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Entrepreneurship, Social Environment and Endogenous Growth

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Abstract: This paper develops a model highlighting the effect of entrepreneurship on economic growth through social environment (forced mutual help and mimetic dynamics) compatible to an African context. The mimetic dynamics arise when the presence of foreign entrepreneurship inspires local entrepreneurship to develop endogenously through a cumulative process. By using an endogenous growth model (AK model), we show that economic growth is related to usual variables (entrepreneurial rate, productivity of capital, fraction of the economic surplus, rate of depreciation of the capital, fraction of the variation of the investment coming from the economic surplus). Importantly, economic growth is positively related to entrepreneurship through mimetic dynamics depending on some values of an indicator of forced mutual help. For some of these values, the ones compatible with too much community-based transfers, reducing those transfers induce a reinforcement of the impact of mimetic dynamics in entrepreneurship on economic growth. So that, in the context of an economy where the investible surplus is strongly dissolved into the universe of social obligations, governmental policies can reinforce the positive impact of entrepreneurship on economic growth by reducing those community-based transfers.

Keywords: entrepreneurship, endogenous growth, social norms.

JEL classification: L26, O41, Z19.

1. Introduction

From the late 1970s onwards, economics literature rediscovered the entrepreneur and started to include him formally in economics models. Until then, perfect competition assumptions from traditional theoretical neoclassical models and models

of general equilibrium still obstructed the formal inclusion of the entrepreneur. First economic models trying to formalize the entrepreneurship phenomenon focused the attention on the individual, the potential entrepreneur deciding between remaining employed (or leaving unemployment) and becoming self-employed. By that time, and from the entrepreneur perspective, entrepreneurship can be considered an activity where individuals work for themselves and trade off risk and returns, rather than opting for safe returns in a different occupation - typically, paid employment. Apart from these models of occupational choice between entrepreneurship and paid employment, remained alive, during almost the whole 20th century, the conviction that entrepreneurship is a key factor in economic growth and development. However, despite this widespread belief, few attempts were made to incorporate entrepreneurship in formal growth and development models.

According to Hirschman (1958), the theories of growth and development neglect the main handicap of developing countries: the deficit of an entrepreneurial spirit. Treating the entrepreneur as an invisible man in the firm and the economy limits the pertinence of growth theory applied to developed countries. The incorporation of entrepreneurship in formal growth models dates at least the early 1990s (Schmitz 1989; Wennekers and Thurik 1999). Applying the model linking entrepreneurship to growth in the context of African economies imposes to take into account two insights specific to them in the field of entrepreneurship: the role of forced mutual help as a barrier to entrepreneurship and the importance of foreign enterprises in encouraging a dynamic local entrepreneurship. Alby, Auriol and Nguimkeu (2013) show that in Africa, the forced mutual help is a social barrier to entrepreneurship by lowering the productivity of the workers and the performance of the firms. Foreign enterprises create an exogenous entrepreneurial dynamic in the economy that may impulse an endogenous entrepreneurial dynamic through mimic behaviors (Bygrave and Minneti, 1999; Kouakou, 2018). Creating a business inspires another if it is nearby. If initially, the density of foreign companies is low, the imitation effect remains low. But when this density exceeds a certain threshold, the cumulative process begins and local entrepreneurship develops endogenously. Increasing returns occur in social environment because the more entrepreneurial activity a social environment exhibits, the more new entrepreneurial opportunities it creates.

Thus, the social environment can build on socio-cultural norms to create an entrepreneurial culture or to curb it. In the paper, we model, in an endogenous growth model framework, the impact of entrepreneurship on economic growth via

social environment (forced mutual help and mimetic dynamics). The rest of this paper is organized as follow: after a literature review (section 2), we develop a model of endogenous growth explaining the nexus entrepreneurship-economic growth through social environment and make public policy recommendations (section 3). The section 4 concludes our paper.

2. Related Literature

The instrumental role of entrepreneurship in economic growth draws on Schumpeter's ideas about the entrepreneur as an innovator and as the potential source of equilibrium destruction. Since Schumpeter (1911), the entrepreneur emerged as the key figure being considered the persona causa of economic development (Hébert and Link, 1989; Santarelli and Pesciarelli, 1990). The way through which entrepreneurs could promote growth and development can be summarized through two main keys: the entrepreneur as the innovator (identified as the Schumpeterian entrepreneur) and the entrepreneur as the creator of new firms and new jobs. The entrepreneur creates value and new jobs, which in turn might impact positively on the overall economy, by founding and operating a new business firm. Thus, by innovating and transforming inventions and ideas into economically viable entities, entrepreneurs improve economic development and promote growth (Wennekers and Thurik, 1999). The incorporation of entrepreneurship in formal growth models dates at least the early 1990s (Schmitz, 1989; Wennekers and Thurik, 1999).

Baumol (1968) highlights the instrumental role of entrepreneurship in economic renewal and growth (Elliasson and Henrekson, 2004). For him, growth cannot be explained by the simple accumulation of various factors of production per se. Human creativity and productive entrepreneurship are needed to combine the inputs in profitable ways. Through his human creativity, the entrepreneur has the central role in long-term economic development and welfare. Individuals pursuing entrepreneurial opportunities is likely to be the most important factor for growth and renewal. As a result, an institutional environment that encourages productive entrepreneurship becomes the ultimate determinant of economic growth. Baumol (1990, 1993) argues that entrepreneurship can be found in many societies throughout history, but while it is productive in some, it is unproductive and even destructive in others. In other words, entrepreneurial activities may have negative consequences in terms of decreased social income and welfare, particularly when the entrepreneur earns money at the expense of other citizens in society. Baumol (2010) develops a microtheory of

the entrepreneur, highlighting the distinction between innovative and replicative entrepreneurs, as well as the importance of entrepreneurship to economic growth and development. In order to encourage creative entrepreneurship, it is necessary to create conditions that allow the entrepreneurial pursuit of self-interest to accord with social wealth creation. More generally, Baumol studies the importance of institutions and incentives for the allocation of entrepreneurship and defends new ideas on the need for the right incentives to promote entrepreneurship. Under perverse incentive systems, "rent-seeking" can dominate entrepreneurial motivation (Casson, 1982, 2005).

But all these works trying to link entrepreneurship to economic growth and development don't take into account all the potential of the dynamics of the Schumpeterian innovator entrepreneur. Endogenous growth theory has created new possibilities for fitting entrepreneurship or the assumed entrepreneurs' innovative behavior into growth models. Endogenous growth models started highlighting the role of knowledge and innovation for the growth of nations (Romer 1986, 1990; Lucas, 1988). New knowledge was argued to lead to innovations and it could be capitalized by being transformed into new products, processes and organizations. Besides assuming knowledge externalities, endogenous growth models started to propose increasing returns to scale. Knowledge externalities occur when the entrepreneurial insights of some produce entrepreneurial opportunities for others, while increasing returns occur because the more entrepreneurial activity an economy exhibits, the more new entrepreneurial opportunities it creates (Holcombe, 1998). The recognition of entrepreneurship's role in the market process filled some limits of endogenous growth theories (Holcombe, op. cit.). Entrepreneurship is already considered one of the key growth components in "new growth theory" (Audretsch *et al.,* 2006; Henrekson, 2005).

The new focus on entrepreneurship pushed growth theory away from neoclassical theories that focused on production process' inputs and forward, towards the institutional setting within which growth occurs. Entrepreneurship appears to be one of the channels through which knowledge spillovers occur. It is a conduit for the spillover and commercialization of knowledge. Doing so, entrepreneurship permits to better understand the processes of knowledge externalities and increasing returns to scale, that appeared as a black box in the mainstream growth theory. Without entrepreneurship, we did not go very far toward illuminating the process by which knowledge externalities produce growth, or by which increasing returns can

be manifested in the production process. By identifying entrepreneurship as the missing link in the previous models, being responsible for the conversion of knowledge into economically relevant knowledge, subsequent theoretical models started introducing entrepreneurship and/or entrepreneurs' innovative activities in the endogenous growth models (Acs *et al.* 2004, 2009).

Schmitz (1989) developed a model in which endogenous entrepreneurial activity was found to be a key determinant of economic growth. Aghion and Howitt (1992) showed that industrial innovations conducted by entrepreneurs, which improve the quality of products, were the key channel to induce progress and growth in the economy. In summary, incorporating entrepreneurship into the framework of economic growth added to the growth theory mainly by showing the nature of increasing returns to scale, knowledge externalities and the role of human capital. More recent concerns of economic growth theory have been related to the quality of the entrepreneurship. Recent models have been suggesting the need to encourage high ability entrepreneurs, as reduced quality of entrepreneurs is argued to retard growth (Jiang *et al.,* 2015; Jaimovich, 2010). These new results stress the need to provide the right incentives to the most able entrepreneurs, in order to promote productive and growth-enhancing entrepreneurship, and avoid unproductive or even destructive entrepreneurial activities, in line with Baumol (1990).

In an African context, a model linking entrepreneurship to growth supposes to take into account two insights specific to them in the field of entrepreneurship: the role of forced mutual help as a barrier to entrepreneurship and the importance of foreign enterprises in encouraging a dynamic local entrepreneurship. Forced mutual help consist in social obligations that often imply nepotism, tribalism and forced solidarity, and can be unproductive for business performance and the economic growth of African countries. Alby, Auriol and Nguimkeu (2013) show that in Africa, the forced mutual help is a social barrier to entrepreneurship by lowering the productivity of the workers and the performance of the firms. Forced mutual help can also reduce the share of the economic surplus invested in the economy (Mahieu, 1990; Koulibaly and Mahieu, 1992). A fraction of this surplus is supposed to dissolve into the universe of social obligations (Hugon, 1992).

Thus, the social environment in African economies does not just curb entrepreneurship, it can also promote it. Indeed, the social environment plays a key role in the decision to create or develop a business. The entrepreneur is, above all,

the product of his environment (Fortin, 2002). The social environment is in the form of three concentric circles: family context, specific support mechanisms for entrepreneurs, sociocultural norms accepted in society (Saporta and Verstraete, 2006). Sociocultural norms have a ripple effect on the entrepreneurial activity. The sequence is as follows: the dominant sociocultural norms induce the predominance or not of an entrepreneurial culture and determine the degree of diffusion of the entrepreneurial spirit in all strata of society. The result is an increase in the rate of entrepreneurship, which, through a feedback effect, modifies the sociocultural norms, and so on. Bygrave and Minneti (1999) develop an entrepreneurship model to explain differences in entrepreneurial activities between nations, by drawing on the sociological theory of the riots of Granovetter (1978). According to this theory, if the number of behaviors observed exceeds a certain threshold, the simple act of observing a similar behavior to that which one proposes to oneself, exerts a positive influence in favor of this behavior and can entail the adhesion in spite of the initial reticences.

Bygrave and Minneti (op. cit.) adapt this theory to economics and show how creating a business inspires another if it is nearby. Increasing returns occur in social environment because the more entrepreneurial activity a social environment exhibits, the more new entrepreneurial opportunities it creates. This local entrepreneurial development is cumulative, exponential and endogenous induced by increasing returns to scale and knowledge externalities emerging from an imitative, innovative and incubative environment. The propensity of a population to create new enterprises is not only a cognitive affair but also a question of social environment. Kouakou (2018) develops a model generalizing Bygrave and Minneti (1999)'s framework to a case compatible to african context where the presence of foreign enterprises create an exogenous entrepreneurial dynamic in the economy that may impulse an endogenous entrepreneurial dynamic through mimic behaviors. If initially, the density of foreign companies is low, the imitation effect remains low. But when this density exceeds a certain threshold, the cumulative process begins and local entrepreneurship develops endogenously.

As the social environment can build on socio-cultural norms to create an entrepreneurial culture or to curb it, it is interesting to analyze the role of forced mutual help and mimetic dynamics in the nexus entrepreneurship-economic growth. In the rest of this paper, we model, in an endogenous growth model framework, the impact of entrepreneurship on economic growth via social environment.

3. A Theoretical Model of Endogenous Growth

3.1. The Assumptions

We develop a simple model to analyze the link between entrepreneurship and growth. This model is inspired by the simple AK model developed by Pagano (1993) to examine the link between the financial system, investment and growth. In the theoretical framework that it adopts, Pagano (op.cit.) assumes that part of the savings disappears during its transformation into investment: $I = \psi E$ with $\psi \leq 1$ and E representing the global saving. The coefficient ψ reflects the imperfection of financial markets (tax levies, inefficiency of financial markets, banking intermediation margins, etc.). The production function depends only on capital, in a form with constant returns ($Y = AK$) where A is the productivity of capital K; savings represent a constant fraction of the national income $E = eY$ and the gross investment is the sum of the net investment ΔK and the replacement investment δK: $I = \Delta K + \delta K$. As $\Delta Y = A\Delta K$, the growth rate of the economy is written:

$$g \equiv \frac{\Delta Y}{Y} = \frac{AI - \delta AK}{Y} = e\psi A - \delta \quad (1)$$

The rate of growth of the economy is therefore positively related to the savings rate and the productivity of capital, and negatively to the depreciation of capital and the imperfections of the financial market. This model of Pagano then makes it possible to test a simple linear relationship between an indicator of the imperfections of the financial market and the growth rate over the long term. This simple model, derived from the endogenous growth theory, allows a profound renewal of the way of analyzing the link between financial development, investment and growth (Villieu, 2007).

We adapt this model to show theoretically the impact of entrepreneurship on economic growth. To do this, we consider two sorts of entrepreneurship: a local entrepreneurship and a foreign entrepreneurship. Local entrepreneurship develops through the accumulation of the economic surplus created in the national economy. The economic surplus created in the economy is denoted ΔS and its accumulation should be turned into investment. We suppose that only a fraction ϕ of this surplus is invested in the economy in order to develop local entrepreneurship:

$$\Delta S^* = \phi \Delta S \Rightarrow S^* = \phi S \quad (2)$$

In order to better interpret the fraction ϕ in an African context, we must introduce some social considerations. In Africa, social obligations can reduce the share of the

economic surplus invested in the economy (Mahieu, 1990; Koulibaly and Mahieu, 1992). A fraction (1-ϕ) of this surplus is supposed to dissolve into the universe of social obligations (Hugon, 1992). These social obligations, taking the form of forced mutual help, tribalism, nepotism, community-based transfers, can be unproductive and inefficient for business performance and the economic growth of African countries. Albi *et al.* (2013) show that the forced mutual help lowers the productivity of the workers and the performance of the firms in Africa. Here, we analyze the inefficiency of forced mutual help through its ability to reduce the capital invested in the economy. In this line, the fraction $\phi \leq 1$ reflects the imperfections in the accumulation of capital due to forced mutual help. It captures the inefficient dimension of forced mutual help. Moreover, the economic surplus is supposed to represent a constant fraction θ of the national revenue ($S = \Delta Y$). Let's also assume that that the production function Y depends only on capital K^*, with constant returns to scale, according to the relation: $Y = AK^*$, where A is the capital productivity.

Furthermore, we assume that foreign entrepreneurship allows investment in the economy. We denote I^f the investment realized by the foreign companies in the national economy. This investment from foreign entrepreneurship is the sum of net foreign investment ΔK^f and the investment of replacement δK : $I^f = \Delta K^f + \delta K$. Thus, the total investment is the sum of foreign investment I^f and the fraction of the surplus invested in the economy $\phi \Delta S$:

$$I^* = \Delta K^f + \delta K + \phi \Delta S \quad (3)$$

Let us consider now the interaction between local entrepreneurship and foreign entrepreneurship by postulating the driving role of psycho sociological factors and of proximity of foreign companies. The presence of foreign companies induces increasing returns to scale and knowledge externalities that allow a cumulative, exponential and endogenous induced local entrepreneurial development (Bygrave and Minneti, 1999; Kouakou, 2018). Put another way, by carrying positive externalities, foreign companies can induce mimetic dynamics on the part of local entrepreneurs. Indeed, starting from the idea that creating a business inspires another if it is nearby, it comes that if initially, the density of foreign companies is low, the imitation effect remains low. But when this density exceeds a certain threshold, the cumulative process begins and local entrepreneurship develops endogenously. Thus, if the density of foreign companies exceeds a certain threshold, the simple act of observing foreign companies exerts a positive influence in favor of local entrepreneurship in spite of the initial reticence.

3.2. The Determination of the Economic Growth Rate

The way the fraction ϕ of the surplus (reflecting the imperfections in the accumulation of capital due to forced mutual help) is really invested or not in the economy depends on the driving role of psycho sociological factors and of proximity of foreign companies. More precisely, it depends on the density of foreign companies in the national economy. The net economic surplus is reinvested in the economy when the density of foreign enterprises existing in the economy exceeds a certain threshold. Assuming that the density of foreign companies is proportional to their net investment, the threshold can be written in terms of net investment $\overline{\Delta K}$. Below this threshold, the net economic surplus is not reinvested in the economy. But above the threshold, the net economic surplus is reinvested in the economy so that the higher the density of foreign companies, the more local businesses will be created. We capture this presence of knowledge externalities and increasing returns to scale by linking the net foreign investment ΔK^f and the fraction of the surplus invested in the economy $\phi \Delta S$ as follows:

$$\begin{cases} I^* = \Delta K^f + \delta K + \phi \Delta S & if\ \Delta K^f \geq \overline{\Delta K} \\ I^* = \Delta K^f + \delta K & if\ \Delta K^f < \overline{\Delta K} \end{cases} \tag{4}$$

This equation (4) highlights the threshold effect in the expression of the total investment due to imitation effect. We can reduce this expression by using an indicator variable $\mathbb{1}_{\Delta K^f}$ such that $\mathbb{1}_{\Delta K^f} = 1\ if \Delta K^f \geq \overline{\Delta K}$; and $\mathbb{1}_{\Delta K^f} = 0 \quad if \Delta K^f < \overline{\Delta K}$. We obtain:

$$I^* = \Delta K^f + \delta K + \mathbb{1}_{\Delta K^f} \phi \Delta S \tag{5}$$

We can now calculate the economic growth rate. Remembering that the economic surplus represents a constant fraction θ of the national revenue ($S = \theta Y \Rightarrow \frac{AS}{Y} = \theta A$) and a constant fraction α of the investment ($S = \alpha I^*$), and $K^* = K^f + \phi S$, we have:

$$Y = A \times \left(K^f + \mathbb{1}_{\Delta K^f} \phi S\right) \Rightarrow \Delta Y = A \times \left(\Delta K^f + \mathbb{1}_{\Delta K^f} \phi \Delta S\right) \tag{6}$$

The economy growth rate is written:

$$g \equiv \frac{\Delta Y}{Y} = \frac{A \times \left(\Delta K^f + \mathbb{1}_{\Delta K^f} \phi \Delta S\right)}{Y} = \frac{A \times (I^* - \delta K)}{Y}$$

$$\Rightarrow\ g = \frac{AI^*}{Y} - \delta \frac{AK}{Y} = \frac{AI^*}{Y} - \delta \frac{AK^f}{Y} - \mathbb{1}_{\Delta K^f} \delta \phi \frac{AS}{Y} \tag{7}$$

We have the following relations:

$S = \theta Y \Rightarrow \frac{AS}{Y} = \theta A$; $Y = A\left(K^f + \mathbb{1}_{\Delta K^f}\phi S\right) \Rightarrow \frac{AK^f}{Y} = \frac{AK^f}{A\left(K^f + \mathbb{1}_{\Delta K^f}\phi S\right)} = \frac{K^f}{K^f + \mathbb{1}_{\Delta K^f}\phi S} = \frac{1}{1 + \phi \mathbb{1}_{\Delta K^f}\frac{S}{K^f}}$ and $S = \alpha I^* \Rightarrow \frac{AI^*}{Y} = \frac{AS}{\alpha Y} = \frac{A\theta}{\alpha}$.

Finally, the expression of the economic growth rate is:

$$g = A\theta\left(\frac{1}{\alpha} - \mathbb{1}_{\Delta K^f}\delta\phi\right) - \frac{\delta}{1 + \mathbb{1}_{\Delta K^f}\phi\frac{S}{K^f}} \equiv g\left(A, \theta, \delta, \alpha, \frac{S}{K^f}, \phi, \mathbb{1}_{\Delta K^f}\right) \quad (8)$$

The equation (8) links the economic growth rate to two types of variables:

- some usual variables highlighted in the theory of growth: A: capital productivity; θ: fraction of the economic surplus in the national revenue; α : fraction of the variation of the investment coming from the economic surplus; δ : the rate of depreciation of the capital; $\frac{S}{K^f}$: ratio local capital/ foreign capital that is an indicator of the entrepreneurial rate;
- some variables specific to an African context and related to the social environment: ϕ : the indicator of forced mutual help reflecting some imperfection in the accumulation of capital; $\mathbb{1}_{\Delta K^f}$: an indicator variable such that $\mathbb{1}_{\Delta K^f} = 1\ if \Delta K^f \geq \overline{\Delta K}$; and $\mathbb{1}_{\Delta K^f} = 0 \quad if \Delta K^f < \overline{\Delta K}$. This indicator $\mathbb{1}_{\Delta K^f}$ highlights a threshold effect in the relation between entrepreneurship and economic growth due to mimetic dynamics and the driving role of psycho sociological factors.

The link between the economic growth rate and the usual variables is stated in the proposition below as follow (see proof in appendix 1):

Proposition 1: The rate of growth of the economy is positively related to the productivity of capital (A), the fraction of the economic surplus (θ), the indicator of entrepreneurial rate $\left(\frac{S}{K^f}\right)$ and negatively to the rate of depreciation of the capital (δ), and the fraction of the variation of the investment coming from the economic surplus (α).

3.3. Social environment and economic growth

Concerning the variables specific to an African context and related to the social environment, we first pose the nature of the relation between the rate of growth of the economy and (ϕ), the indicator of forced mutual help. We express the equation (8) as follows:

$$\begin{cases} g_1 = A\theta\left(\frac{1}{\alpha}\right) - \delta & if \Delta K^f < \overline{\Delta K} \\ g_2 = A\theta\left(\frac{1}{\alpha} - \delta\phi\right) - \frac{\delta}{1 + \phi\frac{S}{K^f}} & if \Delta K^f \geq \overline{\Delta K} \end{cases} \quad (9)$$

We calculate $\frac{\partial g_2}{\partial \phi} = -A\theta\delta + \frac{\delta\frac{S}{K^f}}{\left(1+\phi\frac{S}{K^f}\right)^2} \gtrless 0$. In order to determine clearly the relation the rate of growth of the economy and (ϕ), let us rewrite equation (9) after assuming that $g_2^1(\phi) = A\theta\left(\frac{1}{\alpha} - \delta\phi\right)$ and $g_2^2(\phi) = \frac{\delta}{1+\phi\frac{S}{K^f}}$:

$$\begin{cases} g_1(\phi) = A\theta\left(\frac{1}{\alpha}\right) - \delta \perp \phi & if \Delta K^f < \overline{\Delta K} \\ g_2(\phi) = g_2^1(\phi) - g_2^2(\phi) & if \Delta K^f \geq \overline{\Delta K} \end{cases} \quad (10)$$

We see that the expression of g_2 (ϕ) is the difference between $g_2^1(\phi)$ with $g'^1_2(\phi) < 0$ and $g_2^2(\phi)$ with $g'^2_2(\phi) < 0$. Thus, when ϕ increases, $g_2^1(\phi)$ decreases and $-g_2^2(\phi)$ increases such that the final effect remains ambiguous and depends on the starting value of ϕ. If this starting value of ϕ is too low, the increase of $-g_2^2(\phi)$ prevails on the decrease of $g_2^1(\phi)$ such that the final effect is an increase of g_2 (ϕ). If this starting value of ϕ is high enough, the decrease of $g_2^1(\phi)$ prevails on the increase of $-g_2^2(\phi)$ such that the final effect is an decrease of g_2 (ϕ).

Lemma 1: There is a threshold effect in the relation between the indicator of forced mutual help ϕ and the economic growth rate.

In order to capture the effect of mimetic dynamics on growth rate, we check the conditions under which entrepreneurship has a positive effect on economic growth via mimetic dynamics. Formally, we check the conditions under which g_2 (ϕ) > g_1 (ϕ). Those conditions must be about the parameter ϕ. Indeed, when the density of foreign firms is high, it may not have an effect on investment and growth if ϕ is too low. So there is a value of ϕ for which entrepreneurship has a positive effect on growth via mimetic dynamics in entrepreneurship. We can express the link between the impact of mimetic dynamics on economic growth and the indicator of forced mutual help ϕ, as :

$$\Delta g(\phi) \equiv g_2(\phi) - g_1(\phi) = \delta\left(A\theta\phi - \frac{2 + \phi\frac{S}{K^f}}{1 + \phi\frac{S}{K^f}}\right) \tag{11}$$

This equation (11) highlights an interesting feature: the mimetic dynamics in entrepreneurship affects economic growth via the indicator of forced mutual help, by transforming potentially invested surplus into effectively invested surplus.

We show that mimetic dynamics in entrepreneurship have a positive impact on economic growth, formally $\Delta g(\phi) > 0$, for some values of the indicator of forced mutual help ϕ satisfying the following inequality (proof in appendix 2):

$$h(\phi) \equiv \frac{S}{K^f}\phi^2 + \left(1 - \frac{1}{A\theta}\frac{S}{K^f}\right)\phi - \frac{2}{A\theta} > 0 \tag{12}$$

Lemma 2: Entrepreneurship has a positive impact on economic growth rate through mimetic dynamics if, ceteris paribus, the indicator of forced mutual help ϕ satisfies the following quadratic inequality:

$$\frac{S}{K^f}\phi^2 + \left(1 - \frac{1}{A\theta}\frac{S}{K^f}\right)\phi - \frac{2}{A\theta} > 0$$

Let ϕ_1 and ϕ_2 be the values of ϕ such that $\Delta g(\phi) = 0$; we have (proof in appendix 2):

$$\phi_1 = \frac{\frac{S}{A\theta K^f} - 1 - \sqrt{\left(1 - \frac{S}{A\theta K^f}\right)^2 + \frac{8S}{A\theta K^f}}}{2S/K^f} \tag{13}$$

$$\phi_2 = \frac{\frac{S}{A\theta K^f} - 1 + \sqrt{\left(1 - \frac{S}{A\theta K^f}\right)^2 + \frac{8S}{A\theta K^f}}}{2S/K^f} \tag{14}$$

We summarize the social foundations of economic growth in the proposition below:

Proposition 2: The rate of growth of the economy is positively related to entrepreneurship through mimetic dynamics if, ceteris paribus, the indicator of forced mutual help ϕ belongs to the interval $[0, \phi_1] \cup [\phi_2, +\infty]$. Moreover, there is a threshold effect in the relation between the indicator of forced mutual help ϕ and the economic growth rate.

3.4. Public politics recommendations

The positive relation between economic growth and entrepreneurship through mimetic dynamics for values of the indicator of forced mutual help ϕ belonging to the interval $[0, \phi_1] \cup [\phi_2, +\infty]$ should tempt the public authorities to reinforce this positive relation by encourage measures that influence the value of ϕ. But public authorities should be careful because the threshold effect in the relation between the indicator of forced mutual help ϕ and the economic growth rate makes it possible to have the contrary effect. Indeed, for some value of ? to be determined, increasing ϕ lowers the economic growth so that the positive effect due to mimetic dynamics should be compensated by the negative effect due to forced mutual help. Let us determine the values of forced mutual help compatible with a reinforcement of the positive link between economic growth and entrepreneurship through mimetic dynamics.

Let's define $\bar{\phi}$ as the value of ϕ that mimimizes the function $h(\phi)$; we have (proof in appendix 2):

$$\bar{\phi} = \frac{1}{2A\theta} - \frac{K^f}{2S} \tag{15}$$

Knowing that $\phi_1 \leq \bar{\phi} \leq \phi_2$, we show that when $\phi \in [0, \phi_1]$,, that is, ϕ is too low, $h(\phi)$ is decreasing in $\phi \Rightarrow \Delta g(\phi)$ is increasing in ϕ : the more greater the indicator of forced mutual help, the more increases the positive effect of mimetic dynamics on economic growth. When $\phi \in [\bar{\phi}, \phi_2]$, that is, ϕ is high, $h(\phi)$ is increasing in $\phi \Rightarrow \Delta g(\phi)$ is decreasing in ϕ : the more greater the indicator of forced mutual help, the more decreases the positive effect of mimetic dynamics on economic growth. Proof in appendix 2.

We can now interpret these results in terms of economic politics. We summarize the public politics recommendations in the proposition below:

Proposition 3: Starting from a very low value of ϕ (too much community-based transfers), the governmental policies that consists in reducing those community-based transfers induce a reinforcement of the impact of mimetic dynamics in entrepreneurship on economic growth. On the contrary, starting from a high value of ϕ (low community-based transfers), the governmental policies that consists in reducing those community-based transfers worsen the impact of mimetic dynamics in entrepreneurship on economic growth. So the governmental policies that consist in reducing those community-based transfers are effective in reinforcing the positive

impact of entrepreneurship on economic growth only in the context of an economy where the investible surplus is strongly dissolved into the universe of social obligations.

4. Concluding remarks

In this paper, we have developed an endogenous growth model that highlights the effect of entrepreneurship on economic growth through social environment compatible to an African context. We have shown that economic growth is related not only to usual variables (entrepreneurial rate, productivity of capital, fraction of the economic surplus, rate of depreciation of the capital, fraction of the variation of the investment coming from the economic surplus) but also to social variables (forced mutual help and mimetic dynamics). More precisely, economic growth is positively related to entrepreneurship through mimetic dynamics depending on some values of an indicator of forced mutual help. Reducing the poids of the transfers linked to forced mutual help induce a reinforcement of the impact of mimetic dynamics in entrepreneurship on economic growth.

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Appendix

Appendix 1: proof of proposition 1

The expression of the economic growth rate is:

$$g = A\theta\left(\frac{1}{\alpha} - \mathbb{1}_{\Delta K^f}\delta\phi\right) - \frac{\delta}{1 + \mathbb{1}_{\Delta K^f}\phi\frac{S}{K^f}} \equiv g\left(A, \theta, \delta, \alpha, \phi, \frac{S}{K^f}\right)$$

We calculate the partial derivatives:

$$\frac{\partial g}{\partial A} = \theta\left(\frac{1}{\alpha} - \mathbb{1}_{\Delta K^f}\delta\phi\right)$$

$$\frac{\partial g}{\partial \theta} = A\left(\frac{1}{\alpha} - \mathbb{1}_{\Delta K^f}\delta\phi\right)$$

$$\frac{\partial g}{\partial \delta} = -A\theta\mathbb{1}_{\Delta K^f}\phi < 0$$

$$\frac{\partial g}{\partial \alpha} = -\frac{A\theta}{\alpha^2} < 0$$

$$\frac{\partial g}{\partial\left(\frac{S}{K^f}\right)} = \frac{\mathbb{1}_{\Delta K^f}\phi\delta}{\left(1 + \mathbb{1}_{\Delta K^f}\phi\frac{S}{K^f}\right)^2} > 0$$

The rate of growth of the economy is positively related to the productivity of capital (A), the fraction of the economic surplus (θ), the indicator of entrepreneurial rate $\left(\frac{S}{K^f}\right)$ and negatively to the rate of depreciation of the capital (δ), the fraction of the variation of the investment coming from the economic surplus (α).

Appendix 2: proof of proposition 2

$$g_2 - g_1 = A\theta\left(\frac{1}{\alpha} - \delta\phi\right) - \frac{\delta}{1 + \phi\frac{S}{K^f}} - A\theta\left(\frac{1}{\alpha}\right) + \delta$$

$$g_2 - g_1 = \delta\left(A\theta\phi - \frac{1}{1 + \phi\frac{S}{K^f}} - 1\right) = \delta\left(A\theta\phi - \frac{2 + \phi\frac{S}{K^f}}{1 + \phi\frac{S}{K^f}}\right)$$

As $\delta > 0$, $g_2 - g_1 > 0$ when :

$$A\theta\phi - \frac{2+\phi\frac{S}{K^f}}{1+\phi\frac{S}{K^f}} > 0 \Rightarrow \phi > \frac{1}{A\theta} \times \frac{2+\phi\frac{S}{K^f}}{1+\phi\frac{S}{K^f}}$$

$$\Rightarrow \phi\left(1+\phi\frac{S}{K^f}\right) > \frac{1}{A\theta}\left(2+\phi\frac{S}{K^f}\right)$$

$$\Rightarrow \phi + \phi^2\frac{S}{K^f} > \frac{1}{A\theta}\left(2+\phi\frac{S}{K^f}\right)$$

$$\Rightarrow \frac{S}{K^f}\phi^2 + \left(1-\frac{1}{A\theta}\frac{S}{K^f}\right)\phi - \frac{2}{A\theta} > 0 \qquad QED$$

Let ϕ_1 and ϕ_2 be the values of ϕ such that $g_2 - g_1 = 0$;

We have:

$$\phi_1 = \frac{\frac{S}{A\theta K^f} - 1 - \sqrt{\left(1-\frac{S}{A\theta K^f}\right)^2 + \frac{8S}{A\theta K^f}}}{2S/K^f}$$

$$\phi_2 = \frac{\frac{S}{A\theta K^f} - 1 + \sqrt{\left(1-\frac{S}{A\theta K^f}\right)^2 + \frac{8S}{A\theta K^f}}}{2S/K^f}$$

We show simply that $\phi_2 \geq 0$, $\phi_1 \gtrless 0$ and $\phi_2 \geq \phi_1$. Suppose that $\phi_1 \geq 0$, we have $g_2 - g_1 > 0$ when $\phi \in [0, \phi_1] \cup [\phi_2, +\infty[$..

As $\frac{S}{K^f}$ the coefficient of ϕ^2 is positive, the polynomial admits a minimum when:

$$\frac{d\left[\frac{S}{K^f}\phi^2 + \left(1-\frac{1}{A\theta}\frac{S}{K^f}\right)\phi - \frac{2}{A\theta}\right]}{d\phi} = 0$$

$$\Rightarrow \phi^* = \frac{1}{2A\theta} - \frac{K^f}{2S} \equiv \bar{\phi}$$

We have : $\phi_1 \leq \bar{\phi} \leq \phi_2$.

If $\phi \geq \bar{\phi}$, that is if $\phi \in [\bar{\phi}, \phi_2]$, the function $\frac{S}{K^f}\phi^2 + \left(1-\frac{1}{A\theta}\frac{S}{K^f}\right)\phi - \frac{2}{A\theta}$ is increasing $\Rightarrow g_2 - g_1$ is increasing in ϕ : the more greater the indicator of forced mutual help, the more increases the positive effect of mimetic dynamics on economic growth .

If $\phi \leq \bar{\phi}$, that is if $\phi \in [0, \phi_1]$, the function $\frac{S}{K^f}\phi^2 + \left(1 - \frac{1}{A\theta}\frac{S}{K^f}\right)\phi - \frac{2}{A\theta}$ is decreasing $\Rightarrow g_2 - g_1$ is decreasing in ϕ : : the more greater the indicator of forced mutual help, the more decreases the positive effect of mimetic dynamics on economic growth .