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Poor People and Risky Business

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Abstract

We explain why economic conflicts and illegal business often take place in poor countries. We use the concept of subsistence level of consumption (d) and assume a regular concave utility function for consumption levels higher than d . For consumption levels lower than d utility is constant and equal to zero. Under this framework poor agents are risk-lovers. This result helps to explain why economic conflicts are more likely to appear in poor economies and why poor agents are more willing to undertake illegal business.

KEYWORDS: poverty, income distribution, illegal business

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1. Introduction

Many times risky activities are undertaken by poor people. In particular, economic conflicts and illegal business often take place in poor countries. We suggest an explanation for these facts based on the characteristics of the utility function. We consider a utility function consistent with the view of poverty as desperation.

Banerjee (2001) formalizes the idea of poverty as desperation assuming that there is some bound on how low the indirect utility function can get. There can be several explanations for this bound. It could be the result of social policy: it may embody the guarantees given by the welfare system; or it may reflect private generosity; or it can be the point beyond which having less to eat stops mattering because the body gives up. Summarizing, according to the view of poverty as desperation poor agents are likely to be risk takers.

In our framework, when the consumption lies below a subsistence level, d , the utility is constant and equal to zero; while when the consumption lies above the subsistence level, d , the utility is positive, concave and increasing in the consumption level. Beyond the point d , having less does not matter.

Using this framework we can improve our understanding of old problems related to criminal activities. In particular, we try to shed some light on the following facts:

1. In relation to illegal crops:
 - Plantations of coke, marihuana and poppy are located mainly in poor countries (Afghanistan, Bolivia, etc.).
 - Historically, repressive efforts like fumigations were not successful in reducing planted areas (for the case of Colombia, see Tokatlian, 2003)
2. In relation to economic conflicts:
 - Persistent and generalized economic conflicts arise only in poor countries (This is the case in Africa and some Latin-American countries). Indeed, the risk of civil war has been systematically related to a few economic factors, such as low national income (see Collier, 2000 and Reynal-Querol, 2002 among others).
 - Conflicts may persist even if there are high costs. It is well known that conflicts consume resources and divert inputs from production. It is also known, that redistribution can eliminate conflicts and, in this way, save resources, allow for the reallocation of factors and increase total output in such a way that every one is better off compared with the situation of conflict (see Azam, 1995 and Roemer, 1998). However, several societies are castigated by conflicts and solutions do not appear easily.

The study of the economic incentives for appropriative activities is not new. Economic theories of the causes of civil war follow two distinct approaches. The first approach focuses on motivation, the second approach focuses on feasibility and views the rebel group as an unusual type of business which can only prosper in special conditions.¹

The standard theoretical model focused on motivation has its foundations in the work of Hirshleifer (1991, 1994). In this literature the key variables generating incentives for predatory behavior is productivity and power. The same basic model can be found in the works of Skaperdas (1992) and Skaperdas and Syropoulos (1997), who study the case of two agents who can invest in productive or appropriative activities. They find that the agent, whose productivity in the production of goods is lower than in the appropriative activity, will invest more in appropriative activities and will expand its military power. Given the obvious link between productivity and poverty, according to these models poor agents are, in general, more willing to incur into predatory behavior.

Grossman (1991, 1994 and 1999) takes the perspective of the potential peasant recruit with households deciding how to allocate their labor to production, soldiering, or participation in an insurrection. The interaction between the ruler and the peasants generates an equilibrium allocation of labor time and a probabilistic distribution of income from the various activities.

These models are subject to one main criticism. Since predatory behavior is costly, agents can improve on redistribution if the productive agents engage in pre-emptive redistribution. In effect, the endowment differences should produce redistribution rather than rebellion, a line of analysis most closely associated with Azam (1995) and Roemer (1998).

The model we present is not subject to this type of criticism. In our setting, redistribution may not prevent predatory behavior if the society as a whole is poor (see propositions 3 and 4).

Other models of economic conflicts are provided by Brito and Intriligator, (1992), Murphy, Shleifer and Vishny (1993) and Zuleta (2004), among others. However, none of these authors relate poverty and illegal business through the willingness to undertake risky activities.

In the same way, the supply-side of Illicit Drugs has been deeply studied but not related with poverty and risk-loving behavior (Whynes, 1991, Flower, 1996, Burrus, 1999, Cussen and Block, 2000 and Kennally, 2001). In particular, regarding the relation between poverty and illegal crops, there are theoretical works that explain this link (explicitly or implicitly) through the comparison between expected earnings (see for example Grossman and Mejia, 2008). Our paper differs from previous research in two ways. First, in the mechanism we use

¹ For a complete literature review see Collier and Hoeffler (2007).

to explain the relation between poverty and illegal crops and second, with the same mechanism we can also explain the relation between poverty and economic conflicts.

As we stated before, in our framework, the consumption level of poor people lies close to the subsistence level and, for this reason, they are risk takers. Under such conditions they prefer illegal risky activities if such activities pay more than the subsistence level with a positive probability.

The effect considered in the paper is well known in the field of public economics. When the state guarantees some minimum income, the utility function is constant for low levels of income while when the consumption lies above the minimum income the utility is positive, concave and increasing in the consumption level. For example, Sinn (1982) shows that under such circumstances a risk-avertter may choose not to buy any insurance.² Here, we apply this logic to a different context, that of conflict and crime.

The utility function we use can be seen either as a special case of the Stone–Geary utility function or as a special case of the prospect theory.

The Stone-Geary utility function is popular because it gives a linear expenditure system. This type of utility function generally considers more than one good and assumes that for any good there exists a minimum level of consumption, \underline{c} , such that when the consumption lies above \underline{c} the utility is positive, concave and increasing in the consumption level. However, the utility function for consumption levels below \underline{c} is not always defined.³ The utility function we use is defined for consumption levels below \underline{c} (is equal to zero) and considers only one good.⁴

Regardless of the differences between the traditional Stone-Geary and the utility function we use, the empirical evidence supports our assumptions about the existence of a positive consumption level for which the utility is zero and below which the utility function does not behave in a standard way. Indeed, many scholars have estimated the critical consumption level, \underline{c} , for different goods. Abbott and Ashenfelter (1976), Rosen (1978), Gaudin, Griffin and Sickles (2001) and Prowse (2006) among others, find a positive subsistence level of consumption consistent with the Stone Geary preferences.

On the other hand, according to the prospect theory, the utility functions are convex below some consumption level and concave above such level. The

² Shavell (1986); Konrad and Skaperdas (1993) and Gollier, Koehl and Rochet (1996) examine the optimal demand for insurance of a decision maker under limited liability and show that the decision maker may decide not to purchase any insurance even if it is actually fair.

³ In general, the empirical papers related to Stone Geary utility functions are focused on estimations of linear expenditures systems and, for this reason, there are no explicit assumptions about the utility level when consumption lies below the subsistence level

⁴ The assumption of one good simplifies the analysis and does not affect the results of the paper.

empirical relevance of these utility functions was noted by Friedman and Savage (1948) and has been tested by many authors in the field of experimental economics (Kahneman and Tversky, 1979; Piron and Smith, 1995; Edwards, 1996, among others). However, in the prospect theory the critical level of consumption is not related with the consumption level in absolute terms.

The paper is organized in 4 sections. In the second section we present a review of the empirical literature that relates poverty with risk aversion, criminality, illegal crops and guerrilla movements. In the third section we present and explain the utility function, we also analyze the relation between risky business and poverty and study the link between poverty and economic conflicts and finally we present the conclusions.

2. Poverty and Risky Business

2.1 Poverty and Risk Aversion

In our framework, the basic mechanism explaining the link between poverty and criminal activities is a causal relationship between poverty and risk taking behavior. In the following lines we refer to two studies that find that the degree of risk aversion is correlated with the income level.

Bosch and Silvestre (1999), develop an experiment where the agents are given a list of seven amounts of money (Initial Experimental Incomes, or IEI's). They are asked whether or not they would insure them. The main result of the experiment is that half of the people chose to insure all income levels (IEI), whereas another half chose instead not to insure low levels, but to insure high levels. In other words, people appear not be risk averse for low levels of income.

In a related study, Bosch and Silvestre (2006) develop an experiment with two groups of people: The first group includes students of a public high school in a low-income neighborhood in Barcelona. The second group includes students attending a high-tuition private school in a plush area in the same city. They call these groups Nonwealthy and Wealthy, respectively. They find that risk attraction is more prevalent among the poor when the amounts of money at risk are big.

2.1 Poverty and Criminality

As we stated before, we use the proposed theoretical framework in order to improve our understanding of old problems related to criminal activities. We focus our attention on guerrillas and illegal crops. However, since criminal activities are generally risky, the real-world validity of this mechanism can be tested using different measures of criminality and different types of criminal

activities. Several authors have undertaken this type of research and the predicted relation between poverty and criminal activities at the individual level is supported by empirical evidence: Berk, Lenihan and Rossi (1980), for example, show that property is causally related to crime at the individual level and state that modest transfer payments appear to reduce arrest for both property and non property crime. Myers (1984) finds that better wages and employment reduce individual recidivism rates. Finally, Hsieh and Pugh (1993) conclude that poverty and income inequality are each associated with violent crime.

2.2 Poverty and Civil Wars

Under the framework proposed here, the existence of guerilla movements depend on the income level and on the distribution of income. Indeed, the opportunity cost of becoming a guerrilla is legal income. The income of a guerrilla is the appropriated share. Therefore, a better distribution of income reduces the incentives to join guerrilla groups.

Collier and Hoeffler (1998) argue that countries with low income levels and high demographic growth are more likely to suffer economic conflicts and emphasize that in these countries the recruitment for illegal groups is cheaper. In a related study Collier and Hoeffler (2004) find that economic factors such as the level, growth and structure of income are significant predictors of war initiation. More precisely, poorer countries and countries with low growth rates were more likely to experience war during 1960-99.

Despite the evident reverse causality from conflict onto income, it has been possible to separate out that part of the correlation that is due to causal relationships: low growth and low income cause the risk of conflict (see Collier and Hoeffler, 2007). One interpretation of this causal relationship is that low incomes and growth rates indicate lack of opportunities, thus making recruitment to rebel forces much easier.

Additionally, two studies have assessed the robustness of the empirical results. Sambanis (2004) examines the sensitivity of this causal relationship to different definitions of civil war. He finds that a large number of results are robust across a wide range of definitions. Hegre and Sambanis (2006) assess the robustness of the various results to the choice of model specification and country-year coverage. They use the methodology of comprehensive permutations of regressions previously applied to growth regressions by Sala-i-Martin (1997). They find that the robust risk factors are large population, low income, low growth rates, recent political instability, inconsistent democratic institutions and location in a war-prone or undemocratic neighborhood.

In summary, the relation between poverty and economic conflicts is supported by the empirical evidence.⁵

2.3 Poverty and Illegal Crops

Under the framework we propose, poor agents are more likely to cultivate illegal crops. This result seems to be supported by the empirical evidence presented by Diaz and Sanchez (2004) and Ibañez (2007). Diaz and Sanchez find that illegal crops are more common in municipalities with higher Indices of Basic Unsatisfied Needs. Ibañez finds that under poverty, coca is cultivated not only because it pay-offs but also because individuals are obliged to do so to survive, that is, there are no outside opportunities.

In summary, according to the empirical evidence (i) people with low levels of wealth seem to be less risk averse, (ii) there exists a positive relation between poverty and criminality, (iii) there exists a relation between poverty and illegal crops and (iii) there exists a relation between poverty and economic conflicts.

3. Utility Function: Assumptions and Implications

3.1 Utility Function

We consider a subsistence level of income above which utility is concave and increasing in consumption and below which - equal to zero. That is:

$$U = (c - d)^\beta \quad \text{if } c > d$$
$$U = 0 \quad \text{if } c \leq d$$
(1)

Where u is utility, c - consumption, d - subsistence level and β ($1 > \beta > 0$) indicates the degree of risk aversion of the consumer when his income is higher than the subsistence level.

[Insert figure 1 about here]

In general, with this utility function, there exists an income level y^* such that whenever the income of a consumer is below y^* , the consumer prefers a lottery, which delivers a quantity higher than d or zero (both with a positive probability), than the secure equivalent of the expected value of such a lottery.

⁵ For a general discussion of this relationship see also Goodhand, (2003).

Figure 1 represents the utility function from equation 1. Note that the function is not concave for low values of c . Therefore, agents with low income levels may be risk lovers. The dashed line in Figure 1 represents the expected utility of all the lotteries which pay with some positive probability the outcome y^* and with some positive probability - zero. The exact value of y^* can be derived knowing that the slope of the straight line (dashed line) is equal to the marginal utility evaluated at y^* .

$$\left. \frac{\partial U}{\partial c} \right|_{c=y^*} = \beta (y^* - d)^{\beta-1} \quad (2)$$

The slope of the dashed line is constant and equal to $\beta (y^* - d)^{\beta-1}$. Therefore, when it is evaluated at y^* it is equal to both $y^* \beta (y^* - d)^{\beta-1}$ and $U(y^*)$. Thus,

$$y^* \beta (y^* - d)^{\beta-1} = (y^* - d)^\beta$$

Rearranging,

$$y^* = \frac{d}{1 - \beta} \quad (3)$$

This simple framework helps to understand why poor agents are more willing to work in risky activities. Now, since illegal activities are characterized by high risk, ceteris paribus, poor agents are more willing to work in illegal activities than rich agents.

3.2 Risky Business

Assume that an agent has to choose between two different activities A and B . These activities are described as follows:

- A is risk-less and its return is equal or lower than y .
- B is risky and its return is y_h with probability p and y_l with probability $(1-p)$, where $y_h > y_l$.
- $y = p(y_h) + (1-p)(y_l)$.

Proposition 1: *If $y < d < y_h$ and $p > 0$ then the risky option is preferred.*

Proof. The proof is straightforward from $U(y) = 0$ and $U(y_h) > 0$.

Proposition 2: *If the expected outcome of activity A is equal to the expected outcome of activity B , $y_l = 0$ and $d < y_h \leq y^*$ then the risky option B is preferred.*

Proof.

1. The expected outcome of activity A is equal to the expected outcome of activity B so $py_h = y$ and $p = y/y_h$
2. $y_l < d$ so $U(y_l) = 0$ and the expected utility of activity B is given by,

$$E[U(B)] = p(y_h - d)^\beta = \frac{y}{y_h} (y_h - d)^\beta$$

3. The expected utility of activity A is given by,

$$U(A) = \begin{cases} (y - d)^\beta & \text{if } y \geq d \\ 0 & \text{if } y < d \end{cases}$$
. Since $y_h > d$ and $y < y_h$ then

$$\frac{y}{y_h} (y_h - d)^\beta > (y - d)^\beta \text{ and } \frac{y}{y_h} (y_h - d)^\beta > 0.$$

From 1, 2 and 3 it follows that $E[U(B)] > U(A)$.

These propositions help to understand why illegal crops are grown in poor countries and why the efforts of different governments to increase the risk in such activities do not seem to reduce the planted area. If the expected income of outside opportunities is close to the subsistence level coca growers do not have incentives to stop growing coca. Moreover, any effort directed to increase the risk of growing coca is useless because coca growers are risk takers.

According to our result there are three ways to curb incentives to undertake illegal risky business:

- i) Reduce the probability of success. This policy is often hard to implement. On the one hand, the income in case of success may be positively correlated with risk. For example, the price of coke goes up after repressive policies. On the other hand, if the income derived from the legal activity is close to the subsistence level the only way to reduce the incentives is setting the success probability equal to zero ($p = 0$).
- ii) Reduce the high outcome (y_h) of the risky business. If the income derived from the legal activity is close to the subsistence level ($y \approx d$) any reduction in the high outcome of illegal business (y_h) would be useless unless the new outcome is equal or lower than the outcome of the legal activity ($y \geq y_h$).
- iii) Increase the outcome of the risk-less business (y). This type of policy might be successful by itself if the new outcome is higher than y but can also be a complement to the first two policies. Thus, a successful policy should include not only a repressive action against the illegal business but also an effort to increase the return to legal business⁶.

⁶ The results obtained by Moreno-Sanchez, Kraybill and Thompson (2003) indicate that the incentives to produce legal substitute crops may have greater supply-reducing potential than eradication.

3.3. Conflict

We address now the problem of economic conflicts. We consider an economy with two agents (1 and 2) where both of them consume the same good and each has an initial endowment. Each agent can consume his (her) endowment or enter into a conflict with the other agent. In case of conflict an agent has a positive probability of winning the other agent's endowment and a positive probability of losing his own.

To analyze the incentives of the agents let us define some concepts:

e_1 : Endowment of agent one

e_2 : Endowment of agent two

δ_1 : Probability of winning for agent one

δ_2 : Probability of winning for agent two

Lottery: Game in which agent one (agent two) can have an endowment equal to e_1+e_2 with probability δ_1 (δ_2) and an endowment equal to zero with probability δ_2 (δ_1), where $\delta_1 + \delta_2 = 1$.

Proposition 3: If the endowments of agents 1 and 2 are such that $d < e_1 + e_2 < 2d$ then for any allocation there exists a lottery such that at least one agent is better off and no one is worse off with respect to the situation where each agent consumes her own endowment .

Proof. First, consider the case without lottery, where each agent consumes his (her) own endowment. The utility for agent one is given by,

$$U_1 = (e_1 - d)^\beta \text{ if } e_1 \geq d \quad \text{and} \quad U_1 = 0 \text{ if } e_1 < d \quad (4)$$

and the utility for agent two,

$$U_2 = (e_2 - d)^\beta \text{ if } e_2 \geq d \quad \text{and} \quad U_2 = 0 \text{ if } e_2 < d \quad (5)$$

$e_1 + e_2 < 2d$ implies that if $e_2 > d$ then $e_1 < d$ and if $e_1 > d$ then $e_2 < d$. So, either $U_1 = 0$ or $U_2 = 0$.

Now, consider a lottery such that agent one gets $e_1 + e_2$ (agent two gets nothing) with probability δ and zero with probability $1-\delta$ (agent two gets $e_1 + e_2$). The expected utility is given by

$$E(U1(L)) = \delta_1(e_1 + e_2 - d)^\beta \text{ and } E(U2(L)) = (1 - \delta_1)(e_1 + e_2 - d)^\beta$$

Therefore, if $e_1 > d$ then $U2 = 0$ and $E(U2(L)) > 0$, so agent two prefers the lottery and if $e_2 > d$ then $U1 = 0$ and $E(U1(L)) > 0$, so agent one prefers the lottery .

Now suppose that $e_1 > d$. For agent one the expected utility of the lottery is higher than the utility without the lottery if the following inequality holds,

$$\delta_1(e_1 + e_2 - d)^\beta > (e_1 - d)^\beta \quad (6)$$

So, whenever $\delta_1 > \left(\frac{e_1 - d}{e_1 + e_2 - d} \right)^\beta$, at least one agent is better off with the lottery and no one is worse off. Therefore, if the probability of success is relatively high then agent two has incentives to play the lottery.

In the case where $e_2 > d$ it is easy to prove that whenever $\delta_2 > \left(\frac{e_2 - d}{e_1 + e_2 - d} \right)^\beta$ at least one agent is better off with the lottery and no one is worse off.

Economic conflicts can be understood as a lottery. Two parties or two agents fight for some amount of wealth and both parties have a positive probability to win and lose and a positive probability to loose. Therefore, from proposition 3 it follows that for poor agents a conflict is a way to increase expected utility. In corollary 4 we explain the relation between conflict and poverty in a more formal way.

Corollary 4: If the endowments of agents one and two are such that $d < e_1 + e_2 < 2d$ and if both have positive probabilities of winning a conflict then at least one agent has incentives to start the conflict. Moreover if

$$\delta_i > \left(\frac{e_i - d}{e_1 + e_2 - d} \right)^\beta \text{ for every } i, \text{ both agents have incentives to start the conflict.}$$

We can conclude that a successful policy to prevent economic conflicts should include not only a repressive action but also an effort to increase the income of the population and, in particular, the income of the poorest agents.

An important implication of corollary 4 is that if the total wealth of the economy is very low any effort to redistribute is useless and the only way to avoid conflict is by increasing the total wealth of the economy. Notice that in proposition 3 and corollary 4 we have assumed that conflicts are costless. However, conflicts demand resources that could be used in the production of goods. The existence of such costs may eliminate the incentives for economic conflicts.

Proposition 5: If the endowments of agents 1 and 2 are such that $d < e_1 + e_2$, $e_1 < d$ and the cost of conflict (x) is lower than the difference between the endowment of the economy and the subsistence level, that is, if $x < e_1 + e_2 - d$, then the cost cannot prevent conflict.

Proof. If $x < e_1 + e_2 - d$ then $e_1 + e_2 - (x + d) > 0$ so $\delta(e_1 + e_2 - (x + d))^\beta > 0$. So for the poorest agent the expected utility with conflict is higher than the expected utility with peace.

From proposition 5, given the income of the poorest agent, the possibility of an economic conflict depends on two variables: the cost of the conflict and the

income of the richer agent. In other words, inequality plays an important roll in the configuration of economic conflict. Therefore, re-distributive policies can be useful to avoid economic conflicts. However, if the society is too poor, it is impossible to eliminate economic conflicts through redistribution of wealth.

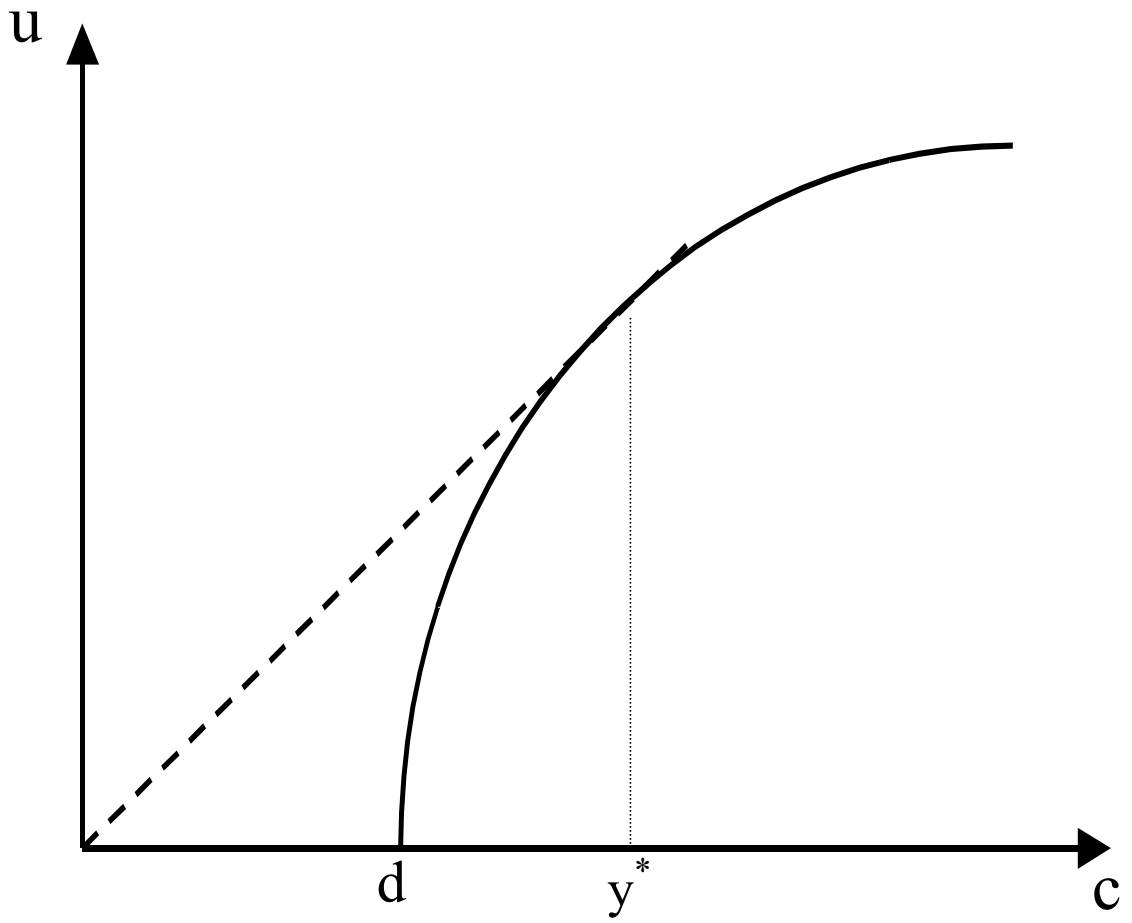
4. Conclusions

We consider a utility function such that when the consumption lies below a subsistence level the utility is zero and when the consumption lies above the subsistence level the utility is positive, concave and increasing in the consumption level. With this utility function poor individuals are risk lovers and, for this reason, are more willing to undertake risky activities. Since poor agents are risk lovers and illegal activities are characterized by high risk, *ceteris paribus*, poor agents are more disposed to work in illegal activities than rich agents.

Using this framework we can conjecture some policy implications: A successful strategy against illegal activities should include not only a repressive action but also an effort to increase the return to legal business and guarantee a minimum income for the poorest agents.

It remains to say that we do not argue that illegal activities and economic conflicts are necessarily explained by poverty. We just state that poverty is one important determinant of illegal activities and provide a simple theoretical framework that can help to see why. We are aware of the fact that there are other determinants, many of them non economic, of both violent conflicts and criminality. However, the aim of the paper is not to provide a self-contained theory of economic conflicts. Rather, we emphasise the importance of compartmental factors triggered by poverty, which affect incentives for conflict initiation.

Figure 1



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