

Conflict and Economic Growth: A Survey of the Theoretical Links

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Abstract

This paper surveys the theoretical literature that links conflict and economic growth. The diversion of resources from productive to defense or appropriative activities is the channel that has been used most of the times to study the way in which conflict affects economic growth. Other channels include the destruction of capital and production, and the negative effect of insecurity on investment rates. Furthermore, various papers coincide with the view that economic growth may foster conflict at initial stages of development, but this relation reverses at some point in the process of economic development. Among the determinants of this non-monotone relation so far identified in the literature are the quality of property rights and the distribution of income.

Key Words: Economic Growth, Conflict, Defense Spending, and Property Rights.

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1. Introduction

All societies face an insecurity problem: somebody, from the inside or the outside, can challenge the control of property or threaten the life or the material wealth of its individual members by extortion, plundering, kidnapping, etc. Therefore, societies must confront decisions such as how much to allocate to defense activities? how to deter predators from continuing the extraction and destruction of its material and human well being? These two questions are among the most important issues that a society has to solve to protect its resources. Conflict (and the possible destruction that derives from it) is costly for a society, but defense is too, as it uses resources that could otherwise be used in productive activities. Therefore, the diversion of resources towards non-productive activities and the possible destruction of some of these resources reduce the growth rate of the economy. The purpose of this paper is to review of the literature that links conflict and economic growth, to explain the channels through which conflicts affects economic growth and vice versa.

Despite the prediction of the well-known neoclassical growth model (Solow, 1956), many poor countries (or less developed economies) have invested at lower rates and its growth rate has been lower than predicted by this model. In other words, the inverse relation between wealth levels and growth rates that the neoclassical model predicts, which should be further strengthened by technological diffusion and the opportunities for “catching up”, has not been empirically observed and rather, available empirical evidence points more towards a flat, and possibly a hump-shaped, relation between this two variables (Benhabib and Rustichini, 1996). Even though for many cases the answer to this regularity can be found in endogenous growth models that incorporate human capital accumulation (Lucas, 1988) or some form of increasing returns to factor accumulation (Romer, 1986, 1990), in other cases the lack of investment and the low growth rates observed in those countries at the low tail of the world income distribution have to do with the direct and indirect consequences of conflict, violence or rent-seeking activities (or all at the same time). The work of Collier (1998), Barro (1991), Alesina and Perotti (1993) among others, have found a significant negative empirical correlation between

investment and growth rates with different measures of conflict and political instability. This empirical relationship has been found to be robust to different specifications and different econometric methods of estimation.

While conflict may be violent (when force is actually used by some agent or group of agents as a mean to obtain an end) or non-violent (when the threat of the use of violence is enough as a mean to obtain an end), the effects that it has on the economy are very diverse and have been reasonably well identified in the literature: diversion of resources towards unproductive (for instance, rent-seeking) activities, destruction of physical and human capital, reduction in investment rates that result from uncertain outcomes or the risk of expropriation, and an increasing military burden that take public resources that could have been invested in the provision of infrastructure, education or health, etc.

Perhaps the other way causality (from growth to conflict) has been more debated. While some authors claim that insecurity and conflict may rise with development as opportunities for diversion and the “size” of the appropriable pie expands, others authors have identify a negative relationship between conflict and growth in models where individuals make an occupational choice based on the relative rewards to productive or rent-seeking activities. This is because the rewards to productive activities increase with economic development,¹ driving resources from unproductive to productive activities as the economy goes through the process of development.

As the reader may have already noticed, the definition of conflict has been loosely used so far. Even though conflict is not easy to define, it will be taken here as the use of resources to appropriate others’ property or resources: what the literature has called “conflict over claims of property”, or defense of ones’ resources or wealth from the threat of expropriation or destruction by others. In other words, one of the most straightforward ways to measure the intensity of conflict is by the amount of resources used in appropriative or defense activities (see for instance, González, 2003). This is because, as

¹ For instance, the returns to human capital accumulation increase with technological progress, or with the incorporation of new vintages of intermediate goods to the production process.

pointed out before, conflict may be non-violent. If one tries to measure conflict by the amount of capital or production being expropriated from its owner, one may end up concluding that there is no conflict in societies that devote a large fraction of its resources to guarding and defense activities. But this would be clearly wrong because property may be perfectly secure but at the expense of a large reallocation of resources from productive to defensive activities due to the threat of expropriation. Conflict and insecurity under this definition are closely related because as some agents allocate resources to appropriative activities, the property of some other agents, by definition, becomes insecure.

This paper will survey the recent theoretical links that the literature has identified between conflict and economic growth. Even though the empirical evidence is important to motivate the relevant questions to be asked and of those, the ones that can be answered, the search for a methodological framework (economic models) is extremely useful as it provides an organized and systematic way to think about the link between conflict and economic growth.

The paper contains five sections where this introduction is the first one. The second section outlines the basic questions and identifies some of the possible links between conflict and economic growth. The third one reviews those models constructed under a partial equilibrium analysis, and the fourth section will review the models constructed in a general equilibrium framework. The fifth section draws the main implications derived from the models and outlines some issues that remain to be studied or clarified.

2. The Main Questions and Links

Empirical studies have found a negative and significant effect of conflict on (short term) growth rates (Collier, 1998). But, as said before, the mechanisms through which conflict affects economic growth that the theoretical literature has identify are many. First, the diversion of resources from productive to unproductive activities (Grossman and Kim, 1996; González, 2003). Second, the impact of conflict on investment in physical and

human capital accumulation is not negligible once one takes into account that one of the most powerful incentives to invest is the capacity to ensure a secure return on investment (Lloyd-Ellis and Marceau, 2002). Third, while some authors point out that there is a positive relation between military expenditure and economic growth, because defense may enhance productivity through its effect on infrastructure, human capital formation and even discipline formation (Benoit, 1978), some authors argue that there is an inverse relation between defense spending and growth: increased military spending “crowds-out” investment and may create a large fiscal burden for future generations (Deger and Sen, 1983; Klein, 2004).

Among others, some of the main questions that the literature that links conflict and economic growth are: what is the optimal allocation of resources to defense and predatory activities? (Grossman and Kim, 1996; Mejía and Posada, 2003; González, 2003); what is the size of the effect of conflict on economic growth? What determines a larger negative effect of conflict on economic growth? What are the factors that govern the relationship between conflict, security of property and economic performance? (González, 2003); does income or wealth inequality foster conflict? If so, what is the channel? (Benhabib and Rustichini, 1996; Lloyd-Ellis and Marceau, 2002); is the relation between conflict and growth monotone in the process of development or is it likely to change as the economy grows? (Benhabib and Rustichini, 1996 and Lloyd-Ellis and Marceau, 2002); why do some countries invest much less and what is the role of incentives in the decision to accumulate? (Benhabib and Rustichini, 1996); are the effects of conflict on growth transitory or permanent? What determines this? (Grossman and Kim, 1996 and Mejía and Posada, 2003).

3. The Partial Equilibrium Models

Given that conflict is an intricate problem, it is sometimes useful to undertake partial equilibrium analysis if one wants to answer very precise questions and conjectures that the effects of other variables are of second-order importance.

Benhabib and Rustichini (1996) provide a game theoretic framework to explain the conflict that arises between two social groups over the distribution of income from a common pool of resources (a common production process) that itself depends on the amount of resources appropriated by each of the agents involved. The conflict arises because groups may try to appropriate a larger share of output directly or by manipulating the system of transfers. As usual, the part of output that is not consumed becomes part of the capital stock in the next period. The conflict arises as follows: how much the economy is able to enlarge the size of the pie over time depends on the strategic interaction between the two groups over the distribution of it. Whether the strategic behavior is likely to increase or diminish growth at low or high levels of wealth depends on the curvature of the production technology and the preferences.

Given the rule presented in the model for the actual allocation of consumption between the two agents, a *trigger strategy* pair is an agreed consumption path for each agent that leaves some positive amount of savings (accumulation of productive capital to enlarge the size of the pie next period) if no historic deviation from this equilibrium has happened in the past. As usual in this kind of framework, for the *trigger strategy* pair to be a sustainable equilibrium it has to fulfill the individual rationality constraint. That is, each agent should obtain a higher utility under this strategy pair than under that obtained if she decides to deviate to obtain a higher consumption level today and leave, thereafter, zero savings.

As stated above, whether the conflict that arises over the distribution of resources affects growth at low or high levels of development depends on the parameters of the production technology and the preferences. When there are high diminishing returns in utility and not so high diminishing returns to capital accumulation, appropriation of a larger share of production at high levels of wealth becomes less attractive, but at lower levels of wealth (when consumption is low and therefore marginal utility high) appropriation of a higher share of output becomes very attractive. Under this parameterization of preferences, low levels of wealth lead to low growth rates, and under some extreme circumstances to a “growth trap”. On the other hand, when marginal utility does not diminish very rapidly

whereas the marginal product of capital does, capital accumulation exhibits high marginal returns relative to the marginal utility of consumption at low levels of wealth. Under this alternative parameterization of preferences and technology one should expect to see the neoclassical prediction: low levels of wealth are associated with high growth rates. Under the first parameterization, conflict arises at low levels of development whereas under the second, conflict arises at high levels of development. Olson (1982) supports this second case by explaining that the inefficiencies derived from conflict over the distribution of production are more likely to arise at high levels of development because “organized groups have had the time to mature and exert redistributive pressures” (see Benhabib and Rustichini, 1996).

This model can also capture the relation between inequality, conflict over the distribution of resources, and growth. Under both parameterizations of technology and preferences, there exists a trade-off between growth and equality: in economies with high levels of inequality, growth will be low as disadvantaged groups undertake redistributive actions at the expense of lower rates of investment and therefore lower growth.

This is a political economy model where growth is wealth dependent and a conflict over the distribution of resources may arise at low or high levels of wealth depending on the characteristics of the economy. The accumulation problem is transformed into a commons problem where one may encounter under-investment in equilibrium as a result of conflict over the distribution of resources. The model provides an explanation for why poor countries invest little and a possible framework for the “Olson’s” case explained above.

Mejía and Posada (2003) incorporate the possibility of defense on the Ramsey growth model in an economy that faces exogenous attacks aiming to destroy the productive capital stock. This is a partial equilibrium model in the sense that the motivations of those actors who decide to destroy the capital stock are taken as exogenous. The agents in this economy not only decide how much to consume out of income (as in the standard model) but also what proportion of the labor force to allocate to defensive activities to attenuate

the (exogenous) destruction of capital. The fraction of the capital stock that is effectively destroyed each period depends on the amount of the labor force allocated to defensive activities per unit of capital, and on two productivity parameters of the defense technology: an autonomous technological parameter, and one that depends itself on the exogenous degree of destruction. The former is a positive parameter that reflects the fact that more labor allocated to defense prevents the destruction of the capital stock. However, the latter, not being restricted to be positive or negative,² allows for the possibility that more destruction may lead to improvements in strategy and defensive organization, or to elevate the morale of the personnel in the defense sector (if this parameter is positive) or, it may be negative if the attacks generate inefficiencies due to a congestion effect or discouragement in the defense sector.

This model assumes decreasing returns to capital accumulation.³ In early stages of development, when capital is very valuable, the proportion of the labor force allocated to defense activities is relatively large and, as capital grows, everything else equal, optimal defense diminishes because capital become less productive. At some point in time, the capital stock reaches a level such that the marginal benefit from allocating labor to defending the productive capital of the economy is lower than the marginal cost, and therefore optimal defense becomes zero thereafter.

In some range of the transition path this model generates a constant growth rate. This is explained by the reallocation of the labor force from defensive to productive activities. This constant growth rate lasts until the point where optimal defense becomes zero. In the following stage, decreasing returns to capital settle in and the growth rate diminishes in the same fashion of the standard Ramsey model.

² This ends up being an empirical question.

³ As will be seen later, the models by Grossman and Kim (1996) and González (2003) assume a constant rate of return to capital accumulation, which may drive different results on the evolution of defense activities in the process of economic development. This distinction, I think, deserves further work because, if the returns to physical capital investment are decreasing, the costs of protection may eventually be so high relative to the benefits that complete deterrence may cease to be the optimal strategy at high levels of economic development. Also, if the returns to productive activities (human capital investment, for instance) increase with the level of economic development, the result that complete deterrence is the optimal strategy is even less likely to hold.

Given the simplicity of the model, its discrete time version is used at the end of the paper to simulate a shock on the exogenous rate of destruction and the response of the endogenous variables of the model. The simulations show how, after an increase in the exogenous destruction rate, optimal defense jumps up immediately but after some time starts to decline as the capital stock rises. The time path of the growth rate of the economy shows interesting results that may be used to explain the rapid growth rate in Germany and Japan after WWII: as mention above a temporary increase in the rate of capital destruction increases optimal defense (i.e. reduces the proportion of the labor force allocated to productive activities) and reduces the capital stock. But, right after the high rate of destruction ends two effects are in place: a rapid reallocation of the labor force to productive activities and, because the capital stock has decreased due to a high level of destruction, its returns are very high and hence there is rapid capital accumulation. This two effects lead to a period of very rapid growth that takes place right after the shock to the destruction rate ends. Even though is a simplistic characterization of the experience of Japan and Germany after 1945 it sheds some light on the explanation of the rapid growth rates observed in these two economies.

Shieh et al. (2002) Setup a continuous time growth model to try to explain the “peace dividend” that is associated with a reduction in defense spending. The model incorporates the government sector in the Ramsey model that is in charge of providing a weapon stock that enters as a factor of production and also provides utility to the agents. The alternative to weapons from the point of view of the government is to provide public infrastructure. The government levies a tax on production that is used to finance the creation of the weapon and infrastructure stock. In principle a constant predetermine fraction of government income is devoted to investment of weapons whereas the remainder is devoted to investment in public infrastructure. Once the authors obtain the constant growth path by means of a dynamic optimization problem they proceed to find the optimal fraction (the fraction that maximizes the growth rate of the economy) of government spending in weapons and infrastructure. The authors find that the optimal fraction of government’s income devoted to weapons creation is the ratio of the elasticity

of output with respect to the weapons stock to the sum of the elasticities of output with respect to public infrastructure and the weapon stock. Also, the authors claim that this fraction of spending in weapons is not the welfare-maximizing fraction. This is because weapons enter directly in to the utility function and in the production function whereas public infrastructure gives utility to the agents indirectly through its effect on the level of production. Finally what the authors call the “peace dividend” is the reallocation of public resources from weapons creation to infrastructure creation. This is only the case if the initial fraction of resources devoted to weapons is greater than that optimal. As mentioned above, if the initial fraction of public resources devoted to weapon creation is greater than the optimal one, a decrease in this fraction will increase the growth rate of the economy permanently and this is what the authors call the “peace dividend”.

The model, although elegant algebraically, lacks structural foundations. Including the weapons stock in the utility function without anything in the model that threatens the property is too far-fetched. If for any reason, one decides to call, let’s say “amusements parks”⁴ what the authors call weapons one would obtain the same results that the authors obtain but with different names. In other words, there is no conflict in the model to justify the inclusion of defense spending.⁵ Even if conflict was present, including the weapon stock in the utility function seems quite wrong: agents derive utility from consumption (also from leisure if there are reasons to include it) whereas weapons are means to increase consumption in the presence of conflict if they serve as a factor in the contest success functions⁶ to keep the output that one produces or the capital that one owns from expropriation by others, or to deter other agents from threatening one’s private property.

⁴ There are better reasons to think that public amusements parks enter into the individual’s utility function than weapons.

⁵ Remember that conflict does not necessarily have to be violent.

⁶ A Contest Success Function (CSF) is a mathematical relation whose inputs are the amounts of resources devoted to conflict by each one of the contestants and whose output is the division of the contested prize between them, or the (average) expected likelihood of success for each one of the contestants. For an extensive treatment of CSF see Hirshleifer (2001), chapter 5, and Skaperdas (1996).

4. The General Equilibrium Models

The first model to introduce a general equilibrium framework to study the relation between conflict and economic growth is that of Grossman and Kim (1996). In this dynastic model there are two groups of agents: the potential predator and the prey, which are explicitly separated from the beginning in the sense that a prey is assumed never to be a predator. On the one hand, the predator, out of inherited wealth, chooses how much to allocate to consumption, productive capital and offensive weapons, whereas the prey chooses how to distribute its inherited wealth between consumption, productive capital and defensive fortifications. The security of the prey's property at each period is endogenously determined by a contest success function that depends on the allocation of wealth by each generation of the prey and the predator to defensive fortifications and to offensive weapons respectively. The contest success function also incorporates a parameter that measures the effectiveness of predation relative to defense activities. On the other hand, production (for both groups) is captured by a $y = Ak$ production technology,⁷ so the marginal productivity of physical capital accumulation remains constant over time.

The potential predator, after observing the allocation of resources made by the prey, decides how much to allocate its wealth between productive and predatory activities. The model is therefore a dynamic Stackelberg leader (prey) – follower (predator). If the decision by the prey is such that a sufficiently high amount of resources are allocated to defensive fortifications, the potential predator will be deterred from allocating any resources to predatory activities and will instead become a producer. Under these circumstances the prey's property is perfectly secure but, at the expense of lower capital accumulation and therefore a lower growth rate. But, if the relative allocation of the prey

⁷ By choosing this function the authors greatly simplify the analysis. Even though some of the predictions of the model seem to rely on this assumption, the incorporation of decreasing returns to scale production function makes the analytic solution of the model almost intractable as it includes an additional non-linearity.

to defensive fortifications is low,⁸ the potential predator will allocate all his resources, net of consumption, to offensive weapons. Under this case the prey's property is less than perfectly secure but the rate of physical capital accumulation is high. As the authors claim, one of the main conclusions of the model is that "... contrary to conventional wisdom, greater security of property can be associated with slower accumulation of capital..., deterrence is a costly choice".

Depending on whether the initial relative level of wealth between the predator and the prey is low or not, the prey dynasty will choose to tolerate predation. Namely, if the relative wealth of the predator relative to that of the prey is very low, although the prey's wealth is almost perfectly secure, he is willing to tolerate some positive degree of predation. At initial stages of the process of economic development the prey will lose some of its wealth to the predator and as a result the relative wealth of the predator will increase over time and the degree of security of the prey's property will decrease. When this relative wealth reaches some (endogenous) threshold value, the prey will no longer find it optimal to tolerate predation and from that period on he will devote more resources to defensive fortifications resulting in its property becoming perfectly secure from then on. At this point the economy optimally switches from a state of positive predation to one where the property of the prey becomes perfectly secure and where the rate of physical capital accumulation is low.⁹ In the second stage, greater security of property is associated with a lower rate of growth of the economy because deterrence requires a large allocation of wealth to defensive fortifications at the expense of lower investment in productive capital.

The main contribution of Grossman and Kim (1996) is to provide a general equilibrium growth model to study the interactions between a potential predator and its prey, as well as the effects of conflict on resource allocation and growth.

⁸ Relative to the allocation to productive capital.

⁹ One of the reasons why this result is obtained is that the way the contest success function is defined does not imply a marginal cost of defense going to infinity as property becomes perfectly secure.

González (2003), in a very similar fashion as Grossman and Kim (1996), introduces a model of appropriative conflict where the quality of property rights turn out to be the key determinant of the effects of growth on the allocation of resources to appropriative activities. In this model the author does not ex-ante assume the existence of a prey and a predator separately but, rather, each private party “spend resources in an attempt to defend their claims to property and challenge those of others” (González, 2003). One of the main purposes of the model is to explain under what circumstances conflict intensifies with economic growth and to what extent conflict reduces economic growth. A relatively high quality of property rights is associated with a higher security of property encouraging the allocation of resources to productive activities. But, if the process of development is not accompanied by a sufficient increase in the degree of property rights protection the result may end up being a more intense conflict (as measured by the amount of aggregate resources allocated to appropriative activities). The logic of the argument is as follows: under a low degree of property rights, faster economic growth, by enlarging the size of the pie subject to appropriation, increases the rewards to the allocation of resources to appropriative activities and as a result conflict over claims to property increases. Another dimension that the model captures is that of “socio political fragmentation”. By assuming the existence of n different groups interacting with each other (and not just two as in most of the literature),¹⁰ the author can derive conclusions on the effects of increases on sociopolitical fragmentation on the intensity of conflict and its effects on the growth rate of the economy. The inclusion of this new dimension in the model is motivated, the author claims, by the increasing empirical evidence (cited in the paper) of a significant negative relation between measures of sociopolitical fragmentation, institutions, and growth.

The framework used by González (2003) is a general equilibrium model where each of the n infinitely lived agents maximizes the discounted sum of future utility (derived only from consumption), subject to a resource constraint. The technology of production, as in Grossman and Kim (1996), is captured by a $y = Ak$ production function. The result of

¹⁰ This is one of the novelties in the paper if one compares it with that of Grossman and Kim (1996).

the conflict over claims to property is captured by a context success function that depends on the allocation of each agents' resources to appropriation, the allocation of the other $n-1$ agents to appropriative activities, the measure of property rights protection (what in Grossman and Kim (1996) is called the "security of claims to property") and the number n of agents participating in the appropriation process.

Under one of the possible parameter configurations property rights are perfectly secured at a negligible cost, the first best outcome is obtained, and no resources are allocated to appropriative activities. In the other case, that of less than perfectly secure property rights, the symmetric equilibrium is one where the stock of appropriative capital per unit of productive capital decreases with the quality of property rights and rises with the degree of agent's fractionalization, and with the strength of diminishing returns to resources devoted to appropriative activities.

On the equilibrium path of the model, an increase in the quality of property rights generates two effects: first, it leads to a lower allocation of resources to appropriative activities as it increases the relative return to productive activities; second, the increase in resources allocated to production increases growth which in turn creates incentives to allocate resources to appropriative activities. This second effect increases conflict because it increases the size of the pie subject to appropriation.

The net effect of an increase in the quality of property rights on conflict follows an inverted U shaped function between these two variables. When the quality of property rights is relatively low the second effect dominates and increases in the quality of property rights exacerbates conflict. When property rights reach a certain threshold value the net effect of increases in property rights reduce the amount of conflict because the trade-off effect between production and appropriative activities dominates the "size of the pie" effect. This is an interesting result because it suggests that the effect of increases in the quality of property rights may not always be associated with reductions in the intensity of conflict. This last point supports the idea that institutional reforms (viewed

here as increases in the quality of property rights protection) should take the form of major institutional change if they pretend to be welfare increasing (p. 23).

With respect to sociopolitical fragmentation, the analysis is similar to the one described above. A larger number of agents competing for claims to property makes private property less secure and lowers growth, but less growth in turn means lowers returns to appropriative activities which decreases conflict. The positive influence of sociopolitical fragmentation on conflict tends to dominate at low levels of fragmentation but, at higher levels, because the negative effect on growth is relatively large, the negative effect of fragmentation on conflict (via lower growth) dominates. Again the relation between political fragmentation and the intensity of conflict is described by an inverted U shaped function.

To summarize, one of the main results of González (2003) is that the intensity of appropriative conflict tends to increase with economic growth if there isn't a sufficiently large increase in the protection of property rights in the process of economic development. This result, even though questionable empirically as a general characteristic, supports the idea that economic reforms that tended to "adopt Western-style economic systems might tend to exacerbate appropriative competition and even reduce welfare unless it is accompanied by sufficient institutional change" (p. 23).

Lloyd-Ellis and Marceu (2002) explore the implications of having endogenous credit market constraints on the relation between insecurity and development in an Overlapping Generations (OLG) model. Credit market constraints in this model endogenously determine to what extent conflict increases with the process of development in the initial stages and how, in the later stages, the decrease in diversionary activities tend to foster economic growth. To motivate the paper the authors show empirical evidence on how the crime rate in England (a measure of conflict) increased between 1815 and 1860 and the

subsequent decrease thereafter, and mention that similar experiences are observed in other European countries throughout the 18th century.¹¹

In this model agents are alive for two periods. They are born with different level of abilities so they earn different wages. In the first period they have to decide whether to become capitalist producers, “parasites”, or to subsist when old. On the one hand, producers invest but if they don’t have enough wealth they can borrow the capital. They also hire young agents at the market wage rate. Parasites, on the other hand, try to appropriate the profits of the producers on a matching basis where one parasite can only appropriate the profits of one producer. The agents for whom the returns to appropriative activities are small and who are unable to become capitalist subsist on relatively low incomes.

Because in the early stages of development few agents have enough wealth to acquire a loan, the remaining agents are left with the choice between low subsistence income and, becoming parasites. The rate at which those agents who are eligible for a loan can borrow the capital necessary to undertake investment in productive capital depends positively on the degree of insecurity, which itself depends on the relative number of parasites vs. capitalist producers (because of the matching process just described). The opportunities for diversion in the early stages of development are constrained by the rate of economic activity (the relative number of producers to parasites). Insecurity (and therefore the interest rate charged on loans) at this early stages its maximum, as there are more parasites than producers. In the early process of capital accumulation the wage increases and more agents become eligible for loans to become capitalists. The increase in the number of capitalists increases the possibilities of diversion (a greater number of matching parasite-producer pairs) and insecurity increases. In this early stage also, because there are more potential predators than producers, insecurity and the interest rate on loans remain at their maximum levels while diversion is increasing. As the number of producers grows, it eventually reaches a level that exceeds the number of parasites and the economy enters into the second stage of economic development. Insecurity decreases

¹¹ Germany, France and Sweden.

(after this point there will be producers that will not be matched with a parasite) and the interest rate on loans decline as more agents are drawn out of the pool of potential parasites and become eligible for a loan (eligible to become capitalists). As the economy continues growing, the supply of producers increases and two effects settle in: first, the number of parasites decline so insecurity (and the borrowing rate of interest) declines, and second, the demand for labor increases inducing an upward pressure on the real wage rate which in turn forces profits to decline. Under the assumption that the wage elasticity of demand is high, the second effect is relatively small and the first force dominates so profits also rise as insecurity declines.

The two stages of development described below imply a hump-shaped relation between growth and diversionary activities. The first phase “corresponds to Adam Smith’s hypothesis that appropriation would tend to rise with the accumulation of wealth, and arises when credit market constraints are particularly severe”. The second phase, that of decreasing insecurity as the economy continues its development process, corresponds to the hypothesis that economies with lower rates of diversion tend to be more developed.

In a very simple model Murphy et al. (1993) incorporate the effects of rent-seeking (appropriative) activities on growth. They identify two channels through which rent-seeking activities are costly to growth: first, rent seeking activities exhibit general equilibrium increasing returns to scale (i.e. as resources move into rent seeking activities, the returns to productive activities may fall faster than returns to rent-seeking activities inducing more rent-seeking) and second, rent-seeking (especially public rent-seeking) hurt innovative activities through corruption of government officials who charge a bribe to producers who want to setup a new business. I will develop in some detail the first effect but not the second one because the former is more directly related to the literature on the effects of conflict on economic growth.

They consider a farm economy in which agents can engage in one of three possible activities: producing a crop for the market, producing a subsistence crop that yields some

positive return but smaller than the market crop or, appropriating the return on the crop from those who engage in the market activity.¹² The authors assume a maximum level of appropriative activities. Under this setting, appropriative activities drives farmers out of crop production and into subsistence production. An equilibrium is an allocation of the population between the three activities that depends only the returns to each activity. There are three cases: first, if the returns to rent seeking are lower than the returns to subsistence which in turn are lower than the returns to market production, all agents engage in the production of the market crop and property right are completely secure. In this first case, income is the highest possible and is equal to the level of market production. In the second case, if the returns to rent seeking are initially higher than the returns to market production, the equilibrium is such that the net returns to market production are driven all the way down (because of rent-seeking activities) to equate the returns of subsistence. Initially the returns to rent seeking are constant as the ratio of rent seekers to market producers is below some threshold level. The net returns to market production falls as the number of rent seekers increases. This happens up to the point where the number of rent seekers to market producers is such that rent seekers begin to crowd-out each other and the returns to appropriative activities starts to decrease. At some point, the net return to market production and that of rent seeking activities equate the return to subsistence activities. At this point there is no more reallocation of agents between activities and the economy reaches an equilibrium with a low level of income, which is equal to the subsistence income. Under the third case, the returns to rent seeking are lower than the returns to market production but higher than the returns to subsistence. Under this case there are three possible equilibria: a “good equilibrium” where everyone engages in market production and income is the highest possible, (the equilibrium derived in case one), a “bad one” where there is a positive amount of rent-seeking and the net returns to market production, in the same fashion as the second case, are driven all the way down to the subsistence level. And an intermediate, unstable equilibrium, where a small increase in the relative number of rent-seekers “invites further increases in resources devoted to rent seeking activities” up to the point where the third, “bad” equilibria, is reached.

¹² It is assumed that the subsistence crop is not subject to appropriation.

The returns to rent-seeking activities in this model capture the degree of protection of property rights. A very high return to rent seeking activities mean a very low level of protection of property rights that may eliminate the possibility of reaching the good equilibrium (first case). On the other hand, an increase in the return to productive activities, *ceteris paribus*, not only increases the equilibrium income in the good equilibrium but also increases the possibility that this equilibrium actually arises. The crucial point of this article is that, if an economy is initially in the “bad equilibrium”, a quite radical increase in the protection of property rights is necessary to get the economy out of it since the bad equilibrium is stable and is not affected by small changes in the quality of the property rights as captured by the returns to appropriative activities. In fact, this result by Murphy et al. (1993) is cited in many papers (including the one by González (2003)) when referring to the case where growth may exacerbate conflict unless is accompanied by large (what Murphy et al. it call “quite radical”) increases in property rights protection.

5. Conclusions

An important portion of the literature that studies the theoretical links between conflict and economic growth was reviewed in this paper. While there is consensus on the negative effect of conflict on economic growth, the channels through which conflicts impact the process of development are very diverse. The one that is mostly recognized in the literature is that of the diversion of resources to non-productive (appropriative, rent-seeking, etc.) activities. Among others are the destruction of capital and wealth that derives from violent conflict, the increase in the risk associated with insecurity which raises the interest rates and reduces investment, and the crowding out of resources that result from the impact of the military burden. While it is clear from the literature that conflict impacts negatively economic growth it is not so clear if the effects are temporal or permanent. Of course, this depends on the duration of conflict but this point deserves more attention.

Another important point, which may be worth studying more deeply, is that on the relation between inequality (not only of income but of opportunities) and the emergence of conflict. The empirical evidence suggests that those countries where the degree of income inequality is high and the average level of human capital is low are more prone to conflict than those where the population has opportunities and access to basic needs.

On the other hand, there seems to be some agreement on the effects of growth on conflict: of the papers that undertake this point many propose a “hump-shaped” effect of growth on conflict. At initial stages of development conflict tends to increase with growth, because, as the size of the appropriable pie expands the opportunities for appropriative activities increase. This positive effect of growth on conflict offsets a negative one where, as the size of the economy increases, the returns to productive activities also increases and more growth disincentives the allocation of resources to unproductive activities. As the process of development continues, the second effect (substitution effect) gains importance relative to the first one and a second stage in the process of development sets in where more growth decreases the intensity of conflict.

At this point, again, the effects of inequality are interesting to be analyzed. Is growth in the initial stages of development more pro-rich? If this is true, as seems to be the case by the empirical facts on the Kuznetz curve, more inequality in the initial stages of development may increase the possibility of the emergence of conflict.

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