sharman, 2011, p. .68) and (Choi, and Thum, 2005, p.13)]. As before, there is a tax rate, $\tau \geq 0$, the revenue from which is transferred as a lump sum. Tax collection has a cost $C(\tau)\,\bar{y}$.

For each of the three social groups, the preferred tax rate is the one that maximizes $\hat{y}^i$. It satisfies the condition:

$$\begin{cases} -y^i + \left(1 - \acute{C}(\tau^i)\right)\bar{y} = 0 \quad \text{and} \quad \tau^i > 0\,, \quad \text{or} \\ -y^i + \left(1 - \acute{C}(\tau^i)\right)\bar{y} \leq 0 \quad \text{and} \quad \tau^i = 0 \end{cases} \qquad (19)$$

By substituting for the income expressions, we meet these two conditions as being:

$$\begin{cases} \left(\frac{\delta^i - \theta^i}{\delta^i}\right) - \acute{C}(\tau^i) = 0 \quad \text{and} \quad \tau^i > 0 \quad \text{or} \\ \left(\frac{\delta^i - \theta^i}{\delta^i}\right) - \acute{C}(\tau^i) \leq 0 \quad \text{and} \quad \tau^i = 0 \end{cases} \qquad (20)$$

Thus, the overall share in national income of the two richest and most influential groups becomes: $\tilde{\theta} = \theta^r + \theta^o$, with $\tilde{\theta} > \theta$. The advent and spread of corruption result in an exasperation of income inequality proportional to the degree of extraction of the predatory group on the other groups of agents. Equation (13), which remains decisive here, changes form somewhat but its relevance remains the same; it becomes:

$$\tilde{\theta} > \mu. \qquad (21)$$

Previously, the game consisted of a sequence where the elite started by setting the tax rate, before the citizens decided to revolt. Now the game is different; it is the citizens who first make the decision to make a revolution or not, then, if there is no revolution, the elite sets the tax rate.

In the first case, there was no problem of commitments made. The elite set the tax rate before the decision of the citizens, and could therefore manipulate the tax rate to get away from revolution. In the second case, this

is no longer possible because the elite sets the tax rate once the decision to make a revolution is made.

**4-3 Corruption and polarization of society**

The analysis of this subgame perfect equilibrium is done as before by backward induction, starting with the last subgame, the one where the citizens decide not to undertake anything. In this subgame, the elite sets the tax rate, implements it, and the game ends. Because there are no more constraints, the elite chooses its most preferred rate, $\tau^r = 0$, which gives, in a non-democracy, the following payouts for citizens and elite, respectively:

$$V^p(N) = V(y^p|\tau^N = \tau^r) = y^p \quad \text{and}$$
$$V^r(N) = V(y^r|\tau^N = \tau^r) = y^r$$
$$V^o(N) = V(y^o|\tau^N = \tau^o) = y^o$$

Going back to the previous stage of the game, citizens must decide between resorting to violence, which yields the amount $V^p(R, \mu)$ as shown in (10), or not, which gives the sum:

$$V^p(N) = V(y^p|\tau^N = \tau^r)$$

The first is higher as long as equation (21) is applicable. In this case, the citizens will revolt.

There is evidence that the following strategies constitute a single equilibrium. When $\tilde{\theta} \leq \mu$, we have $\rho = 0$ and $\tau^N = 0$. In this equilibrium, the revolution constraint does not apply and, therefore, the citizens do not revolt, and the elite sets its tax rate equal to zero. When $\tilde{\theta} > \mu$, then the strategy $\rho = 1$ constitutes the unique equilibrium. In this case, revolution becomes the optimal action for the poor. We therefore have the following proposition:

There is a unique subgame perfect equilibrium $\{\tilde{\sigma}^r, \tilde{\sigma}^p, \tilde{\sigma}^o\}$, and it is such that:

- If equation (21) does not apply, then $\rho = 0$ and $\tau^N = 0$.
- If equation (21) applies, then $\rho = 1$.

The outcomes of this proposition are different from those of the previous proposition, and an equilibrium occurs for a wider range of parameters. This reflects the problem of elite commitments. In the game described in the previous section, this problem did not exist, because the elite acted before the citizens decided to make a revolution. In the game of this section, this problem exists, because the elite acts after the citizens and, whatever the promise they can make, it remains not credible.

However, what's really new compared to the previous section relates to the introduction of corruption as a distinctive element of the behavior of part of the minority in power (Fisman and Miguel, 2007, p. 1022). By doing so, this

group will profoundly modify the previous section equilibrium of the game characteristic of the two-actor model. Corruption tends to reinforce already existing inequalities. It tends to strengthen and expand. Corruption contributes to inequality by facilitating the unequal appropriation of wealth and privileges, and by inhibiting institutional changes that could threaten existing advantages (Johnston, 2005, p.120).

Thus, income inequality becomes more important ($\tilde{\theta} > \theta$), which increases the risk of revolution by citizens (MacMullen, 1988, p. 25). In addition, the concern for the preservation of social peace, and the maintenance of an income redistribution policy more accommodative towards the majority now requires a more proactive tax policy. Most of the tax burden is thus indirectly transferred to the rich (the non-corrupt minority) who thus bear the consequences of the criminal acts of the corrupt minority.

## 5- EQUILIBRIUM RESULTING FROM EXTENDED CORRUPTION

In this last section, we make new hypotheses that will give our work a new meaning. We first consider the case of a predatory economy or a kleptocracy (Grossman, 1999, p. 268) where corruption targets the rich more particularly, a kind of ″price discrimination″ (Olken and Barron, 2007, p. 425). They now concede a much higher portion of their income compared to the previous section: $\dot{\gamma} > \gamma$. Glaeser and Shleifer tell us in this regard that "the gain of an offense is proportional to the investment (D), but only part of the costs (of litigation) are proportional to D: the costs that represent bribe payments (to bribe the judge) are independent of D; which makes expropriation more attractive as the scale of the business increases" (Glaeser and Shleifer, 2002, p.23). The extent of corruption, the socio-political conditions in which it operates, and the levy rates it allows, are such that the economic-financial decline it causes the rich to demote them socially from class possessor to an upper middle class (Mauro, 1995, p. 700-701). For Glaeser, Scheinkman and Shleifer ″the causality between inequality and injustice runs both ways. Initial inequality leads to the subversion of institutions, but weak institutions themselves allow only those who are able to protect themselves to become wealthy″ (2003, p. 201).

### 5-1 The actors

Furthermore, the assumption that not anyone of the citizens' group get involved in corruption is abandoned. As rich and non-rich engage in corruption, corrupt practices spread and networks of corruption grow and

deepen (Grossman and Minseong, 1996, p. 338). A portion of this group, often coming from the small state bureaucracy, is thus able to increase its purchasing power by using this method at the detriment of the only non-corrupt part of the group (Reinikka and Svensson, 2004, p. 17). This, is again relieved of part $\omega$ of its income. The members of the majority thus fall into two sub-categories: non-corrupt citizens and corrupt citizens. Corruption allows this group to increase its income, to the detriment of the rest of the class to which it belongs, and thus to rise to the level of the middle class.

So, we have four groups of agents: a declining rich class, an elite or rather a corrupt caste, non-corrupt citizens and corrupt citizens. We denote them by the symbols I, II, III, IV, respectively. The size of each class is $\delta^r$, $\delta^o$, $\delta^p$ and $\delta^c$, respectively. We also consider that $\delta^r > \delta^o$ and $\delta^p > \delta^c$. The income level of each group of agents becomes:

$$y^p = \frac{\theta^p(1-\lambda-\omega)\bar{y}}{\delta^p} \;;\; y^c = \frac{\theta^c(1-\vartheta+\omega)\bar{y}}{\delta^c} \;;\; y^r = \frac{\theta^r(1-\dot{\gamma})\bar{y}}{\delta^r} \;;\; y^o = \frac{\theta^o(1+\lambda+\vartheta+\dot{\gamma})\bar{y}}{\delta^o} \qquad (22)$$

$\vartheta$ is the part of its income which the corrupt part of the citizens conceded to the corrupt caste; $\omega > \vartheta$, corruption allows the group of citizens who carry it out to compensate for the part taken from its income by the corrupt minority and to increase its income. We also assume that $\dot{\gamma} \geq \vartheta$. The rate of predation on the income of class I is greater than or equal to that levied on group IV. Indeed, it is to be expected that corruption will create, in the long term, a relationship of objective alliance between the two groups involved in it. You and Khagram (2005, p. 139) assert, in fact, that ″the poor are likely to be satisfied with small advantages by participating in petty corrupt exchanges and patronage, instead of resisting the grand corruption of the rich and of the powerful, which offers them the possibility of benefiting from much greater benefits″.

Equation (18) becomes:

$$\frac{\theta^o}{\delta^o} > \frac{\theta^r}{\delta^r} > \frac{\theta^c}{\delta^c} > \frac{\theta^p}{\delta^p}$$

Class II is the wealthiest social group, followed by Class I, then Class

Ultimately, this configuration with four categories will lead to a model with three social classes. A powerful and corrupt minority, poor and marginalized citizens and a middle class, symbolized by the letter *m* and

consisting of the old rich class (I) as well as corrupt citizens (IV). We thus have, $y^m = y^r + y^c$, $\theta^m = \theta^r + \theta^c$ and $\delta^m = \delta^r + \delta^c$; with: $\frac{\theta^r}{\delta^r} > \frac{\theta^c}{\delta^c}$.

As before, for each of the three groups, the preferred tax rate is the one that maximizes $\hat{y}^i$, equations (19) and (20) remaining unchanged.

On a political level, the existence of an undemocratic regime is often not incompatible with the holding of elections at regular intervals. After the fall of the Soviet bloc, and except few countries where a single party still exists, the electoral process in a non-democracy is carried out under the control of the state bureaucracy, so that the election results conform to the interests of the minority. We therefore assume the existence of a two political parties society; Party A, defending the interests of the majority and advocating the democratization of society, and Party B, serving as an instrument of political domination by the minority.

**5-2 A perverted electoral process**

We consider that in the event of free and fair elections, party A would win, because the two classes I and III are in the majority, $\delta^p + \delta^r > 1/2$. Regarding the former rich class, - which has become the middle class - its vote needs to be clarified. Under certain conditions, this group would vote as a whole for Party A. This part of the middle class is on the side of group III, and would vote for party A, if the latter undertakes to practice a fiscal policy which guarantees it a level of income at least equal to the prevailing one [(Alesina and Rodrik, 1994, p.470), (Casamatta, Cremer and Pestieau, 1992, p.517)].

In accordance with the median voter theorem, introduced by Duncan Black (1948, p. 28) and based on the competition model of Hotteling (1929, pp. 52-53), the new government will institute a positive tax rate, $0 < \tau \leq 1$. The two categories II and IV, having everything to lose from the accession to power of a democratic government, will vote for party B.

$$V(y^r|\tau^D) = (1-\tau)y^r + T \geq V(y^r|\tau^N) = (1-\hat{\tau})\theta^r(1-\dot{\gamma})\bar{y} + \hat{T}$$

In this equation, *N* and *D* refer to a non-democracy and a democracy, respectively. Even if the newly elected government practices a higher tax rate, which is not entirely in line with the interests of the middle class, its democratic functioning allows the eradication of corruption and the restoration of the conditions for growth healthier, means that the income of class I would be higher than it was before party A came to power. It should also be borne in mind that, for cultural and doctrinal reasons, they are of this minority who constitute the bulk of the political personnel of party A. It is this scheme which roughly corresponds to the process which, at the end of a

long political struggle, led to the democratization of many countries in the world (Cervellati and Sunde, 2012, p.10).

Thus, if the victory of party A is recognized and respected, the median voter will be from the middle class ($\delta^p < 1/2$) and the payments they will receive will be: $V^m(D) = y^m + (\tau^m(\bar{y} - y^m) - C(\tau^m)\bar{y})$. The tax rate used will thus oscillate between that preferred by citizens and that preferred by the minority. It will be close to the first if $\bar{y} > y^m$. We have, in fact, $d\tau^m/d\theta^m < 0$. The more the share in the national income of the middle class is relatively limited, the more it is favorable to a higher tax rate; the opposite is also true [Roemer, 1985, p. 106].

We know from the experience of democratic transition in poor countries that, if the political caste does not recognize the legitimacy of Party A, its reaction will often take one of two forms: either to force through and proclaim the victory of party B, or concede power to party A, the time to prepare and execute a counter-revolution in the form of a coup. The military often continue to advocate on behalf of the minority better.

In the first case, where party A is usurped of its electoral victory, we find the initial model of this article with, however, different variables and parameters. The main one is that, with a corrupt political caste, the share in the total income of the majority is further reduced, ($1-\tilde{\theta} < 1-\theta$), which constitutes for the citizens an additional incentive to revolt to recover their stolen victory. Otherwise, they would resign themselves to accepting the coup de force of the political elite, especially if the latter agrees to practice a policy of redistribution of income closer to their expectations. With the difference that this time, the lines of demarcation are no longer the same. The dividing line which was vertical and clearly separated the social categories from each other – citizens on one side, ruling minority on the other – becomes rather transverse; part of the middle class, would be tempted to side with the citizens, while the other, that of the citizens faced with their new status to corruption, would take up the cause of the corrupt elite. This is due to the fact that, in many cases, "it is the members of the middle class who play a vanguard role in the organization of revolutionary activities because they have a level of education superior that gives them more opportunities" (Acemoglu and Robinson, 2006, p.287). Corruption therefore becomes the factor determining the behavior of each person and, therefore, of each group of agents.

**5-3 The risk of a coup**

The second case relates to one where the army, at the instigation of the elite, would organize a coup, after allowing party A govern for a while. In terms of modeling, it is interesting to note the parallel between the reasons that lead citizens to want democracy, and the reasons that lead the minority to prefer non-democracy. In the latter case, too, the minority could not trust the promises of the majority party not to abuse its power, once elected, by practicing a very progressive fiscal policy. This model retains two kinds of agents forming two opposing camps: the anti-democracy, formed from groups II and IV, and the pro-democracy, formed from groups I and III. The assumptions about the agents and their income levels remain unchanged, with some adjustments relating to the costs of the coup. So, we have:

$$\hat{y}^i = \zeta\left[\kappa\,(S)\,y^i + (1-\zeta)\,(1-\tau)\,y^i + (\tau - C(\tau))\,\bar{y}\right] \qquad (24)$$

where the convention $\zeta = 0$ denotes the absence of a coup, and $\zeta = 1$ denotes its existence. The notation $\kappa\,(S)$ represents the fraction of national income destroyed following the execution of a coup in a state of nature $S$. These costs do not exist if there is no coup; therefore, if $\zeta = 0$, then $\kappa = 1$. The appropriate cost is therefore the value of $\kappa$ when $\zeta = 1$, which we denote by $1-\varphi$ where $0 < \varphi < 1$.

Initially, as we are in a democracy, the median voter sets a tax rate, $\tau^D$. If there is no coup threat, the median middle-class voter sets its most preferred tax rate, $\tau^m$, as shown in (9). This gives rise to gains $V^p\,(D)$, $V^r\,(D)$ et $V^m\,(D)$. The decision of the minority to mount a coup or not depends on the value of continuation in a democracy and a non-democracy. Because of the threat of a coup, the tax rate chosen by the middle class is made to be different from $\tau^m$. Consequently, the elite chooses to resort to violence, in which case the society falls into a non-democracy, and the elite sets her most preferred tax rate, $\tau^N = \tau^r$, and the game ends with the respective earnings for citizens, middle class, and elite:

$$V^p\,(C,\varphi) = (1-\varphi)\,y^p,\ V^m\,(C,\varphi) = (1-\varphi)\,y^m \text{ et } V^r\,(C,\varphi) = (1-\varphi)\,y^r \qquad (25)$$

Two important observations emerge from this section in relation to the previous one. On the one hand, the fact that it is the rich who pay the greatest price for corruption reduces the polarization of income distribution, and contributes to the emergence of a middle class which could act as a buffer to dampen tensions between citizens and the minority in power. When the size of the middle class is large, and its income relatively high, peaceful democratic transition becomes easier to operate, thus removing away the specter of a violent and destructive revolution. On the other hand, the spread of corruption in the strata of society participates in the

transformation of the income repartition, and brings out new social categories whose members become the objective allies of the ruling class (Bardhan, 1997, p.1336).

**Conclusion**

The case of non-democratic countries with undeniable potential for economic growth but unable to overcome deep economic stagnation is not uncommon (Haque and Kneller, 2012). This observation spurs to make an innovative reading of the theory of economic development (Rodrik, 2009) and take a look at political practice to detect the causes of such a paradox (Dixit, 1996). Accepting the idea that the insurmountable contradiction that exists in a non-democratic country, between a ruling minority and the rest of the population, can only be overcome by a democratization of society (Fukuyama, 1992 and Baecheler, 1995), the article shows that, under certain conditions, a compromise can be found between these two protagonists. This deal which stipulates that the minority agrees to practice policies of distribution of income and more conciliatory social benefits, against the renunciation by the majority to claim power by violent means. This tacit pact presupposes a fiscal policy, in particular, and an economic policy, in general, which sacrifice the objectives of economic progress and competitiveness to the imperatives of safeguarding political power by the minority.

Nothing prevents this implicit agreement between the minority in power and the majority from lasting over time. It risks, however, not being a stable equilibrium when the rationality on which it is based, globally and individually, no longer arouses the same support as at the beginning. The use of corruption by a portion of the minority to recover with the right hand what they pay in taxes with the left hand, risks accentuating the inequality of income and rendering null and void the pact which binds the two groups of agents (Tanzi and Davoodi, 1997). This risk of denunciation of the intergroup compromise becomes less when corruption affects the rich more than the poor, and that it spreads to reach the underprivileged strata of society.

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