Journal of Conflict Resolution
http://jcr.sagepub.com/

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Journal of Conflict Resolution 2013 57: 41 originally published online 19 November 2012
DOI: 10.1177/0022002712464852

The online version of this article can be found at:
http://jcr.sagepub.com/content/57/1/41

Published by:
SAGE
http://www.sagepublications.com

On behalf of:
Peace Science Society (International)

Article

Journal of Conflict Resolution
57(1) 41-64

DOI: 10.1177/0022002712464852
jcr.sagepub.com
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Misallocation of Entrepreneurial Talent in Postconflict Environments

M. Sanders[1] and U. Weitzel[2]

Abstract

Entrepreneurship is generally regarded as a productive force of change, innovation, and development in modern economies. Particularly for institutionally less developed environments, however, it has been argued that the same energy and talent can also be allocated to unproductive ends. In this article, we present a model that analyzes the allocation of entrepreneurial talent into productive activities and raiding in Postconflict environments, where most formal and informal institutions have broken down. We show that the distribution of initial wealth and entrepreneurial talent play a decisive role. Our analysis also suggests that microcredits can support the transition to a productive equilibrium, because they help to overcome credit constraints without creating incentives for raiding.

Keywords

Destructive Entrepreneurship, Bottom-up reconstruction, Postconflict regions, incentives, institutions

Entrepreneurship is widely recognized as a force of good in market economies. Schumpeter (1911) puts the entrepreneur center stage in his theory of innovation and capitalist development, and Kirzner (1973) ascribed an important role to

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profit-driven entrepreneurs to restore market equilibria. Of course, the idea that self-interested and even greedy entrepreneurs could do society some good in the pursuit of their own fortunes was already established by Adam Smith and has been a cornerstone in economic thinking since.

This force of good holds much promise for developing nations and postconflict regions as well. Entrepreneurship, the innovative application of new and existing knowledge for commercial gain, can help increase standards of living, generate employment opportunities and alleviate poverty. But more importantly entrepreneurship has the potential to build/rebuild ties of mutual interest and good governance from the bottom up in times of peace.

Baumol (1990); Murphy, Schleifer, and Vishny (1991); Mehlum, Moene, and Torvik (2003); and Acemoglu (1995), however, have argued that the same energy and talent can also be allocated to unproductive ends. In these models, the entrepreneurs can choose between productive ventures and redistributive practices in which they appropriate (legally or illegally) a share of the productive entrepreneurs' profits. This rent-seeking behavior actually reduces the incentive to engage in productive ventures.

(Top-down) institutional reform is typically suggested to prevent this. The problem is that institutions are not so easily changed or built up. Strong but wrong institutions that reward rent-seeking behavior are likely to persist. For example Acemoglu, Johnson, and Robinson (2001) argued that institutions are largely historically determined, and in Acemoglu and Robinson (2008) a model is proposed to explain the persistence of bad institutions, even in democratic regimes. Similarly, if proper institutions are absent or weak they can not be set up overnight. This situation applies to developing and postconflict regions. In such a context, many preexisting institutions have broken down and entrepreneurial talent can therefore easily allocate into activities that maximize private but not necessarily social returns.

This article presents a model of such an economy, which is close to the "stateless society" presented by, for example, Bates, Greif, and Singh (2002). Without reducing the need for institutional development in the medium and long run, this article focuses on strategies to improve the incentive structure under weak institutions in the short run, for example directly after armed conflicts. In such situations entrepreneurial talent may choose between productive and truly destructive activities, such as raiding productive inputs. We therefore ground our model on the theory of destructive entrepreneurship proposed by Desai (2008), Desai and Acs (2007) and Desai, Acs, and Weitzel (2011) in this Special Issue and advance their theory to the area of raiding. Furthermore, we translate their game-theoretical model into a general equilibrium framework, which allows for additional policy implications with regard to occupational choices and the corresponding role of inequality, institutions, entry barriers, and wages.

In our model, we assume that entrepreneurs can choose to be wage earners, or raiders, or to employ their talent and resources in a productive venture but risk being

raided when doing so.[1] When raided the productive entrepreneurs do not merely lose a share of their profit flow, as in the models of unproductive entrepreneurship mentioned above. In fact, following Desai, Acs, and Weitzel (2013), they actually see their the productive assets liquidated, their venture terminated, and the proceeds consumed by the raiders. This adds insult to injury and reduces both the incentives and opportunities to engage in productive entrepreneurship in the next rounds.

Obviously institutional recovery helps. A noncorrupt and well-equipped police force that will uphold the rule of law can reduce the payoffs to raiding and hence the probability of being raided. That can improve matters and help the economy move to a more productive entrepreneurship equilibrium. The practical problem with such a strategy is that this takes time and that in the initial state there is no tax base from which such an investment might be financed or sustained. Stuck in the raiding equilibrium, such a tax base will also not develop, and outside funding for such investments is rarely available. One implication of our model is that wealth redistribution or the provision of microcredits to productive entrepreneurs improves the incentive structure toward more productive activities and away from raiding without the requirement to successfully develop a macro-institutional environment first. As such our model shows how entrepreneurial energy and talent can also be oriented away from criminal and toward genuinly productive activity from the bottom up. The mechanism in the model that enables such a development strategy hinges on the reduction of credit constraints for many raiding would-be entrepreneurs without producing attractive new targets for the remaining raiders.

The article contributes to three related streams in the literature. Since Becker (1968) and Ehrlich (1973), there is a long-standing tradition in economics to study the determinants and consequences of criminal behavior. This literature relates to our model, because the raider does not behave differently from a criminal in the economic crime models. However, despite a large number of theoretical and empirical studies, this literature focuses on the effects of punishment, more particularly, on the incentive and the incarceration effect of prison sentences (e.g., Freeman 1999). The longer a prison term, the more likely it is both to discourage (incentive effect) and to disable (incarceration effect) people from committing a crime. Although the analysis of these effects is crucial for the evaluation of crime policy, they do not fully apply to our setting, where institutions are assumed to be weak and policing is largely absent. Furthermore, as the main focus of many of these models lies on crime deterrence (Cameron 1998), the theoretical economics of crime literature rarely investigates where the proceeds from criminal activity exactly come from. However, in terms of economic development, there can be a large difference between fraudulently diverting profits and raiding productive inputs if the former is welfare neutral and the latter welfare destroying.

Another related field of research investigates the determinants of conflict. The so-called predator–prey models in this literature primarily study the emergence of conflicts and their resolution. As one of the earliest and most prominent contributors in this field, Hirshleifer (1987) covered a multitude of aspects including the analysis of continuing conflict (Hirshleifer 1988), the paradox of power (Hirshleifer 1991a),

the technology of conflict (Hirshleifer 1991b), as well as anarchy and its breakdown (Hirshleifer 1995), culminating in his Presidential Address to the Western Economic Association in 1993 (Hirshleifer 1994). These and many other studies in the field cover a broad spectrum (e.g., Bates, Greif, and Singh 2002; Neary 1997; Skaperdas 1992), although their main focus is on the effect of rule of law, enforceable property rights and offense or defense technologies on the trade-off between productive and coercive activities. As such they provide a very fertile breeding ground for economic models on the allocation of entrepreneurial talent, which represent the third stream of the related literature.

In fact, the border between models of conflict and allocation models of entrepreneurial talent (e.g., Murphy, Schleifer, and Vishny 1991; Acemoglu 1995) is rather blurred, as the article by Mehlum, Moene, and Torvik (2003) on parasitic enterprises shows. While the former focuses more on the trade-off between productive and coercive activities, the latter mainly investigates the trade-off between productive and unproductive activities. However, as in the economics of crime, little attention is spent on the origin of the appropriated proceeds. More specifically, in all three research streams the criminal, predatory, or rent-seeking activities aim at profits, but not, as proposed by Desai, Acs, and Weitzel (2013), at productive inputs. One noteworthy exception is Bhagwati (1982) who provides a taxonomy of four types of directly unproductive (DUP), profit-seeking activities, some of which not only redistribute profits but also reduce the production possibilities. Rent-seeking activities can, although indirectly, also reduce endowments, but raiding productive inputs is immediately destructive, because it directly reduces productive capacity and thereby welfare. Where most parasitic and predation models focus on the struggle for the golden eggs, in Desai, Acs, and Weitzel (2013; and in our extension of their model), the goose actually gets killed and eaten.

The remainder of the article first presents the basic structure and the three occupations in the model and derives the behavior of and payoffs to those in these occupations in the second section. We then analyze the choice of occupation in a one-generation game in the third section and discuss the comparative statics to identify what parameters in the model drive the allocation of talent in the fourth section. In the fifth section, the dynamics in a repeated game overlapping generations structure and some potentially interesting generalizations of our basic model are discussed, after which we conclude our analysis.

The Occupations: Behavior and Payoff

Our model borrows from the overlapping generation model of endogenous growth with imperfect capital markets as in Galor and Zeira (1993), Barro and Sala-I-Martin (2004), and Aghion and Howitt (1998) and models of occupational choice and the allocation of entrepreneurial talent such as Murphy, Schleifer, and Vishny (1991) and Acemoglu (1995). We take the simplest possible setup that illustrates the key mechanism of interest, leaving interesting extensions, richer modeling

approaches, and more realistic assumptions for discussion in the fifth section. Assume individuals live for two periods and for simplicity abstract from altruism and bequests, such that individuals maximize:

$$U_t^i = \log c_t^i + \rho \log c_{t+1}^i. \tag{1}$$

where U_t^i is the total lifetime utility at time t for individual i. All instant utility is derived from consumption, c_t^i, and we use a simple two-period log-linear instant utility function. Period t+1 utility is discounted at the rate of pure time preference, ρ. For the occupational choice model, we focus exclusively on that part of the population that has the option to become an entrepreneur. The rest of the population is assumed to provide a perfectly elastic labor supply at a subsistence level wage w_s, such that in equilibrium the wage is always equal to w_s and any amount of labor can be hired at that rate.

The N individuals that have more than one option are endowed with a level of entrepreneurial ability θ^i that is uniformly independently identically distributed (i.i.d.) over the interval [0,1] and one unit of labor in the first period.[2] As we want to focus on a postconflict context, we also assume that financial intermediation is absent and no interest-bearing financial assets exist. Individuals in group N then have to finance investments with their own wealth and savings do not generate any return unless invested in one's own productive venture.[3] Assume an individual receives a random endowment of initial wealth ω that is uniformly and i.i.d distributed over an interval $[\omega_L, \omega_H]$ and that can be consumed, saved for consumption in period 2, or invested in one's own venture.[4]

At the start of the first period, an individual i in group N chooses between three available occupations: worker, entrepreneur, or raider, discussed in detail in the following. That choice is made based on rational expectations about the events in the periods ahead. Once the choice is made, random events are realized and all agents receive their income over period 1. Then they decide to consume goods and services and save or invest. In the second period, the individuals consume their savings and receive capital income only. The problem for all individuals in group N is the same and can be formalized by

$$\begin{aligned} &\max_{c_t^i, c_{t+1}^i, OC_t^i} : U_t^i = \log c_t^i + \rho \log c_{t+1}^i \\ &s.t. : c_{t+1}^i = \omega_t^i + E[Y_t^i | OC_t^i] + E[Y_{t+1}^i | OC_t^i] - c_t^i \\ &s.t. : E[Y_t^i | OC_t^i] + \omega_t^i \geq c_t^i, \end{aligned} \tag{2}$$

where $E[Y_t^i | OC_t^i]$ is the expected income, Y that is conditional on occupation OC chosen by individual i at time t. An individual chooses an occupation first and then solves the problem in equation (2) conditional on this choice and the random events that follow. The occupation is chosen to maximize ex ante expected utility. We therefore first consider the maximum expected utility for individual i in each occupation and then work out who will choose what occupation in the third section.

The individual has three options: worker, entrepreneur, or raider, indexed by $OC_t^i = 1$, 2, and 3, respectively. Option 1 is to become a worker and receive the market wage for supplying one unit of labor. When an individual chooses to be a worker, he cannot invest his wealth in a productive venture, and it can only be held in noninterest-bearing assets such as cash or gold.[5] These assets can be consumed at the end of the first or the second period. As the wage is given and the same for all individuals in N, the expected incomes in this occupation are equal to

$$\begin{aligned} E[Y_t^i | OC_t^i = 1] &= w_t \\ E[Y_{t+1}^i | OC_t^i = 1] &= 0, \end{aligned} \tag{3}$$

where w_t is the wage that clears the labor market at time t.[6] Using the expressions in equation (3) to substitute and solve the problem in equation (2) implies that the ex ante maximum expected utility of this option can be written as

$$E[U_t^i | OC_t^i = 1] = \log\left(\frac{1}{1+\rho}\right) + \rho \log\left(\frac{\rho}{1+\rho}\right) + (1+\rho)\log\left(w_t + \omega_t^i\right). \tag{4}$$

Obviously a higher outside wage implies that more individuals will choose this option. Proposition 1 states this result:

Proposition 1: A higher outside wage level will, ceteris paribus, cause more entrepreneurial talent to allocate into nonentrepreneurial activity.

Individuals in group N can also choose option 2 and become productive entrepreneurs, investing their initial wealth in productive assets and hiring labor to produce a homogenous final output y_t^i according to a standard, constant returns to scale, Cobb–Douglas production function:

$$y_t^i = \theta^i l_t^{i\alpha} (k_t^i - k_0)^{1-\alpha}, \tag{5}$$

where l_t^i is labor employed, k_t^i is the capital stock of individual i at the start of the period, α is the output elasticity of labor and k_0 is a fixed start-up cost in capital units. As we assume that there are no financial markets, individuals can only choose this option and set up a productive venture when their initial wealth exceeds k_0. In period 1, the entrepreneur is assumed to supply his labor to his own venture inelastically and hire additional workers if this is optimal. His entrepreneurial ability θ^i operates to increase total factor productivity in the venture. Normalizing the price of the final good to 1, we know that a productive entrepreneur will employ all his initial wealth endowment as capital $k_t^i = \omega_t^i$ and hire labor to maximize the total income from his venture π_t^i[7]:

$$\max_{l_t^i} : \pi_t^i = \theta^i l_t^{i\alpha} (k_t^i - k_0)^{1-\alpha} - w_t l_t^i. \tag{6}$$

The labor demand for venture i in period t is then given by

$$l_t^{iD} = \left(\frac{w_t}{\alpha\theta^i}\right)^{\frac{-1}{1-\alpha}}(k_t^i - k_0). \tag{7}$$

Note that for every individual productive entrepreneur, the demand for labor is negative in the wage level. Total demand for labor in the entrepreneurial sector is the sum of these individual demands over all productive ventures, and this yields a downward sloping labor demand curve. The total income of a productive entrepreneur in period t is equal to the market wage plus a venture-specific return on his capital. Substituting for capital and labor in equation (6), entrepreneurial income can be written as

$$\pi_t^{i*} = (1 + r_t^i)(\omega_t^i - k_0) + w_t, \tag{8}$$

where it can be verified that the venture-specific expected return on capital, $r_t^i = (1-\alpha)\alpha^{\frac{\alpha}{1-\alpha}}\theta^{i\frac{1}{1-\alpha}}w_t^{\frac{-\alpha}{1-\alpha}} - 1$ is positive in entrepreneurial talent, θ_i and negative in the wage level w_t. In period $t + 1$, the productive entrepreneur cannot supply his own labor as he is old, but he can invest his savings from period t once more into his own venture. He is then entitled to the profit flows in period $t + 1$ and his savings from period 1 yield a positive return.

This occupation, however, is not without risk in our model. The productive entrepreneur can be raided by a raider who will seize his assets and liquidate them. When raided, the productive entrepreneur looses his venture and can only hope to find a job in period t.[8] He will then earn w_t as a worker but has lost his initial wealth endowment. When there are raiders in the economy, the value of productive entrepreneurship is therefore rated down relative to the other two occupations as the probability of being raided and receiving only the market wage is positive. Assuming that this probability is given by ξ_t^i we can write the expected incomes in occupation 2 as

$$\begin{aligned} E[Y_t^i|OC_t^i = 2] &= (1 - E[\xi_t^i])((1 + r_t^i)(\omega_t^i - k_0) + w_t) + E[\xi_t^i]w_t \\ E[Y_{t+1}^i|OC_t^i = 2] &= (1 - E[\xi_t^i])(1 + r_{t+1}^i)k_{t+1'}^i \end{aligned} \tag{9}$$

where $k_{t+1}^i = (1 + r_t^i)(\omega_t^i - k_0) + w_t - c_t^i$ is the amount invested in the venture at the end of period 1 and $r_{t+1}^i = (1-\alpha)\alpha^{\frac{\alpha}{1-\alpha}}\theta_i^{\frac{1}{1-\alpha}}w_{t+1}^{\frac{-\alpha}{1-\alpha}} - 1$ is the period 2 rate of return on capital. $E[\xi_t^i]$ is the expected probability that venture i is raided in period t and will be endogenized below. We assume for simplicity that a productive venture that survives the first period can be maintained without the risk of being raided in the next period. Using these expressions in equation (2) and solving the problem yield the expected utility for occupation 2:

$$E[U_t^i|OC_t^i = 2] = \begin{matrix} \log\left(\frac{1}{1+\rho}\right) + \rho\log\left(\frac{\rho}{1+\rho}\right) \\ E[\xi_t^i](1+\rho)\log(w_t) \\ (1-E[\xi_t^i])\left((1+\rho)\log\left((1+r_t^i)(\omega_t^i - k_0) + w_t\right) + \rho\log\left(1+r_{t+1}^i\right)\right) \end{matrix} . \quad (10)$$

From this equation one can immediately derive Propositions 2 and 3:

Proposition 2: A higher level of entrepreneurial talent will, ceteris paribus, increase the attractiveness of productive entrepreneurship.

Proposition 3: A higher level of initial wealth will, ceteris paribus, increase the attractiveness of productive entrepreneurship.

The intuition is rather straightforward as well. More talent implies higher productivity in the venture and more initial wealth implies that more can be invested in a venture with positive returns to capital. From equation (10) using the definitions of r_t^i, r_{t+1}^i, and π_t^{i*} one can also derive that higher wage levels do not unambiguously make productive entrepreneurship more or less attractive. They increase the wage income and the utility value of the fallback option when the venture is raided, but higher wages also reduce the return on capital invested. The sign of the effect depends on the raiding probability ξ_t^i and the output elasticity of labor α. Also, it should be noted for ceteris paribus will not hold when we endogenize the raiding probability below.

Occupation 3 in the model is the raider who confiscates and liquidates the assets of productive entrepreneurs. We assume that raiders select one victim from the pool of productive entrepreneurs. When selecting a victim, they do not perceive the amount of assets employed in a venture perfectly. Destructive entrepreneurs are therefore assumed to select their victim at random, but the probability of being selected and raided is assumed to be proportional to the level of productive assets employed in the venture. To operationalize these assumptions, we simply assume that each unit of capital is equally likely to be raided. The probability that any given venture being hit is then given by

$$\xi_t^i = \frac{N_3(k_t^i - k_0)}{\int_{n_1}^{n_2}(k_t^i - k_0)di}, \quad (11)$$

where we index the individuals in the group N from 0 to n such that individuals 0 to n_1 are the N_1 individuals that choose to be workers. Individuals n_1 to n_2 are the N_2 productive entrepreneurs, and individuals n_2 to n are N_3 raiders and $N_1 + N_2 + N_3 = N$. This also implies that the total amount of assets the raiders are expected to seize, R_t, is given by

$$R_t = \int_{n_1}^{n_2} \frac{N_3 (k_t^i - k_0)^2}{\int_{n_1}^{n_2} (k_t^i - k_0) di} di. \tag{12}$$

We assume that raiders are all equally likely to select a given productive venture and therefore the expected level of assets seized is equal to R_t divided by the number of raiders N_3. Assuming that a talented raider is better able to liquidate the captured assets and sell them off, the income received in this occupation is then a share $0 < \lambda(\theta^i) < 1$, of captured assets[9]:

$$\begin{gathered} E[Y_t^i | OC_t^i = 3] = \lambda(\theta^i) \frac{\int_{n_1}^{n_2} (k_t^i - k_0)^2 di}{\int_{n_1}^{n_2} (k_t^i - k_0) di}. \\ E[Y_{t+1}^i | OC_t^i = 3] = 0 \end{gathered} \tag{13}$$

It can be verified in equation (13) that the expected period 1 income for raiders is equal to a share $\lambda(\theta^i)$ of the average level of capital employed, only when all productive entrepreneurs have an equal amount of capital installed. As was derived above, productive entrepreneurs will invest their entire initial wealth, such that this result would only materialize when the initial wealth distribution is equal among those that choose productive entrepreneurship. If the initial wealth distribution among productive entrepreneurs is not flat, however, then the average raider expects to seize above average assets. Solving the consumer's problem in equation (2) using these expected incomes yield the ex ante expected utility of occupation 3:

$$E[U_t^i | OC_t^i = 3] = \log\left(\frac{1}{1+\rho}\right) + \rho \log\left(\frac{\rho}{1+\rho}\right) + (1+\rho) \log\left(\lambda(\theta^i) \frac{\int_{E[n_1]}^{E[n_2]} (\omega_t^i - k_0)^2 di}{\int_{E[n_1]}^{E[n_2]} (\omega_t^i - k_0) di} + \omega_t^i \right). \tag{14}$$

This allows us to formulate Propositions 4, 5, and 6:

Proposition 4: More concentrated productive assets, ceteris paribus, make raiding more attractive.

Proposition 5: Higher entrepreneurial talent, ceteris paribus, makes raiding more attractive.

Proposition 6: Higher initial wealth, ceteris paribus, makes raiding more attractive.

The proofs follow directly from equation (14) and the intuition is also rather straightforward. More concentrated wealth increases the probability of raiding a large

venture, seizing more assets. More talented entrepreneurs get higher benefits from the same amount of assets raided, and initial wealth can be consumed without the risk of being raided if you choose to be a raider yourself.

Choosing among Occupations

This section analyzes which individuals will choose what occupation by comparing the ex ante expected utility levels in equations (4), (10), and (14). As the propositions have shown, there are variables that affect the absolute utility level of one or more occupations in different or the same direction. In this section, the relative attractiveness of occupations is considered. First consider the choice between wage labor and raiding. An individual is indifferent between these occupations when the ex ante expected utility levels are equal. Equations (4) and (14) show that an individual will choose to engage in raiding when

$$w_t < \lambda(\theta^i)\zeta_t, \tag{15}$$

where we have defined $\zeta_t \equiv \frac{\int_{n_1}^{n_2} (\omega_t^i - k_0)^2 di}{\int_{n_1}^{n_2} (\omega_t^i - k_0) di}$. Note that this variable is the same for all individuals i and represents the inequality in the initial wealth distribution among those that choose productive entrepreneurship. Assuming λ can be inverted, we can derive the threshold level of entrepreneurial talent $\bar{\theta}$ for which individuals are indifferent between work and raiding. Above that threshold level of entrepreneurial talent individuals will choose for raiding:

$$\bar{\theta} = \lambda^{-1}\left(\frac{w_t}{\zeta_t}\right). \tag{16}$$

Note that the threshold level depends positively on the wage level and negatively on the inequality of the initial wealth distribution among productive entrepreneurs but does *not* depend on the level of initial wealth of individual i.

Now consider the choice between productive entrepreneurship and wage labor. Those with initial wealth levels below k_0 will choose occupation 1 over 2 at all levels of talent because they simply cannot start a venture. Starting at initial wealth level k_0, however, there is a positive level of entrepreneurial talent that is required to make entrepreneurship the preferred option, even without the threat of being raided. This threshold level in entrepreneurial talent can be derived by setting equations (4) and (10) equal and assuming $E[\xi_t^i] = 0$. We then obtain

$$1 + r(\tilde{\theta}, w_{t+1}) = \left(\frac{\omega_t^i + w_t}{(1 + r(\tilde{\theta}, w_t))(\omega_t^i - k_0) + w_t}\right)^{\frac{1+\rho}{\rho}}, \tag{17}$$

which defines the threshold level $\tilde{\theta}$ for entrepreneurial talent, below which all individuals would choose employment over productive entrepreneurship. This threshold level is increasing in initial wealth as the right-hand side of equation (17) is decreasing in the level of initial wealth. The intuition for this result is that, at higher levels of wealth, the consumption of employees rises one for one, whereas for the entrepreneur diminishing returns to capital kick in. To compensate for that, a higher level of entrepreneurial talent is required. However, if there is a positive probability of being raided and that probability depends positively on the level of wealth, as we have assumed above, then the trade-off changes and an even higher level of threshold talent is required. Using equations (4) and (10) without restrictions on ξ we can show that an individual will choose to engage in productive entrepreneurship if

$$\xi^i < \frac{\Omega(\overset{+}{\omega}{}^i_t, \overset{+}{\theta}{}^i) - (1+\rho)\log\left(\omega^i_t + w_t\right)}{\Omega(\overset{+}{\omega}{}^i_t, \overset{+}{\theta}{}^i) - (1+\rho)\log(w_t)}, \tag{18}$$

where $\Omega(\overset{+}{\omega}{}^i_t, \overset{+}{\theta}{}^i) \equiv \rho\log(1+r^i_{t+1}) + (1+\rho)\log\left(w_t + (1+r^i_t)(\omega^i_t - k_0)\right)$ is defined to save on notation. This function is positive in the second argument due to the positive relationship between the rates of return on entrepreneurial ventures, r^i_t and r^i_{t+1}, and entrepreneurial talent, θ^i. Equation (18) allows us to state Propositions 7 and 8:

Proposition 7: For every individual i, endowed with entrepreneurial talent $\theta^i > \tilde{\theta}$, there exists a unique level of initial wealth $\tilde{\omega}^i_t > k_0$ for which that individual is indifferent between occupations 1 and 2. At wealth levels below this threshold level, he will prefer entrepreneurship over wage labor.

Proposition 8: The threshold wealth level in Proposition 7 depends positively on the level of entrepreneurial talent.

The proof for both propositions follows from the properties of equation (18). An individual prefers entrepreneurship over wage labor when the probability of being raided is low. That probability is given on the left-hand side, and it was assumed to be linear in ω^i_t and zero when the initial wealth level is equal to k_0. On the right-hand side is the raiding probability for which the two occupations give the same ex ante expected utility. It can be verified in equation (18) that the right-hand side is strictly decreasing in the initial wealth level and is positive for an initial wealth of k_0. Moreover, the limit of the right-hand side for initial wealth going to infinity is equal to 0. The expression in equation (18) has no closed form solution, but when we draw the left-hand and right-hand side into a ω^i_t, ξ^i plane we find the unique threshold wealth level in Figure 1.

By the fact that $\Omega(\overset{+}{\omega}{}^i_t, \overset{+}{\theta}{}^i)$ is positive in θ^i and appears in the numerator and denominator on the right-hand side, we can derive that the right-hand side depends positively on the level of entrepreneurial talent. It is then clear that a more talented

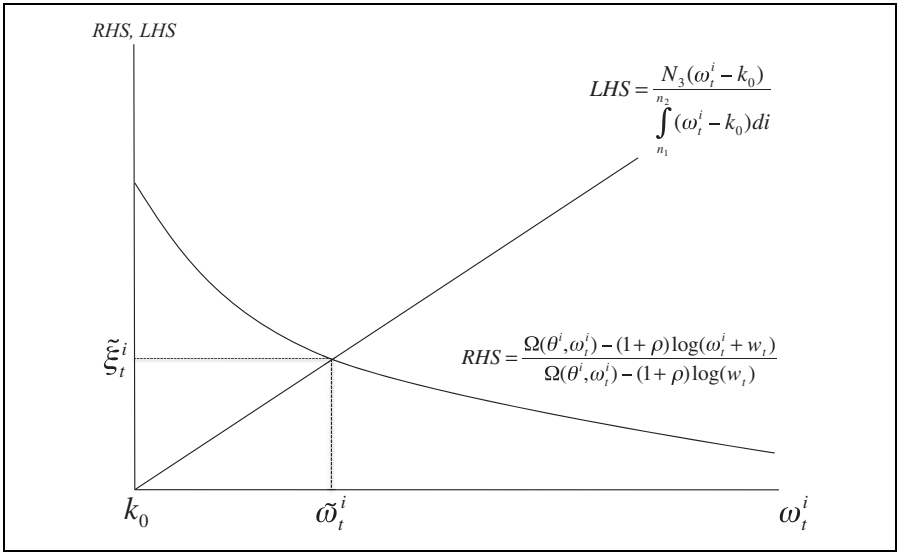

Figure 1. Graphical derivation of $\tilde{\omega}_t^i$.
Source: Own compilation.

entrepreneur is willing to take a higher risk of being raided as he is compensated by higher returns on the venture.

As individuals with a wealth level below k_0 do not have the option to become productive entrepreneurs, even if they would prefer to be, Proposition 4 implies that only those at intermediate levels of initial wealth, between k_0 and $\tilde{\omega}_t^i$ will choose entrepreneurship over labor. The poor cannot set up a venture, and the very rich will not risk their wealth.

The trade-off between entrepreneurship and raiding can be analyzed in a similar fashion. From equations (10) and (14), we can derive that an individual will choose entrepreneurship over raiding if

$$\xi^i < \frac{\Omega(\overset{+}{\omega}_t^i, \overset{+}{\theta}^i) - (1+\rho)\log\left(\omega_t^i + \zeta_t\lambda(\theta^i)\right)}{\Omega(\overset{+}{\omega}_t^i, \overset{+}{\theta}^i) - (1+\rho)\log(w_t)}. \tag{19}$$

This expression allows us to state Propositions 9 and 10:

Proposition 9: For every individual i, endowed with entrepreneurial talent $\theta^i > \bar{\theta}$ there exists a unique level of initial wealth $\bar{\omega}_t^i > k_0$ for which that individual is indifferent between occupations 2 and 3. At wealth levels below this threshold level, he will prefer productive entrepreneurship over raiding.

Proposition 10: The threshold wealth level in Proposition 9 depends negatively on the level of entrepreneurial talent.

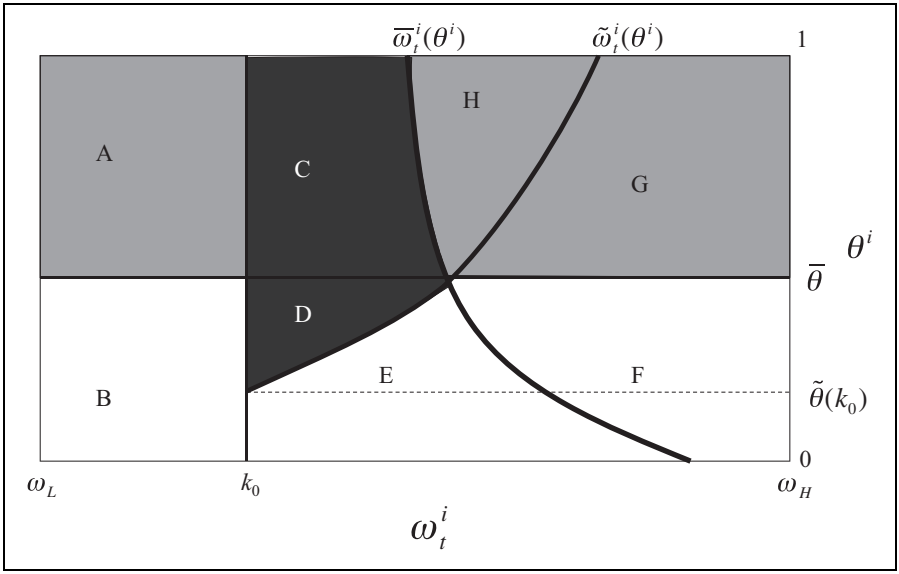

Figure 2. The choice of occupations.
Source: Own compilation.

The proof again follows the same logic and depends on the different properties of the right-hand side in equation (19). The right-hand side takes a value between 0 and 1 at initial wealth level k_0 when occupation 3 is preferred over occupation 1 (see equation (15)). The right-hand side is once more downward sloping and has an asymptote at 0 as the raider does not risk his initial wealth and the productive entrepreneur does. And again there is a unique point of intersection that determines the threshold initial wealth level for which an individual is indifferent. Above that level the probability of being raided exceeds the acceptable level and individuals choose to become raiders themselves. The corresponding graph would be similar to the one in Figure 1, although of course the threshold initial wealth levels are not. Also, this time the right-hand side of equation (19) depends negatively on entrepreneurial talent as that talent also increases the payoff to raiding. This implies that the threshold level of initial wealth will decline as the talent increases.

As shown in Figure 2 we can now draw the derived threshold levels of θ^i and ω_t^i into a box diagram that has θ^i on the vertical axis, running from 0 to 1, and ω_t^i on the horizontal one, running from ω_L to ω_H. The allocation of individuals over the various occupations can now be determined by drawing the thresholds levels $\bar{\theta}$, $\tilde{\omega}_t^i(\theta^i)$, $\tilde{\theta}(K_0)$, and $\bar{\omega}_t^i(\theta^i)$ into the box. It can be verified in the underlying equations that $\tilde{\omega}_t^i(1) > \bar{\omega}_t^i(1)$, when we assume that the most talented entrepreneur will prefer raiding to labor and $\bar{\theta}$ is less than 1. From equations (18) and (19), we know that the two ω curves will intersect at $\bar{\theta}$ and the box has eight areas. These areas are labeled A to H in Figure 2.

We have assumed i.i.d. uniformly distributed talent and initial wealth endowments so the relative size of the areas in the box represent the proportions of the population that will choose one occupation over another. By considering the bilateral comparisons in each of the enclosed areas in the box, we can derive which area chooses what occupation. In area A there is too little wealth to become a productive entrepreneur, but enough talent to be successful as a raider. In area B, there is too little wealth to start a venture and too little talent to become a successful raider. So these individuals choose employment. Those in areas C and D have sufficient wealth to engage in a productive venture but not so much that they must fear raiding. They choose productive entrepreneurship. Those in areas E and F have too much wealth to want to become productive entrepreneurs for fear of raiders but lack the talent to be successful raiders themselves. So they too choose employment. Those in areas G and H choose raiding over employment and productive entrepreneurship. The areas of productive entrepreneurship are dark shaded in Figure 2, whereas the light-shaded areas are those for which entrepreneurial talent allocates into raiding.

We are now ready to investigate in which direction changes in the exogenous variables and parameters will shift the lines in Figure 2 and consequently interpret how such changes affect the allocation over occupations.

Comparative Statics: What Drives the Talent Allocation?

The Entry Barrier k_0. It is clear from the figure that lower initial capital requirements k_0 will reduce the size of the rectangular areas A and B. From equation (17), we can also observe that for a reduction in k_0, $\tilde{\theta}$ will fall, causing the areas C, D, and E to increase. The $\bar{\omega}$ and $\tilde{\omega}$ curves will also respond as both the left- and right-hand side of equations (18) and (19) are affected. The effect on the left-hand side depends on the initial wealth level. A reduction in k_0 will reduce the probability of being raided for individual ventures if the venture is above average size, whereas it will increase that probability for the smaller than average ventures. This implies the $\tilde{\omega}$ and $\bar{\omega}$ curves will rotate clockwise around the point where they intersect the midpoint between k_0 and ω_H. In addition, the negative effect of k_0 on the Ω functions defined above implies that for every level of initial wealth the $\tilde{\omega}$ curve will shift down for a decrease in k_0, whereas for the $\bar{\omega}$ curve the threshold level of talent goes up for every level of initial wealth and the curve shifts up. Their intersection point will move horizontally to the right as long as $\bar{\theta}$ is not affected, causing areas C and D to grow further at the expense of areas H and E. There are no first-order effects on $\bar{\theta}$, but because a possible larger spread in the size of entrepreneurial ventures will increase the attractiveness of raiding through ζ, $\bar{\theta}$ may shift down. As these effects are second-order effects, however, it can be concluded that the shifts in $\tilde{\omega}$, $\bar{\omega}$, $\tilde{\theta}$, and the k_0 line all work toward increasing the number of productive entrepreneurs.

The intuition of these comparative static results is as follows: a reduction in the costs of setting up a venture, or, alternatively, reducing the financing constraints on

small productive ventures, will produce less raiding by the talented poor (area A smaller) and induce more people to switch from employment into productive entrepreneurship (area E to D). In addition, the lower initial capital requirements increase the payoff to the productive ventures, making productive venturing more attractive relative to raiding (from H to C). One implication from this is that microcredits can help to make the transition to a productive equilibrium. Microcredits could provide an incentive to switch into productive entrepreneurship at the individual level by helping to overcome the credit constraints. As the productive assets that they finance are not easily captured, these assets are unlikely to create enough incentives for a switch to raiding at the aggregate level.

Given the central importance of our institutional strength variable, $\lambda(\theta)$, it is interesting to consider how these comparative statics are affected by institutions. For very strong ($\lambda(\theta^i)$ close to 0 for all θ^i) and very weak ($\lambda(\theta^i)$ close to 1 for all θ^i) institutions, we know that the impact of individual talent parameter will be very small on the payoff to raiders. This first of all makes $\bar{\theta}$ very small (weak institutions) or big (strong institutions). It also flattens the slope of the $\bar{\omega}$ curve. The above results are therefore most pronounced for intermediate levels of institutional strength, which should be interpreted as implying that the pay-off to raiding varies considerably with entrepreneurial talent and raided assets cannot be consumed directly.

Wages w_t, w_{t+1}

The current wage level w_t affects all curves in the graph. The direct impact of w_t on $\tilde{\theta}$ is negative. The current wage w_t has an ambiguous effect on the $\tilde{\omega}$ curve. On one hand, both wages drive the Ω functions down, which increases the right-hand side of equation (18) and thus shifts the curve to the right. On the other hand, an increasing wage level reduces the right-hand side, as the relative importance of initial wealth levels is reduced. As both effects work in opposite direction, it is unclear how the curve will shift. In the comparison with raiding the effect of an increase in the wage level is unambiguously positive on the right-hand side, causing the $\bar{\omega}$ curve to shift up and to the right. Finally, $\bar{\theta}$ is positive in the current wage level. The net first-order effect of an increase in the wage level is then an increase in the number of employees, as areas B, E, and F will increase and area D increases one for one at the expense of C. The shift in the $\bar{\omega}$ curve increases the number of productive entrepreneurs in area C as they have the current wage as their fall-back position. The ambiguous effect on $\tilde{\omega}$ may offset this positive effect on the number of productive entrepreneurs, but the number of destructive entrepreneurs will unambiguously fall, as G + H + A will be smaller.

The future wage only affects the rate of return on productive entrepreneurship in our one-generation, one-shot model. Hence, larger future wages decrease the attractiveness of productive entrepreneurship vis-à-vis the alternatives. $\tilde{\theta}$ increases, $\tilde{\omega}$ shifts up but rotates down because the lower returns need to be offset with higher

initial investments. The trade-off between employment and destructive entrepreneurship is not affected, so $\bar{\theta}$ stays where it is. $\bar{\omega}$ will shift to intersect $\tilde{\omega}$ at $\bar{\theta}$. It is a priori unclear whether the intersection point moves horizontally to the right or left.

The effects of both wages together imply that in an economy with high growth in wage levels, employment will be increasingly attractive and productive entrepreneurship is less attractive relative to employment and destructive entrepreneurship. This, we believe, is an interesting result. It implies that rebuilding the formal economy can actually reduce incentives for people to become productive entrepreneurs. This should not lead one to conclude that growth in wages should be discouraged, however. After all, utility does increase in all occupations as the fall-back option improves. But the perceived shortages of entrepreneurial activity in more developed nations may well be related to this phenomenon. As the economy recovers from conflict, it is perhaps advisable to also build up some incentives that promote productive entrepreneurship.

Again we can consider shortly the effects of very strong or very weak institutions on the above effects and conclude that once more, the above dynamics require intermediate levels of institutional strength, such that the incentives to raiding respond to individual entrepreneurial talent with roughly the same sensitivity as the returns to productive entrepreneurship.

Initial Wealth ω_L, ω_H, ζ_t

A spread preserving increase in the mean level of initial wealth will shift the box to the right and simply add to the light area on the right what is lost on the left. Such a shift would only start to have an impact on the relative size of the occupations when ω_L exceeds k_0, in which case there are no more credit constraints. As that is not a very interesting case, we consider shifting the lower and upper bound separately.

If only ω_L increases, then areas A and B become smaller as earlier. This time there is no further impact on any of the curves as the minimum level of initial wealth has no first-order impact on any of the trade-offs. However, as the number of raiding entrepreneurs falls, the incentives to engage in productive entrepreneurship increase relative to both alternative occupations. The fall in N_3 will, ceteris paribus, reduce the probability of being raided (left-hand side of equations (18) and (19)), thereby lowering the level of talent for every level of wealth for which an individual prefers productive entrepreneurship over labor, but increasing it for those preferring raiding over productive venturing. The $\tilde{\omega}$ curve will therefore shift down and to the right, increasing the number of productive entrepreneurs. And this effect is strengthened by an upward shift in the $\bar{\omega}$ curve. This comparative static result indicates that providing credit or lifting credit restrictions at the lower end of the initial wealth distribution, for example, by providing micro credits, can be a very powerful instrument in reducing the incentives to engage or continue raiding. Increases in ω_H, on the

other hand, will have the opposite effect. The number of raiders will increase, and the curves shift in the opposite direction.

We can consider the effect of changes in the distribution of initial wealth more formally by looking at the comparative statics for ζ_t. This variable is, however, not an exogenous variable in our model. The width of the area C-D in the graph gives the spread of initial wealth in the population of productive entrepreneurs. If it were to increase exogenously then $\bar{\theta}$ would shift down and cause more employees to switch to destructive entrepreneurship. As that happens, the ω curves will shift/rotate down as well but $\tilde{\theta}$ would not fall. This is because the zero raid probability level of talent for which an individual is indifferent between employment and entrepreneurship does not depend upon the probability of being raided. As the $\bar{\omega}$ curve shifts to the left, however, the spread of initial wealth for the productive entrepreneurs is squeezed and this provides an offsetting force. As the spread of initial wealth for productive entrepreneurs is an endogenous variable, determined by the position of the various curves, all this exercise shows is that the allocation is inherently stable. A similar argument holds for variables N_1, N_2, and N_3.

Again, we can shortly consider the impact of institutional strength on these comparative statics. As earlier, under the assumption in our model that payoffs to raiding depend on the individual's talent, these effects will be qualitatively the same. The relationship between initial wealth (distribution) and the incentives to raid is only broken under the extremes of very weak and very strong institutions. Under very weak institutions, the incentives to engage in productive activity will collapse. But as this implies there will be no productive ventures to raid, also raiding in the end is very unattractive and all will allocate into employment, making the initial wealth distribution inconsequential. With very strong institutions, we obtain the result that all those above the threshold capital level k_0 will engage in productive venturing or employment, as raiding has a near zero payoff, even for the most talented raiders.

This result implies that, under our assumptions and at intermediate levels of institutional restraints, lifting credit constraints at the lower end of the distribution, both in the population of talented, N, and the population of productive entrepreneurs, N_2 can reduce the incentives for raiders and increase those for productive venturing. Under these conditions, micro credits to small businesses and potential entrepreneurs are more effective than giving the same amount of financial aid and credit to the already large businesses and wealthy business people. For the latter to be an effective strategy, institutions (e.g. police force, judicial system, contract enforcement, etc.) first need to be built/rebuilt.

The comparative static effects of shifts in the parameters of the model α and ρ are very complex and even harder to interpret in terms of policy implications. In the final subsection, we therefore consider the impact of stronger institutions as captured in $\lambda(\theta)$.

Institutions $\lambda(\theta)$

Institutional strength in our model implies that property rights are enforced and someone protects the productive entrepreneurs from the raiders.[10] To capture this in the model, we assume that institutions can reduce the returns to a given level of entrepreneurial talent by reducing the part of captured assets that can be consumed by the raider. This reflects the fact that it is always possible to raid a productive venture, but strong institutions prevent one from enjoying the proceeds. Strong institutions therefore shift the function $\lambda(\theta^i)$ to the right and down, implying that a higher level of talent is now required to consume the same share of assets captured as before. In Figure 2 such a shift would cause $\bar{\omega}$ to shift to the right. Also $\bar{\theta}$ would move up. As there is no impact on the other curves, it is clear that this reduces the incentives for the rich and the poor to engage in destructive entrepreneurship. When institutions are strong enough to push the $\bar{\omega}$ curve to the point where it intersects $\tilde{\omega}$ at $\bar{\theta} = 1$, all destructive entrepreneurship is eliminated. All economies with institutional strength below that level have a group of poor destructive entrepreneurs and some very rich ones.

The effect of increasing institutional strength is always to reduce the incentives to raid vis-à-vis the alternative occupations but the effect cannot be linear. At the one extreme, beyond a certain level of strength there is no further reduction in raiding as the threshold level of talent is then exceeding the maximum level in society. Increasing institutional strength beyond that point has no further impact on the relative attractiveness of the occupations. The marginal effect of stronger institutions must therefore fall.

At the other extreme, for very low levels of institutional strength the positive effect on incentives is greatly diminished by the fact that more productive ventures and consequently raid-able assets also attract more raiders. As this latter effect is a second-order effect, it will not cause a reversal of the sign, but at very low levels of initial institutional strength, the marginal effects of increasing it may be very small. This implies that a strategy to start with improving institutions in postconflict regions is vulnerable and can easily relapse. In addition, we have not considered the endogeneity of institutional strength in our model for obvious reasons. Investing in a larger but corrupt police force or bureaucracy can be interpreted as increasing, rather than reducing, the probability of being raided for productive ventures.

Extensions and Concluding Remarks

In this section, we briefly consider several generalizations to our basic framework.[11] Because the formal inclusion of these extensions would take us too far outside the scope of this article, we speculate on the impact of these extensions on the basis of the propositions and properties that were derived in the preceding static model before concluding our analysis.

A first extension to our framework was already suggested earlier. When the model is analyzed in an overlapping generations dynamic repeated game setting, the results will be different. The essence of an overlapping generations model is that two cohorts coexist in the model and the decisions of the old affect the choices of the young. If one abstracts from inheritance and still has a random distribution of initial wealth for every generation, the model should take into account that productive entrepreneurial ventures can now be raided in both time periods. In an overlapping generations structure, the incentive to raid is therefore, ceteris paribus, higher for every individual in every cohort. This is a relatively straightforward extension to the static, one-generation model earlier, and it increases the likelihood that any individual chooses raiding. As a result, a larger proportion of the total population will engage in raiding, reducing the levels of productive activity.

The analysis becomes much more complicated when we assume that the young inherit their initial endowments from their parents and individuals act to maximize the utility of their dynasty. In that case high levels of raiding will reduce the inherited wealth and the box will tend to move to the left, causing more and more raiding until all initial wealth is below k_0. As the number of productive entrepreneurs falls, however, so will the incentives to raid and the economy would then end up in an all employment equilibrium. In such an equilibrium, however, wealth starts to accumulate and the box shifts to the right again. There is a priori no reason to exclude dynamic equilibria that have repetitive cycles or even a chaotic system that cycles but never repeats itself.

As the preceding model does not specify how entrepreneurship contributes to economic growth, there can be no predictions on the growth regimes that may result. But it is relatively easy to see that when productive entrepreneurship positively affects growth, the mechanism described earlier implies that various possibilities exist. Depending on the parameters of the model, an economy may be stuck in a no growth equilibrium, a high growth equilibrium, or a continuous cycle of booms and busts. Such economic growth would feed back into the model through higher growth rates of wages in employment, causing an even more complex dynamic process.

We might also consider lifting the assumption of no financial intermediation. Even in the weakest of institutional environments, there is still some intermediation going on, especially between generations. But there is also ways of obtaining credit through other channels. If we lift this assumption, the importance of initial wealth will be reduced. It is also fair to assume, however, that in postconflict regions, the risk of not being repaid, especially after a the debtor has been raided, is very high. Under normal market conditions that would imply extremely high default risk and consequently low volumes of intermediation and high-risk premia. If we add to this the fact that information on the profitability of the venture is private and hard to verify, lending and borrowing is unlikely to significantly change the results obtained above, unless we also extend the analysis into an overlapping generations model.

One might also consider the possibility that raiders, hire labor. In the current model, only the talented are allowed to engage in raiding, but many more can work.

As we have assumed labor supply to be perfectly elastic at the subsistence wage, hiring a band of raiders would cost a raiding entrepreneur the subsistence wage times the number of raiders in his band. He will therefore hire more workers as long as the marginal additional benefits from his raiding exceed these wage costs. As long as we retain the assumption that one raider, with or without a band of helpers, can only raid one venture, the model will not change. A more interesting situation would arise if we allow a raider to raid multiple ventures, depending on the number of "employees" in his operation. As this implies that the most talented raiders would expand their operation, this leaves less assets for raiding to the less talented. Less talent will then sort into raiding, but the remaining raiders will do more raiding, reducing the payoff to productive ventures. This would not affect the results qualitatively as the impact of wages and wealth inequality remain unaltered, but ceteris paribus one would expect the number of talented in productive entrepreneurship and raiding to fall.

Similarly we can consider allowing the productive entrepreneurs to hire protection. They will want to do so up to the point where the marginal expected loss from raiding equals the marginal costs of adding one more worker to a private army. As the latter can be bought at the subsistence wage, this implies that all productive entrepreneurs hire the same amount of protection per unit of capital installed, causing their costs of capital to go up. This will eat into their profits and makes it more likely they will choose wage employment or raiding, provided the private armies are effective in reducing the probability of being raided and/or reduce the payoff to raiding, this will reduce the number of talents sorting into raiding and we obtain the same result as above. Only the most talented will remain in both raiding and productive entrepreneurship. The less talented will switch to wage employment. The comparative statics described in the fourth section all remain unaffected.

A final concern might be that raiders, productive entrepreneurs, and workers accumulate sector-specific (human) capital, thereby making it hard for them to switch between occupations once an initial choice has been made. In particular in postconflict regions a lot of the young males have obtained and gained experience with weapons, have gotten used to taking what they need and are for that reason more inclined to consider a career in raiding, even if their initial wealth and talent would allow them to get a higher income from a productive venture. Such lock-in effects can obviously only be modeled in a dynamic version of our model in which the occupational choice of the individual pre-, inter- and postconflict is modeled explicitly. Our model suggests a first tentative structure for such an extension. Wealth gets redistributed during conflict, "career switches" during conflict have a high degree of path dependence and modeling the chaos that is a civil war in a developing region is beyond anything we have encountered in the literature to date. It is hard to speculate on the impacts that such an extension would have on our models' outcomes. In fact, it constitutes such a fundamental overhaul that this can hardly be considered an extension. We do put this on the agenda for future research as the issue clearly has direct policy relevance.

What is clear from the static analysis above is that stronger institutions will help an economy switch to productive entrepreneurship in the long run, but as such

policies are hard to implement, strategies to reduce credit constraints by setting up financial intermediation and the provision of microcredits may be a promising way to start.

In our model direct wealth redistribution has similar effects as providing microcredits, but it is probably much harder to accomplish in a postconflict environment. Microcredit increases the wealth of the poor but not of the rich. Providing access to small credits therefore changes the distribution of wealth in a similar manner, but without the potential social disruption of wealth redistribution and with a better incentive structure. In our model, microcredit is also superior to macrocredit, because, for the same amount of credit provided, the former will provide less incentives to engage in raiding. Hence, we may conclude from our model that institutional improvements constitute a medium- to long-run growth strategy, whereas the reduction in credit constraints, without attracting destructive raiders (or unproductive rent-seekers) in the process, may be a sensible short-term development strategy.

On a final note, we do not assume that all results and implications of our simple model can be applied or empirically tested 1:1 in the data. We actually expect that individual cases substantially deviate from our model, as the reality in postconflict regions is always much more chaotic and diverse than any stylized model could entail. We feel, however, that our model uncovers a basic underlying mechanism that may prove relevant in most cases, most of the time, and as such it may inform future empirical work on fundamental mechanisms that are at play in the allocation of entrepreneurial talent in postconflict environments. If correct, these fundamental mechanisms and implications should be empirically observable, on average, over time, and across a larger number of cases. This takes time and a lot of data collection.[12] The empirical studies in this special issue may provide a first glance at how our model holds up against the facts. In this spirit, we hope that future research provides us with more theoretical and empirical studies to help us to understand how to channel the potentially destructive force of entrepreneurial talent toward socially beneficial activities.

Acknowledgments

We are grateful to Zoltan Acs, Sameeksha Desai, and participants in the UNU-WIDER-MERIT Workshop on Entrepreneurship, Technological Innovation, and Development, October 30–31, 2008, in Maastricht, the Netherlands, for useful discussions and helpful comments.All remaining errors are ours.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Notes

1. We follow the talent allocation literature referred to above in assuming the stock of available entrepreneurial talent in an economy is given exogenously. The institutional setting determines the allocation of that given amount of talent over activities that we traditionally consider entrepreneurial (productive) and those that are considered to be unproductive or even destructive.
2. Note that our model therefore has nothing to say about the number of (would-be) entrepreneurs in an economy. We assume an exogenously given number of people are endowed with the required talent, knowledge, and risk attitudes and the rest of the population simply is not. Empirical evidence on entrepreneurial talent and traits shows that this is perhaps a simplistic but not unreasonable assumption. The talent is assumed to be there, the institutions determine whether and how it will be used.
3. These seemingly strong assumptions simplify the model without *qualitatively* affecting the results if access to financial services is significantly constrained. We feel that the latter assumption is justified in most developing and certainly postconflict regions. It is surely a more realistic assumption than the alternative of (near-)perfect financial intermediation. Only under (near-)perfect financial markets would the initial wealth distribution be inconsequential in determining who can invest. Similarly, the assumption that no interest-bearing assets exist should be read as an simplification of the reality in most developing countries that such interest-bearing assets are very risky, illiquid, or yield very low returns, such that one's own productive assets are the only thing one would want to invest in.
4. It would be a very interesting extension to consider an endogenous distribution of wealth. One could introduce bequests and make initial wealth dependent on parents' wealth. However, that complicates the model and will not help to explain the key mechanism the model intends to uncover. We therefore leave this for future research.
5. For simplicity, we abstract from inflation and commodity price speculation. We assume that a risk-free asset with a zero expected real rate of return is available.
6. We assume that this wage is known and given to group *N*. This is a reasonable assumption if group *N* is small relative to the total population. In fact, our assumption of perfectly elastic supply of labor at subsistence wages, w_s ensures the market clearing wage is given by w_s. We use the comparative statics on this variable to see how development and economic growth affect the trade-offs in the following. For this reason, we refer to w_t and "outside wages" in the remainder of the article.
7. Employing less than the entire available wealth would imply that total income from the venture is below its maximum as long as the return on capital in that venture is positive. This is a result of our simplifying assumption that wealth can be consumed also after use in the venture. A more realistic approach would be to introduce depreciation, but that would add a lot of complexity to the model and create little additional insights.
8. We eliminate the possibility that he chooses to become a raider for now.
9. Alternatively, this talent-related fraction can be interpreted as reflecting a probability of getting caught. Alternatively, $1 - \lambda$ denotes the costs a raider would have to bear in order to raid the goods. Anything that affects the expected value of a given amount of raid-able

assets can be absorbed in this function. For example, its value will depend on the strength of institutions (e.g., rule of law, informal values and norms). The costs (benefits) of raiding can be very high (low), with a λ close to zero, or very low (high), with a λ close to 1. We assume the function $\lambda(.)$ produces a value between 0 and 1 and is positive and concave in its argument. In the following we also assume the function can be inverted.

10. This "someone" can be the government but also a private army. We have not modeled the endogenous choice to hire protection privately or collectively as this would take us beyond the scope of our article, but it constitutes an important possible extension for future research and is discussed in the fifth section.
11. We thank an anonymous referee for pointing out these extensions.
12. After more than two decades, the basic model of unproductive entrepreneurship, which Baumol first published in 1990, is now being tested empirically (and largely supported), not only with secondary data Bowen and DeClercq (2008), Sobel (2008) but also experimentally, Urbig et al. (2011).

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