Inequality and Public Decency or Utility

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Abstract

Income inequality may explain, to an extent, why different countries have varying degree of public decency or maintenance of public goods. In an environment of endogenous preference, one's attitude towards breaking or maintaining a rule may depend on the people she meets. In the highly unequal societies, this would provoke the risk-averse, less well-off, law-abiders to mimic what the more well-off, law breakers are doing. In a relatively egalitarian society, the opposite may be true.

Itroduction:

This paper addresses an often-observed phenomenon which has not received much attention from economics research. This is the issue of lack of public decency in developing countries. More particularly, why is it the case that whereas in the rich countries people do observe certain written or unwritten conventions in the public sphere, in the poor countries these conventions or rules are observed more in the breach? The question becomes all the more poignant once it is recalled that the received wisdom in social sciences is that the institution of market is underdeveloped in poor countries. This is the purported reason for their very misery. This hypothesis does not square well with the observation that in the Great Britain patients wait for months to be operated upon under the NHS, whereas in the poorer countries, where public health facilities are available and are under greater stress, people resort to unscrupulous means to get medical attention at quicker time. In other words, a parallel, illegal market flourishes in the developing countries for the scantly available utilities - which is not the case in the more 'market-oriented' economies.

In the literature there have been some attempts to decipher how a particular convention comes into being. Kandori *et al* (1993), Young (1993) have dealt with dynamic, evolutionary, game theoretic processes through which a particular equilibrium may be selected in the long run. These attempts differ in a key way from our model in the sense that there the players were uninhibited in playing a particular strategy. In real life, and in the public sphere, there is always an authority which is there to punish certain actions. This is principally because there is a fear of free riding in the provision of public utilities. Hence monitoring is attempted. We shall take this into account and try to show how, given parametric conditions, one or the other equilibrium would sustain in the long run.

In this paper we shall present a simple explanation whereby we shall argue that it is not the level of income but the degree of inequality of a country which affects the use or abuse of public utilities. This is not, however, a sufficient condition. Maintenance of public utilities/decency also depends on the response of the authorities towards the upkeep of the services. We shall present an evolutionary model of public behaviour in which any person's decision upon an action depends on what an alternative action would result in, as well what the people around her are doing. In other words, players have endogenous preferences. More particularly, what a person is going to do depends on her personal gains, but she is also influenced by the action of others. There is a quite old, if not fashionable, strain in the economics literature starting with Veblen (1934[1899]), followed by Duesenberry(1949), Leibenstein (1950) which argues such. Bowles (2003) calls this the 'other regarding behaviour'. Furthermore, in our model we crucially depend on the assumption that people derive certain benefits by conforming to the rest of the society. As Bowles (2003) points out '..social pressures for uniformity are among the most convincingly documented human propensities.' Boyd and Richerdson (1985), Ross and Nisbett(1991), Feldman, Aoki and Kumm (1996) give enough evidence from the realms of biology, psychology and culture to this effect. In our model, we follow the conjecture that a person will conform, but not blindly, or not going by the majority. A person is induced to behave like another, to the extent by which the latter is getting greater benefit than the former.

Inequality seems to be a more important factor than the level of income for the following reason. Though the latter has a higher degree of correlation with corrupt behaviour[1], if we stratify all the countries according to broad economic categories (for example, OECD countries as a whole may be considered as a different category from the South Asian countries; Bhagwati and Srinivasan (1999) talk of the inappropriateness of cross-country econometric studies which undermine country-specific attributes) we find that inequality does explain the difference in the corruption level to a large extent. Within the OECD countries USA ranks poorly both in terms of equality and transparency whereas Japan or Scandinavian countries do better in both. Within the South Asian countries, Sri Lanka has lower inequality and corruption. The high crime rate Latin American and African countries is concurrent with high income inequality.

Sociologists and other social scientists of late are using a category called the 'social capital' to explain the benefits the members of a community receive by dint of the fact that the community inculcates a sense of mutual trust, co-ordination or network within itself[2]. One may be tempted to take recourse to such a convenient short cut in order to explain the problem we have at hand. We did not deem this to be judicious because of two reasons. First, we feel that the literature on social capital is rather vague in terms of pinpointing the exact nature of the said networks

[1]We have done the following cross-country test. We used the Transparency International's (a UN promoted organization) corruption perception index as an indicator of rule abiding in a country. It has a correlation coefficient of about 0.90 with the per capita income (at purchasing power parity) and -0.53 with the Gini coefficient of the countries. Note that corruption in a country is comparable to breaking the queue in a railway ticket counter. In both cases some rule is being broken which affects others adversely and results in a quick if illegal gains for the rule-breaker.

[2]See Krishna (2002), Putnam (1995).

etc. and the benefits they entail. Second, we will attempt to advance an explanation which is purely based on economic rationale. We shall desist from deploying entities which may have some relevance in analyzing the politics, society or anthropology of a country.

The intuition of this paper is as follows. The users of the public utilities have differing income levels, with their aversion for risk declining with income. The authorities, which provide and maintain these utilities, specifies the fees to be paid for using the facilities. If a user tries to cheat the authorities by not paying the fees and is caught, she is to pay a fine. So the notion of corruption we have in the paper is that someone is trying to breach the rule of paying the fees after using the public utility. The possibility of getting caught is less than certain and it depends on the surplus the authorities earn. Ideally the authorities (henceforth, the state) arrives at the figure for fees by making the median or some bench-mark user (henceforth, citizen) indifferent between following the rule and breaking it.

About the information structure of the model: citizens are unaware of each other's risk aversion degree or income level. The state knows the distribution of the income in the economy. This is multi-period game. The citizens decide on whether to follow the rule or to break it depending on (a) how the payoffs from these actions compare to each other, (b) how one's payoff compares with someone she has met in the previous period randomly – provided that the other person had committed an action which is different from what she herself had done. In a way, the component (a) reflects how much a person is motivated by her individual, atomistic gains and losses and (b) takes into account that we are often influenced by the others we meet in social interactions. These influences depend on the differential in the wellbeing of the others compared to our own. With any non-zero weights on these two components, we can show that if the state's response in raising the surveillance is constant, higher income inequality may lead the economy to a dynamic process which will end in every citizen breaking the rule.

The reason being, in an unequal economy the poor (who have been abiding by the rule because of higher risk aversion) would find a greater difference between their own wellbeing and those of the law breakers (the rich). Therefore they would be tempted to break the rule. In a more equal society since the wellbeing differential is not high, a given rate of more state surveillance would compel the rich to eventually abide by the rule. We would also explore the conditions under which in the equilibrium some people would always follow the rule, the rest breaking it. This would happen if the degree of inequality is neither 'too high' nor 'too low'.

The rest of the paper goes as follows. Section 1 presents our model. Section 2 has the results, consisting of a lemma and three rudimentary results. Section 3 discusses the results. Section 4 concludes the paper, pointing out the limitations.

1. The Model

The model economy is composed of two sets of players. The first is the set of citizens, who are N in number. They are arranged in an ascending order according their income level. The i-th citizen has y_i amount of money income with θ_i being the degree of risk aversion. y_i and θ_i are private knowledge. Let C be the set of incomes of the citizens. The correspondence between income level and degree of risk aversion is uniform for all citizens. Each player gets some positive payoff out of using the utility provided by the state, S. a is the monetary value of the benefit accruing to the citizens, a is constant for all. b is the fee S charges for providing the utility, c is the fine if someone did not pay b and was caught. Let p be the probability of getting caught. All these parameters are decided by S, depending on some technical and financial feasibility conditions to be discussed shortly. Citizens take decisions under uncertainty by the following method. Faced with lottery a $l =$ (x, y; p,1-p), a citizen calculates its expected monetary value, z and its certainty equivalent, z*. The risk aversion in our model is defined in the following way.

$$\theta_i = \frac{z - z_i*}{z} \tag{1}$$

The more risk averse one is, less will be her certainty equivalent of a lottery. Hence θ_i would be higher. Citizens have two actions to choose from. One, obey the rule and pay the fees. Two, break the rule and play the lottery, where if caught, one has to pay a penalty. If not caught, ending up with a high payoff compared to the case of paying the fees. Which action a citizen will choose in the following period is determined by the following calculation. At the beginning of a period, given the value of p, she calculates the difference between the payoffs of the two actions. For example she may subtract the payoff of the breaking the rule from that of following the rule. Since breaking the rule entails a lottery, the player simply subtracts the certainty equivalent of the lottery from the sure payoff of obeying the rule. The term will be higher for the citizens with lower incomes (since they have higher risk aversion and hence lower certainty equivalent from the lottery). This takes care of the personal, utility-oriented behaviour of a citizen. The second component in her behavioural calculation is social. If she had met someone in the previous period, who has been doing what she was doing, she would not be affected by this social interaction. The encounter merely reassures her that what she had been doing was alright. Hence in the following period she would be guided by the above mentioned personal payoff differential. However, if she had met someone in the previous period who was doing just the opposite of what she had been doing, she feels that she needs to attach some importance to this 'other' behaviour. And how much weight she would put on the 'other' behaviour would be dictated by how well the other person is doing by indulging in a different action, compared to herself. This is because we want to capture the fact that people tend to judge the correctness or benefit of an action by assessing how better off a person is, who is indulging in it. Put mathematically, at the beginning of a period a citizen, i, makes the following calculation,

$$T_i = \alpha(\Pi_i - \Pi_i^0) + (1\text{-}\ \alpha)(\Pi_i - \Pi_i^*) \tag{2}$$

T will be called the transition function. It may be seen as an indicator of the difference of utilities experienced by a citizen who compares one action against the other. We, however, would like to look at T simply as a decision function, facilitating a citizen making a choice. α is the weight put on the individual payoff differential component, (1-α) is the weightage on the social component. Π_i is the payoff i would get in the following period by doing what she was doing in the previous period. Π_i^0 is what she could get if she did otherwise. Π_i^* is the payoff of the person she met in the previous period who was doing what she was not doing. In other words, i had met someone in the previous period who was doing something different than what she was doing. i calculates what that other person would obtain in the coming period if she continues to do what she was doing. This we denote by Π_i^*.

If T_i is positive or zero, i stays put and continues with the previous period's action. If it is negative she changes her action in the following period. We further specify that in the period 1 (when the game begins), when there is no previous period, α =1. For the expositional clarity we shall assume that $\alpha = 0.5$ thereafter (a different value for α will not make a difference to the nature of the results).

The other player in the economy is the state, S. S has constructed the public utilities. The running cost (which includes recouping the cost of construction) of these utilities is constant per period. If no one follows the rule, even then the surplus that the state earns is positive. Therefore the running fixed cost can be ignored in our calculations. If someone does not follow the rule it inflicts an additional cost of k per unit on S. The surplus function of the state is, R = N(n.b + (1-n)(p.c - k)), here n is the proportion of citizens following the rule. The state is aware of the lowest income level y_l, the highest income level, y_h and the median income level y_m. The parameters a, b, c and p are decided in the following way. Since a is not likely to be too high compared to the income levels, it is reasonable to assume that,

$$a = \beta.y_l, \text{ where } 0 < \beta < 1 \tag{3}$$

c is set in a way that the lowest income earner is not left with a negative income if she breaks the rule. So,

$$c = y_l + a \tag{4}$$

If someone breaks the rule she enters into the following lottery, l = (a - c, a ; p, 1- p). If she does not break the rule she gets $a - b$ with certainty. Higher b makes less and less people keen to follow the rule. At the beginning of the game, S sets b such that it makes someone with a bench mark income level, y_m, indifferent between following and breaking the rule. For the sake of simplicity we shall assume

y_m is the median income level[3] – the results will be valid if y_m is just any income level between y_l and y_h.

The surveillance by S, which affects the probability of detecting the rule breakers, p, is dependent on the current surplus that S has. As the surplus, R rises, the state can afford to spend more on surveillance and this would push up the value of p in the next period. Higher value of p leads to higher surplus[4] and the aim of the state is to maximize surplus.

Observe that the dependence of the state on its own resources for the surveillance expenses presumes an imperfect credit market[5]. This, to our mind, is a reasonable assumption given that we are dealing with an incomplete information framework. Specifically, how S decides on a particular p for the ensuing period is given by the following algorithm. Suppose at the beginning of a period, t, S had decided on a value of p = p_t. It had also formed an expectation of the volume of surplus it can earn during t. If at the end of the period the expectations are fulfilled or more than fulfilled, S raises the probability of detection for the next period (since it is financially comfortable enough to do so). If the expectations are not fulfilled, the probability for the following period gets downgraded. Thus,

$p_{t+1} = p_t + \epsilon$, if $R_t \geq R_t^e$

[3]Why does not S make all the citizens law abiders by lowering b? It is not clear that the surplus function of S is rising in b. Because a high b may earn S more revenue from fees but it forgoes revenue in terms of lost fines.

[4]Under the condition, $c(1-n) + n'.b > n'.(c.p - k)$. $n'(p)$ here measures the response of n on the change of p, which is positive in value.

[5]See Stiglitz and Weiss (1981).

$p_{t+1} = p_t - \epsilon$, if $R_t < R_t^e$ (5)

R_t^e is the expected surplus for the period t. It should depend on the value of p_t (it is a rising function of p_t). Since S knows the distribution of y_i it can predict for which citizens it would be optimal to pay fees. The crucial point is that S predicts R depending on the individual gains and losses of the citizens (the first element in the transition function). Thus S suffers from a degree of myopia – it is unaware of the fact that a social interaction process is going on which may affect behaviour of the citizens. More on this later.

ϵ will be assumed to be constant for different values of p. Observe that as p undergoes change, the payoff a citizen can earn by breaking the rule also changes. The certainty equivalent of the lottery changes, the change will depend of the risk aversion of the citizen in question. We shall assume that the certainty equivalent of the lottery for i is given by,

$z_i * = a - b - \rho(p, y_i)$ (6)

We know, $\rho(p_1, y_m) = 0$. Also $\rho_1 > 0$, $\rho_2 < 0$. Sequentiality of the game is specified by the following diagram figure 1.

Figure 1 about here

2. Results

Lemma 1: For a given value of m, the value-tuple of a, b, c and p_1 partitions the set of citizens, C into two sets, C_l and C_h. $C_l \in$ C, such that $C_l = \{y_i : y_i \leq y_m\}$. And $C_h = C_l^c$ such that, $C_h = \{y_i : y_i > y_m\}$. All citizens in the set C_l will obey the rule and all citizens in C_h will violate it[6].

[6]The marginal citizen m is assumed to be following the rule. This is just to make life easier; strictly speaking, she will be indifferent between following and breaking.

Proof: We know that for the m-th citizen, breaking the rule is as good as following it. If she follows the rule she gets $a - b = \alpha y_l - b$ with certainty. Thus for her $\alpha y_l - b$ is the certainty equivalent of the lottery l = *(a - c, a*; p, 1-p). Now $\forall y_i < y_m$, we know $\theta_i > \theta_m$. In other words, $\frac{z - z_i*}{z} > \theta_m = \frac{z - z_m*}{z}$ (from (1))

This means $z_i* < z_m* = a - b$. That is, for all citizens with income less than that of m, the certainty equivalent of the breaking the rule is less than the payoff from following the rule. Therefore faced with the lottery l and the sure payoff $a - b$, i will choose the latter and follow the rule. Similar argument will hold for all citizens with income higher than y_m who will break the rule since their certainty equivalent from breaking the rule would be more than what they can get by following the rule.

It follows from Lemma 1 that after S has announced the vector of *a, b, c* and p_1, in the beginning of period 1, all the citizens belonging to the set C_l will follow the rule and the rest will break it in that period. Since m was the median income earner, half (approximately) of the population would break the rule, half following it. Let $\overline{y}_l$ and $\overline{y}_h$ be the average income level of the C_l and C_h sets respectively.

What happens after that? This is summarized by the following results.

Result 1

If $\rho(p_2, \overline{y}_h) + \rho(p_2, y_m) < 0$ then citizens with income just below the citizen m would start breaking the rule. The rest of the set C_l will follow suit in the subsequent periods until all those who were following the rule in period 1, start breaking the rule.

Proof: Observe that in the period 1, S had set a particular value of b (given *a, c* and p_1) expecting half of the citizens to follow the rule. And since this is what that would happen (by lemma 1), $R_1^e = R_1$. This implies p_2 would be $= p_1 + \epsilon$ (by (5)). Accordingly S would have an R_2^e.

But when the citizen m calculates her transition function at the beginning of period 2, the following is what she finds,

$T_m = (0.5)(\Pi_m - \overline{\Pi}) + (0.5)(\Pi_m - \Pi_h)$

Here Π_m is what m is earning by following the rule, equal to $a - b$. $\overline{\Pi}$ is her certainty equivalent of the lottery (at p_2). We know, $\overline{\Pi} = a - b - \rho(p_2, y_m)$. And by (6) we know $\rho(p_2, y_m) > 0$. Π_h is the payoff of the random person she has met in period 1. With probability 0.5, that person belonged to C_l. In such a case m would go by only the first element in the transition function. This being positive, she will continue following the rule in period 2. With probability 0.5, however, she will meet someone in the C_h set, in which case the second component will come into play. Since the other person can be anyone, we may take her income to be expected income of the set C_h, $\overline{y}_h$. Therefore,

$\Pi_h = a - b - \rho(p_2, \overline{y}_h)$. Observe that $\rho(p_2, \overline{y}_h)$ is likely to be negative. This is because, $\rho(p_1, y_m)$ is equal to 0. Compared to $\rho(p_1, y_m)$, probability, p, has gone up by a little (ϵ), but income, y, has increased by much $(= \overline{y}_h - y_m)$.

The transition function simplifies to

$(0.5).(\rho(p_2, y_m)) + (0.5)(\rho(p_2, \overline{y}_h))$. And m will break the rule in period 2 if,

$$\rho(p_2, \overline{y}_h) + \rho(p_2, y_m) < 0 \tag{7}$$

The next question is when m finds it optimal to break the rule, do all citizens in C_l find it so? This will depend on the slope of the reduced transition function $\rho(p_2, \overline{y}_h) + \rho(p_2, y_m)$. If it is positively sloped, this means as income rises the function rises in value implying at the time when m finds the function negative in value and breaks the rule, all of the poor set will find the function negative and break the rule. Similarly, when it is negatively sloped, everyone in the poor set may not break the rule when m does. However a positive transition function implies, $\frac{\delta\rho(p_2,\overline{y}_h)}{\delta y} + \frac{\delta\rho(p_2,y)}{\delta y} > 0$. This is infeasible because we have already noted in (6), $\frac{\delta\rho(p,y)}{\delta y} < 0$.

Therefore we are left with the case of the richest among the poor breaking the rule initially.

Notice, however, even if the above condition is satisfied, the person with y_m may not break the rule because she actually may not have met someone from the group C_h. But, in terms of expectation, a top subset of citizens from C_l would break the rule. And we can find a marginal citizen m_1 from C_l, such that

$\rho(p_2, \overline{y}_h) + \rho(p_2, y_{m1}) = 0$

Since the number of rule followers will have gone down compared to the expectation of the state[7], the revenue expectations of the state will remain unfulfilled. Hence it will lower p_3 below p_2 and by (5) this will be same as p_1. The lowering of probability of getting caught will prompt a further surge in rule breaking (since $\rho_1 > 0$ by (6), it implies that lowering of p reduces the risk aversion). The process of rising rule breaking and lowering p is therefore an inexorable one. This will stop at a state of rest (equilibrium) when all citizens are breaking the rule.

[7]It may happen that due to rise in p_2 over p_1, some citizens from the set C_h start following the rule in period 2. We shall discuss this case in the next result. But that should not change this result because overall, the state will have lesser number of law abiders than it had expected.

Result 2:

If $-\rho(p_2, y_{m+1}) < 0$ and

$\rho(p_2, \overline{y}_h) + \rho(p_2, y_m) > 0$

then the citizens with income just above the median citizen would start following the rule first; higher and higher income earners would replicate them with time until the economy ends up in an equilibrium where all citizens follow the rule.

Proof: This is a much simpler proof. Let us assume that the citizen m + 1 is the one whose income is immediately greater to the median income, y_m. Thus her, $-\ \rho(p_1, y_{m+1})$ is a small positive number, δ (say). Observe after period 1 and at the beginning of period 2, her transitional function becomes, $-\ 2.\rho(p_2, y_{m+1})$ – if she meets somebody from the C_l set. Therefore, if $-\rho(p_2, y_{m+1})$ is negative then the citizen m+1 would follow the rule in period 2. More importantly, if m+1 had met someone from his own set (C_h), then she would go by the first element of her transition function. This simplifies to $-\ \rho(p_2, y_{m+1})$. In other words, provided $-\rho(p_2, y_{m+1}) < 0$, all citizens in the set C_h, with income below the marginal citizen m_2 (say) would follow the rule – irrespective of whom they have met in period 1. Here for the citizen m_2, $-\ \rho(p_2, y_{m2})$=0. Observe, since $-\frac{\delta\rho(p,y)}{\delta y}$ >0, we may find such a citizen from the set of C_h. In short, the number of citizens who were expected by the state to be following the rule in period 2 will exactly match with actual number of rule followers provided $-\rho(p_2, y_{m+1}) < 0$.

By the condition $\rho(p_2, \overline{y}_h) + \rho(p_2, y_m) > 0$ stated above, none from the C_l set would break the rule (the condition here is simply obverse of the condition (7) in result 1). Therefore, the number of rule followers will go up. This increment will be, moreover, in line with the expectation of surplus by the state. Thus, R_2 will be equal to R_2^e. By (5), probability p would be further revised up in period 3. As long as the above conditions remain satisfied, another portion from the set C_h, would follow the rule in period 3. The process will continue until all of the citizens end up following the rule.

Result 3:

If $(i) - \rho(p_2, y_{m+1}) > 0$ and

$(ii) \rho(p_2, \overline{y}_h) + \rho(p_2, y_m) > 0$

then we have an interior equilibrium in which citizens in C_l will continue following the rule and those in C_h will keep on violating it after period 1.

The reason for this is, by dint of (ii), citizen m would not alter his action in period 2. Because of (i), neither will the citizen m + 1 be tempted to follow the rule from period 2 onwards. Therefore, the partition of period 1 will persist. S will alternate between p_1 and p_2 in successive periods. In the odd periods S will set p_1, its expectation would be fulfilled following which $p_2 = p_1 + \epsilon$ will be set for the even periods. But this expectation would not be fulfilled as the number of rule compliance would stay at N/2. Thus $p_3 = p_1$, will be the next probability and so on.

3. What do these results tell us?

The simple, self-explanatory, rationale of the discussion so far is that people get influenced by behaviour of others (which may not have been accounted for by the authorities). This prompts a break down of public amenities and erosion of public decency in a more unequal society. The sufficient condition for the break down is condition (7), $\rho(p_2, \overline{y}_h) + \rho(p_2, y_m) < 0$, which signifies a high degree of inequality. We know, $\rho(p_2, y_m) > 0$. If the difference between $\overline{y}_h$ and y_m is not much – which implies low inequality, then the condition (7) may be violated. The response of the authorities can not be undermined in this context. A highly responding state would raise p_2 much above p_1, thus violating the condition (7) and satisfying the condition $-\rho(p_2, y_{m+1}) < 0$ stated in result 2. However if ϵ (difference between p_2 and p_1) is the same in two societies, a society with a higher inequality – satisfying the condition (7), would see a total disregard for public and social rules or conventions.

Note, a more perfect financial market implies a high value for ϵ, than a less perfect one. This enables the state in bearing the surveillance expenses through easier terms in the financial market.

4. Conclusion

"What is it that impels the powerful and vocal lobby to press for greater equality?" asked Margaret Thatcher, in 1975. She offered her own answer: "Often the reason boils down to an undistinguished combination of envy and bourgeois guilt" (quoted from the *Human Development Report*, 2005). What we wanted to demonstrate in this paper is that the case for equality may be more direct and economically compelling, apart from being ethically desirable. Highly unequal societies may produce many riches, but they eventually become less safe and more brutal, as the Latin American and African countries amply exemplify. Lacuna of the paper are the following. First, the authorities have been assumed to be unaware that people do get influenced by the behaviour of others. But notice, there is not much they could have done had they known this. Second, there is not much empirical or behavioural evidence to show that people indeed behave the way they have been assumed to. Third, the breaking of rule by a citizen does not directly affect the well being of others in this set up. But in many real life cases, action of fellow citizens have a direct bearing on the wellbeing and therefore actions of people. Nevertheless, this was an effort to explain a fact of life which has been largely overlooked by economists.

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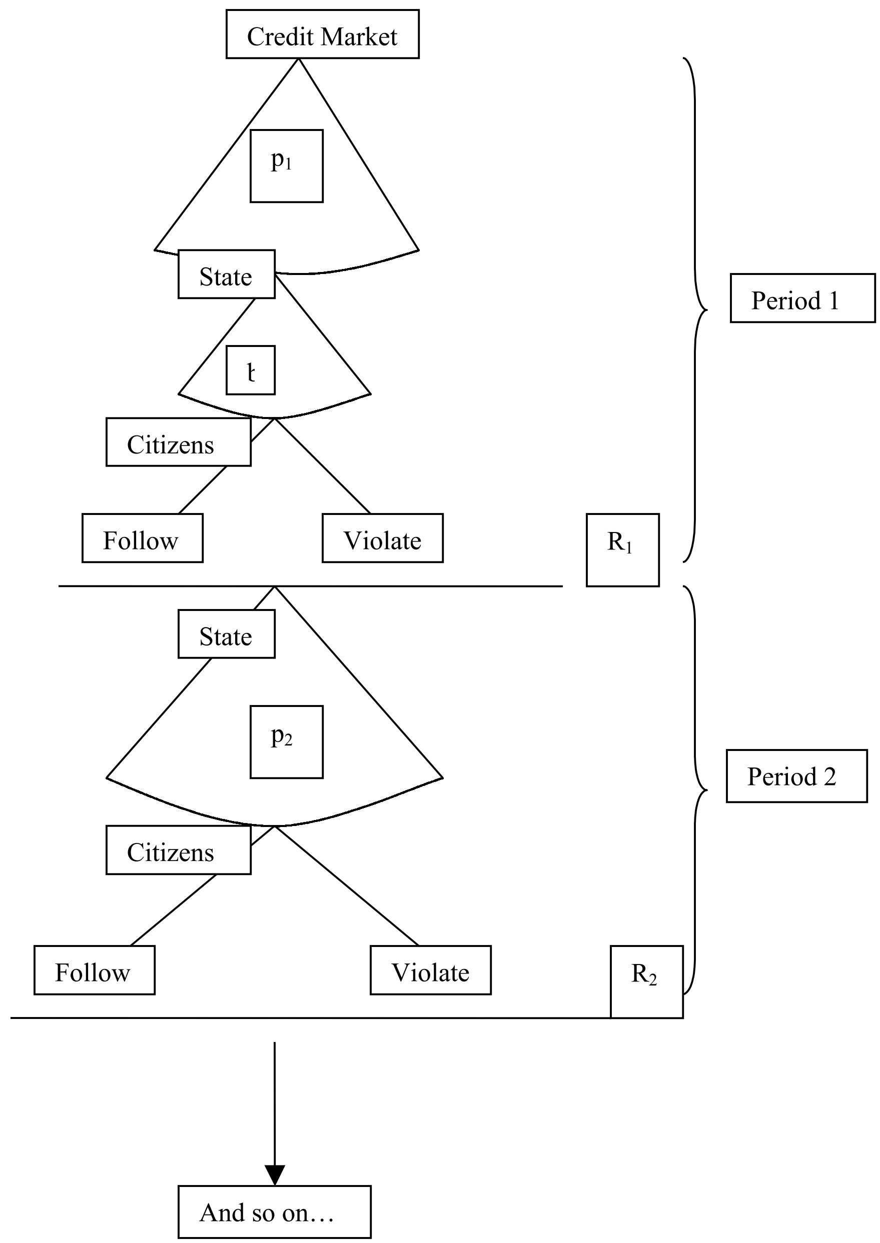
Credit Market
p1
State
t
Citizens
Follow
Violate
R1
Period 1
State
p2
Citizens
Follow
Violate
R2
Period 2
And so on…

Figure 1