The Cultural Transmission of Entrepreneurship and Economic Development

Shankha Chakraborty
University of Oregon
shankhac@uoregon.edu

Etienne Yehoue
International Monetary Fund
EYehoue@imf.org

Abstract

This paper looks at the cultural process through which a nation builds up its entrepreneurial base. People either work for a wage or engage in relatively riskier but high return entrepreneurial activities. Paternalistic parents prefer their offsprings to choose occupations like them and accordingly shape their children's values. Wage-worker parents, for example, having themselves developed some aversion to risk try to endow their children with attributes that predispose them towards wage work. This cultural transmission determines comparative advantage in wage work and entrepreneurship. We examine the effect of family background on occupational choice and how society's appetite for risk-taking is shaped by culture and institution.

1 Introduction

Industrialization, which entails risk taking, is at the heart of economic prosperity. The incentives for economic development are consequently tied to the incentives for entrepreneurship. But innovating entrepreneurs do not emerge

randomly from a society and from all cultures. The economic history of the world is replete with instances of small communities and religious groups – the Huguenots in 17th and 18th century France, *Parsis* in western India, Hasidic Jews in New York's diamond trade, Chinese traders in south-east Asia and Indians in east Africa for example – spearheading industry and trade far out of proportion to their numbers (Hagen, 1975, Bisin and Verdier, 2000). Recent evidence from psychology corroborates this. Weber *et al* (2002) show that risk taking differences across culture and gender are strongly associated with differences in *perceptions* of its benefits. There is good reason to believe then that non-economic attributes of societies like cultural values can determine economic incentives and choices.

Although this aspect of society appears important, it has not received formal treatment in modern growth theory. This reflects, in part, an earlier debate in the profession between those who proposed culture based non-rationality as an explanation for agricultural backwardness in traditional societies and those who took the "poor but efficient" view of peasant agriculture, a debate that Schultz' *Transforming Traditional Agriculture* (1963) resolved convincingly in favor of the latter (Ruttan, 1988). But the reluctance to appeal to culture also reflects the widespread notion that economic development is only limited by the availability of opportunities and technologies: if incentives are strong enough, culture would change to accommodate economic interests.

Our work here is sympathetic to the latter point of view[1] and does not rely on assumptions of non-rationality. We view an entrepreneur as someone who has succeeded in developing certain skills or attitudes that enable him to identify arbitrage opportunities and bear the associated risks. This definition aligns with Schumpeter (1950) who saw identifying arbitrage opportunities as the key entrepreneurial skill and Knight (1921) for whom the willingness to bear risk was important.

With this view of entrepreneurship in mind, we explore whether culture should be taken seriously as a possible explanation of the differences across

[1] This assessment is based on ongoing analysis that is not yet presented in section 3.

countries of the entrepreneurship dynamics. Our definition of culture is the same as Hofstede's (1991, p.5): "the collective programming of the mind which distinguishes the members of one group or category of people from those of another." We also align with the definition that North (1990) cites from the work of Boyd and Richerson (1985), whereby culture is defined as "transmission from one generation to the next, via teaching and imitation, of knowledge, values, and other factors that influence behavior" The notion that culture matters for economic growth is not new. It goes back at least to the work of Weber (1930). In his seminal work, Weber argues that cultural changes, namely the Calvinist Reformation plays a critical role in the development of capitalism and its institution. Others (Lal, (1999) and references therein) have argued that the Western individualism is an important determinant of the rise of markets in the West.

Our view of culture is sympathetic to the one expressed in Stulz and Williamson (2003) citing North (1990, p. 36)'s views of culture as the source of informal constraints that guide our daily interactions. In other words, these informal constraints shape our beliefs or perceptions of events. North (1990, p. 36) points out that the importance of these informal constraints "can be observed from the evidence that the same formal rules and/or constitutions imposed on different societies produce different outcomes." Landes (2000, p. 2) highligthing the importance of culture expresses that "Max Weber is right. If we learn anything from the history of economic development, it is that cultures makes almost all of the difference."

In this paper, we explores whether entrepreneurship is a channel through which culture affects economic growth. Despite the long tradition that culture matters for economic development, the impact of culture on the expansion of entrepreneurial spirit has not been formally treated in modern growth theory. We connect culture with entrepreneurship by appealing to the empirically well established consequences of family background for individual occupational choice.

To model risk taking and its dependence on values and beliefs, we rely on Jovanovic and Nyarko's (1994, 1996) work on learning-by-doing and technology

adoption. Entrepreneurship involves uncertainty and there are different categories of such activities indexed by grades. A higher grade indicates a riskier activity, which requires a higher level of entrepreneurial ability but yields a higher return if successful. The perception of such riskiness is a function of family background, the assumption being children born in entrepreneurial families are better informed about as well as value more such enterprise.

The key departure from standard choice theoretic frameworks is the recognition that people are not born with a set of preferences. Instead a taste for risk-taking is acquired through upbringing and socialization in a manner similar to Bisin and Verdier (2000). Paternalistic parents prefer their offsprings to choose occupations similar to their parents. Accordingly values of working for a wage or an entrepreneurial spirit are transmitted by the parent through cultural education at home. In this parents behave rationally. Their incentives depend on the expected payoffs from the two occupations, subject to a parental disapproval should children turn out to be "different" from their parents. The cultural transmission at home is imperfect. When it fails the child adopts the trait of a randomly chosen member of the active population.

We show how culture through beliefs affects the long-run configuration of the economy. Even though entrepreneurs earn higher incomes in the long run, the two types coexist in steady-state. This stationary distribution depends on attitudes toward risk which determine comparative advantage and on cultural values that determine the desirability of one occupation over the other. Through the insight gained from the model, we analyze possible reasons why some former European colonies became nations of entrepreneurs (e.g. the United States), whereas others became nations with little entrepreneurial spirit (e.g. Africa).

Our paper can also account for the strong positive correlation observed in the data between occupational choice and family background without appealing to market imperfections. A commonly observed fact is that occupational choice and family background correlate across generations (Hout and Rosen, 2000, Constant and Zimmermann, 2003 for example). We account for this in how we model the transmission of comparative advantage. For example, wage-

worker parents — having developed some aversion for risk — may endow their children with human capital and preferences that predispose them toward low risk activities. A similar tendency is at play for entrepreneurship (empirical works have documented that children of a self-employed individuals are more likely to be self-employed themselves; Hout and Rosen, 2000, offer a survey).

2 The Model

2.1 Environment

Childhood and adulthood are the two periods of life in an overlapping generations economy. In any period t a set of agents of measure one are economically active in either of two professions: wage-work or entrepreneurship. Each agent gives birth to one offspring during this period and dies at the end of the period. As in Bisin and Verdier (2000), children are not born with pre-determined occupational preferences. These preferences and attitudes are instead developed through a cultural transmission at home and through socialization.

Parents are paternalistic in that they believe they know better which occupation would best suit their children. Their utility depends on their children's future well being, which they evaluate through their own eyes. In addition, parents experience a disutility at the prospect of their children choosing an occupation not similar to theirs. In imparting values suitable to his occupation, a parent weighs the potential utility of his offspring by using his payoff matrix as if it were the child's.

Not all such cultural education is successful since children also socialize and absorb ideas outside of home. Higher parental effort towards cultural education raises the likelihood of the offspring being similar to the parent. But due to socialization outside, such education may fail and the offspring picks up values of a randomly matched (cultural) parent who may be in an occupation different from the biological parent's.

To formalize these ideas, we begin by assuming entrepreneurs engage in

production through risky and imperfectly understood technologies while wage-work entails a steady risk-free income (for instance, in the government sector or in low-scale self-employment where risks are lower). People differ in their human capital. Potentially this human capital is two dimensional: belief about the riskiness of technologies and skill in wage work. For analytical convenience, we assume that everyone is equally skilled in wage work. Given this basic human capital, h_0, a wage-working agent can invest in education and training to improve his skill.

At the beginning of each period an active agent or a parent must decide whether to work for himself (i.e. become an entrepreneur) or work for someone else (i.e. wage work). We assume no unemployment or withdrawal from the labor force. Self-employment is preferred if the risk-neutral agent expects a higher net income from it.

First consider wage work which yields a payoff equal to $Bs^{\theta}h_0^{\beta} - \rho s$ where ρ is the average cost of acquiring additional skills through training s. Standard optimizing behavior implies all wage workers invest $s = [\theta B h_0^{\beta}/\rho]^{1/(1-\theta)}$. Hence net payoff for wage work is constant over time and equal to

$$z_t^w = \left[B(\theta B/\rho)^{\theta/(1-\theta)} - \rho(\theta B/\rho)^{1/(1-\theta)}\right] h_0^{\beta/(1-\theta)} \equiv \bar{z}. \tag{1}$$

Several grades, indexed by $n \in [0,\infty)$, of entrepreneurial activities are possible depending on the technology being used. In this section we restrict the choice of an entrepreneur to the technology of grade n. A decision ϕ_t yields an output of[2]

$$y_{nt} = A^n\left[1 - \left(q_{nt} - \phi_{nt}\right)^2\right], A > 1 \tag{2}$$

where

$$q_{nt} = \theta_n + \nu_{nt} \tag{3}$$

[2]One way to interpret ϕ is as effort devoted towards fine-tuning machinery that yield a stochastic output, based partly on how effectively it is employed.

is a random target that fluctuates around a grade-specific parameter θ_n and ν_{nt} is *i.i.d.* Normal with mean zero and variance σ_ν^2. A higher n refers to a riskier and higher return activity. But to be successful in such an activity one needs a higher entrepreneurial ability in order to make a better decision ϕ. The agent knows A as well as the distribution of ν_{nt}. What the agent does not know is the mean target output θ_n, about which he has some beliefs (priors). Denoting by $E_t(.)$ the conditional expectation and x_{nt} the conditional variance of θ_n at date t, the optimal decision is

$$\phi_{nt} = E_t(\theta_n) \tag{4}$$

and expected earning

$$z_{nt}^b \equiv E_t\left(y_{nt}\right) = A^n\left[1 - \sigma_\nu^2 - x_{nt}\right]. \tag{5}$$

Equation (5) indicates prior beliefs about θ_n are a form of entrepreneurial human capital: agents with more informed beliefs also expect to earn a higher return on their activities. In observing q_{nt} the agent learns more about the technology. An entrepreneur (pro-business) parent may be able to transfer this technology specific knowledge to his cultural offspring who, in turn, will be able to make a better decision ϕ_{nt+1}. We assume that entrepreneurs differ in their x's while wage-workers are all (equally) uninformed with a dispersed prior x_{n0}. Since entrepreneurial human capital is transmitted via cultural transmission and socialization, that knowledge specific to an entrepreneurial line does not disappear. The learning process is bounded for a given technology (see below): sticking with a grade n along an entrepreneurial line allows agents to eventually learn θ_n completely. Consequently, entrepreneurial expected earnings converge to $A^n(1-\sigma_\nu^2)$ in the limit.

2.2 Socialization and Cultural Transmission

Socialization has two effects. It imparts to the cultural offspring parental preferences regarding the desirability of certain occupations and transmits parental

comparative advantage in these occupations.

It works as follows. The cultural parent educates his naive child with some education effort $\tau \in (0,1)$. We follow Hauk and Saez-Marti (2002) in assuming that with probability equal to the social education effort, this education is successful and the child will be like the biological parent. More concretely it means the child of an entrepreneurial parent picks up the parent's posterior beliefs about technologies as his own priors and a child of a wage-working parent likewise acquires parental aversion to risk as measured by x_{n0}.[3] If social education fails, the child remains naive and gets randomly matched with somebody else whose preferences and human capital he adopts.

It will be convenient to refer to entrepreneurial parents as pro-business (b) and wage-working parents as pro-wage (w). Let p_t^{ij} denote the probability that a child of a type i parent will be of type j. We have:

$$p_t^{ww} = \tau_t^w + \left(1-\tau_t^w\right)\mu_t \tag{6}$$

$$p_t^{wb} = \left(1-\tau_t^w\right)(1-\mu_t) \tag{7}$$

where μ_t is the proportion of pro-wage agents at date t. Similarly for a pro-business parent we have

$$p_t^{bb} = \tau_t^b + \left(1-\tau_t^b\right)(1-\mu_t) \tag{8}$$

$$p_t^{bw} = \left(1-\tau_t^b\right)\mu_t \tag{9}$$

where τ^b is the pro-business parent's effort at social education. Note that while all pro-wage parents are identical in their earning potential, pro-business parents differ in their human capital. Consequently, the socialization effort chosen

[3] More generally it would include parental human capital in wage work h^i if we allowed it to differ across the population. Training investment would then amplify the effect of wage-work background on children's earnings.

by entrepreneurial parents will differ depending on their perception of the benefits of that occupational choice.

Denote the cost of socialization effort by $\psi(\tau)$ and assume $\psi' \geq 0$, $\psi'' > 0$, $\psi(0) = \psi'(0) = 0$ and $\psi \in [0,1]$. Let V^{ij} denote the utility a type i parent derives from his child being type j. Parental altruism is paternalistic in the sense that the parent uses his own payoff matrix to evaluate this utility. Hence given the parent's expected earnings z_t, each parent of type $i \in \{w,b\}$ chooses the social education effort τ to maximize

$$p_t^{ii} V^{ii}\left(z_t^i\right) + p_t^{ij} V^{ij}\left(z_t^i\right) - \psi(\tau_t). \tag{10}$$

The first order solution for this maximization problem is

$$\frac{\partial \psi(\tau_t)}{\partial \tau_t} = \frac{dp_t^{ii}}{d\tau_t} V^{ii}\left(z_t^i\right) + \frac{dp_t^{ij}}{d\tau_t} V^{ij}\left(z_t^i\right) \tag{11}$$

Substituting (6)−(9) in (11), leads to

$$\frac{\partial \psi\left(\tau_t^w\right)}{\partial \tau_t^w} = [V^{ww}\left(z_t^i\right) - V^{wb}\left(z_t^i\right)](1-\mu_t) \tag{12}$$

$$\frac{\partial \psi\left(\tau_t^b\right)}{\partial \tau_t^b} = [V^{bb}\left(z_t^i\right) - V^{bw}\left(z_t^i\right)]\mu_t \tag{13}$$

We can now derive the optimal level of social education efforts τ^w and τ^b. It follows from (12) and (13) that the optimal effort level is

$$\tau_t^i = \tau\left(\mu_t, V^{ii}\left(z_t^i\right) - V_t^{ij}\left(z_t^i\right)\right) \tag{14}$$

with $\partial\tau^w/\partial\mu < 0$ and $\partial\tau^b/\partial\mu > 0$. We infer that parents have less incentive to educate their children the more frequent is their preference in the population.

It remains to specify how parental utility depends on their children's occupations. As mentioned above paternalistic parents evaluate this utility based on their own payoffs (Bisin and Verdier, 2000). A pro-business parent's human capital specific to his occupation is his beliefs about the entrepreneurial risk summarized by x_{nt}^i while his human capital specific to wage-work is simply h_0.

Conversely, a pro-wage parent lacks human capital specific to entrepreneurial activities which results in more dispersed prior x_{n0}. Based on these, we specify parental utilities as[4]

$$\begin{aligned} V_t^{ww} &= \ln z_t^w = \ln \bar{z}, \\ V_t^{wb} &= \ln\left(z_t^b | x_{n0}\right) - \ln \delta_w = \ln\left(A^n\left[1-\sigma_v^2 - x_{n0}\right]\right) - \ln \delta_w, \\ V_t^{bb} &= \ln\left(z_t^b | x_{nt}\right) = \ln A^n\left[1-\sigma_v^2 - x_{nt}\right], \\ V_t^{bw} &= \ln z_t^w - \ln \delta_b = \ln \bar{z} - \ln \delta_b. \end{aligned} \tag{15}$$

Here δ_w and δ_b denote the moral dissatisfaction that a type i parent feels when his child ends up in type j occupation. It is useful to think of $(\mathbf{h}^i, \mathbf{x}_n^i, \delta_b, \delta_w)$ as the "cultural endowments" of this economy (Hayami and Ruttan, 1985). These endowments characterize those aspects of preferences and skills that have an impact on the cultural transmission of attitudes. Importantly, these cultural endowments have an economic significance since they shape individuals' perceptions of the risks and benefits of each type of activity (Weber *et al.*, 2002).

2.3 Dynamics of Preferences

Through a learning process, an entrepreneurial offspring learns about his parent's specific activity. This reduces the prior variance of θ_n for the offspring and raises his expected earning. Suppose that in a given period t, an active pro-entrepreneurial agent has worked on the entrepreneurial activity n. As assumed above her prior distribution over θ_n is Normal with variance x_{nt}. As the offspring observes q_{nt} he is able to form his own beliefs about the distribution of θ_n. The posterior variance of θ_n will become via Bayesian updating this offspring's own priors $x_{nt+1} = F(x_{nt}) = \sigma_v^2 x_{nt} / \left(\sigma_v^2 + x_{nt}\right)$. It is easy to see that the map $F(.)$ has a unique fixed point at $x^* = 0$. Hence the learning process along a given entrepreneurial line transmitted via cultural transmission generates a sequence of variances $\{x_{nt}\}_1^\infty$ which converges monotonically to zero.

[4]The curvature is to ensure the existence of a balanced growth path when we later allow technology upgrading.

The expected net earning from a prior belief x_n when grade n entrepreneurial activity is chosen is, as shown above, $z_n^b = A^n\left[1 - x_n - \sigma_v^2\right]$. We assume that expected earnings from the entrepreneurial activity is higher than the wage for a worker once learning is complete:

Assumption A1: $A^n\left[1-\sigma_v^2\right] > \bar{z}$.

Under assumption A1 there exists a unique variance $\hat{x}$ such that $z_n^b(\hat{x}) = \bar{z}$. We portray z_n^b and $\bar{z}$ in Figure 1: z_n^b is decreasing in beliefs x_n and crosses $\bar{z}$ at $\hat{x}$. If the initial belief about the variance of the technology parameter θ_n is less than $\hat{x}$, entrepreneurial activity dominates wage work. If the initial variance exceeds $\hat{x}$, wage work dominates. This leads to the following result:

Proposition 1 *Under A1, any agent with an initial variance lower than $\hat{x}$ will choose to become an entrepreneur and will choose a socialization effort τ^b. Any agent with an initial variance higher than $\hat{x}$ will choose to become a wage worker and will choose a socialization effort τ^w.*

Let now characterize the dynamic behavior of μ_t. To fix ideas, let $G_t(x_n)$ denote the cumulative distribution of priors over the n-th grade technology in the population where $x_n \in [0, \bar{x}]$ and $\bar{x} \equiv 1 - \sigma_v^2$. We have established above that the fraction of agents who are wage workers at t is $\mu_t = 1 - G_t(\hat{x})$.[5] The dynamics of social preferences can be captured simply through the evolution of μ. The proportion of pro-wage workers in the $t+1$-th generation comprises of three groups. First are the children of pro-wage parents from the t-th generation for whom the social education effort was successful,

$$\int_{\hat{x}}^{\bar{x}} \tau_t^w dG_t = \tau_t^w \mu_t$$

[5]We also assume implicitly that initial or "raw" priors are diffuse enough, that is, x_{n0} is quite close to $\bar{x}$ so that $G_t(x_{n0}) \approx 1$. This ensures that only a negligible set of agents endowed with preferences towards wage-work would rather be entrepreneurs (see Figure 1).

making use of the result that all pro-wage parents exert the same socialization effort. The second group consists of those offsprings for whom the socialization effort was unsuccessful but who were subsequently matched with a pro-wage cultural parent. The proportion of these agents are

$$\mu_t \int_{\hat{x}}^{\bar{x}} (1-\tau_t^w) dG_t = (1-\tau_t^w)\mu_t^2.$$

Future wage-workers are also drawn from the children of pro-business parents for whom the socialization effort was unsuccessful and who were subsequently matched with a pro-wage cultural parent:

$$\mu_t \int_0^{\hat{x}} (1-\tau_t^b) dG_t = (1-\bar{\tau}_t^b)\mu_t(1-\mu_t)$$

where

$$\bar{\tau}_t^b \equiv \int_0^{\hat{x}} \frac{\tau_t^b}{G_t(\hat{x})} dG_t$$

is the average educational effort among entrepreneurial families.

The evolution of μ is then governed by

$$\mu_{t+1} = \tau_t^w \mu_t + (1-\tau_t^w)\mu_t^2 + (1-\bar{\tau}_t^b)\mu_t(1-\mu_t)$$

or,

$$\mu_{t+1} - \mu_t = \left(\tau_t^w - \bar{\tau}_t^b\right)\mu_t\left(1-\mu_t\right) \tag{16}$$

where the educational efforts depend on occupation and belief specific payoffs and on μ as in equations (12) – (15) above.

We are primarily interested in stationary equilibria in this case. When learning is complete ($x_n = x^*$), all pro-business parents make the same socialization investment and occupational earnings are stationary, that is $V_t^{ww} - V_t^{wb} = V^{ww} - V^{wb}$ and $V_t^{bb} - V_t^{bw} = V^{bb} - V^{bw}$ for all t. Equation (16) has three steady states: $\mu = 0$; $\mu = 1$; $\mu = \mu^*$ where

$$\mu^* = \frac{V^{ww} - V^{wb}}{(V^{bb} - V^{bw}) + (V^{ww} - V^{wb})} \tag{17}$$

and both types of parents make the same socialization investment

$$\tau^w\left(\mu^*, V^{ww} - V^{wb}\right) = \tau^b\left(\mu^*, V^{bb} - V^{bw}\right).$$

Under the functional forms for these payoffs assumed above the steady state proportion of wage-workers becomes:

$$\mu^* = \frac{\ln\left[\delta_w \bar{z}/\{A^n(1-\sigma_v^2 - x_{n0})\}\right]}{\ln\left[\delta_w \delta_b (1-\sigma_v^2)/(1-\sigma_v^2 - x_{n0})\right]} \tag{18}$$

Proposition 1 below establishes the stability of this steady-state and Figure 2 offers an intuitive justification.

Proposition 2 *Under A1 and assuming* $\mu_0 \notin \{0,1\}$, μ_t *monotonically converges to* μ^*.

Assumption 1 ensures that entrepreneurs always earn a higher income once learning in the n-grade technology is complete. Output is consequently maximized when $\mu = 0$. That this does not occur has to do with two related assumptions. Parents prefer their children to be like them (occupationally) and impart those values through successful socialization. For entrepreneurial parents these take the form of knowledge and beliefs about the riskiness of modern technologies and for pro-wage parents these values take the form of dispersed beliefs about and reduced appetite for entrepreneurial risk. Secondly, socialization is not always successful. Even if almost all parents were entrepreneurial, not all their biological offsprings would be.

These capture biases and identity formation that are important features of the socialization experience children and young adults go through within and outside the household (as in Hagen, 1962 and Akerlof and Kranton, 2000). This is not to deny the importance of technology. The relative earnings in the two occupations is tied to $\bar{z}/A^n$: more productive technologies and lower compensation for riskless jobs encourage the evolution of an entrepreneurial spirit.

While technologies are important, equation (18) makes clear, a society's propensity to be entrepreneurial also depends on its inherent biases (δ_w versus

δ_b) and its initial cultural endowment x_{n0} (which in our case has a specific economic value). Initial (or "raw") priors regarding entrepreneurship shape people's perceptions of its inherent risks and may themselves be the product of uncertainties in pre-industrial societies; these attitudes may continue to determine risk perceptions even when an economy switches to modern technologies where the inherent risks may be actually smaller than traditional agriculture and trading. As for occupational biases, institutional factors can play an important role in associating certain professions as more desirable than others. Below we turn to one such institutional variable, a country's colonial heritage.

2.4 The Cultural Impact of Colonization

Our analysis provides some perspective on the very different development paths took by some former European colonies: Africa, Australia, New Zealand, and North America. A growing literature on the political economy of development tries to explain the reversal of fortune among nations (Acemoglu 2008 provides an overview). In 1500 for example, North America, New Zealand and Australia were quite poor while today they are among the richest regions in the world. At the same time most of African countries are still struggling with poverty.

The African countries and the nations mentioned above have one thing in common: they all went through some form of colonialism. In addition they were all poor in 1500 although many of the African countries were relatively abundant in natural resources. The puzzle is that United States, Canada, New Zealand, and Australia have managed to become dynamic entrepreneurial societies, while the African countries are stocked with a culture of *fonctionariat* characterized by a preference for becoming a government servant.

A close look at the colonial history reveals some heterogeneities among the colonists or at least in the forms of colonization. In Africa for example, malaria and other tropical diseases killed a substantial number of colonists that led to extractive institutions geared towards resource extraction (Acemoglu *et al.*, 2001). The colonists there set up administrations that induced the "natives" to work for them often portraying such work as a sign of social success. The

schools that emerged from such an administration, the first modern educational institutions the local population came to know, placed little emphasis on an entrepreneurial spirit and striking out on one's own. By associating civil service and job stability for the educated (more broadly working for a riskless wage) with prestige and self-worth, public education system imparted a value system that was antithetical to risk-taking. These cultural norms, transmitted across generations through socialization, would have been capable of changing only gradually.

In contrast, the colonists in North America were not threatened by diseases. More importantly European diseases like smallpox that they brought, wiped out indigenous populations reducing the labor force and making land available. This, combined with the expectations that these lands would yield "all the commodities of Europe, Africa, and Asia" *(*Ferguson 2003) made settlement more desirable. Ferguson writes: *For the settlers...the devastating impact of smallpox furnished proof that God was on the colonists' side, conveniently killing off the previous tenants of this new world (America)...In the words of John Archdale, Governor of Carolina in the 1690s, 'the Hand of God [has been] eminently seen in thinning the Indians, to make room for the English'.*(page 71)

In addition, Europeans who conquered North America, New Zealand, and Australia came from different backgrounds than those who colonized Africa. The first Europeans who went to the first set of countries were mostly people trying to avoid the persecution of the British King and the extortion of war in Europe. They went to the colonies even though living conditions were initially difficult and required a hard struggle. To do so they had to initiate and undertake projects on their own and innovate for a better life. Self made successes who returned home were often admired for their perceived ingenuity and ability to make it on their own – this would have reinforced entrepreneurial attitudes that were already changing due to large-scale industrialization.

3 Switching Technologies

(Analysis under way)

The n-technology model from section 2 offers certain insights about the emergence of an entrepreneurial spirit but it does not entertain growth in the long-run or the possibility of "advantages to backwardness" (Gerschenkron, 1962). Here instead of fixing the entrepreneurial activity index n, we will allow it to vary according to Jovanovic and Nyarko (1994). We assume that there is no direct cost of switching to a different business activity, and as before, no cost to adjusting x. The link between different business activities is informational, and the relation between θ_n and θ_{n+k} for any n and $k \geq 0$ is

$$\begin{aligned} \theta_{n+k} &= \gamma^{k/2}\theta_n + \eta_k \text{ where} \\ \eta_k &\sim N\left(0, \rho_k \sigma_\epsilon^2\right) \text{ and } \rho_k = \begin{cases} \left(1-\gamma^k\right)/\left(1-\gamma\right) \text{ when } \gamma \neq 1 \\ k \text{ when } \gamma = 1 \end{cases} \end{aligned} \tag{19}$$

and where θ_n and η_k are independent. Notice that if $\gamma = 1$ and $\sigma_\epsilon^2 = 0$, then $\theta_{n+k} = \theta_n$ for all k so that any precision about θ_n can be transferred to θ_{n+k}. We assume that entrepreneurs cannot skip intermediate vintages of the technology when switching, that is, upgrading to $n+2$ is possible only via $n+1$ and not directly from n to $n+2$. The model should be able to generate, depending on technological characteristics, leapfrogging in economic status and cultural values across generations as well as technological stagnation that is rooted in "cultural beliefs" regarding the desirability of certain occupations. Preliminary work also indicates exogenous large productivity gains (for instance an increase in A) can generate a rapid change in cultural norms out of which entrepreneurship emerges as the dominant spirit.

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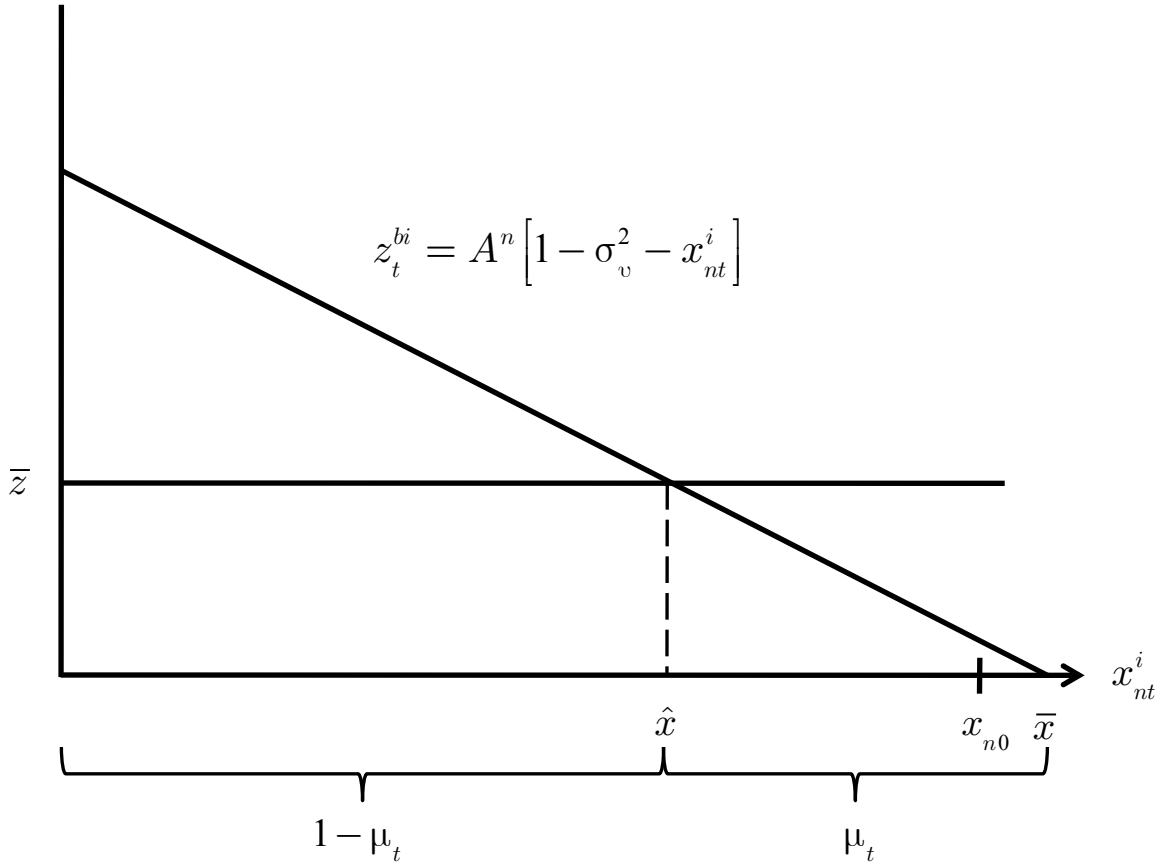

Figure 1: Occupational Choice

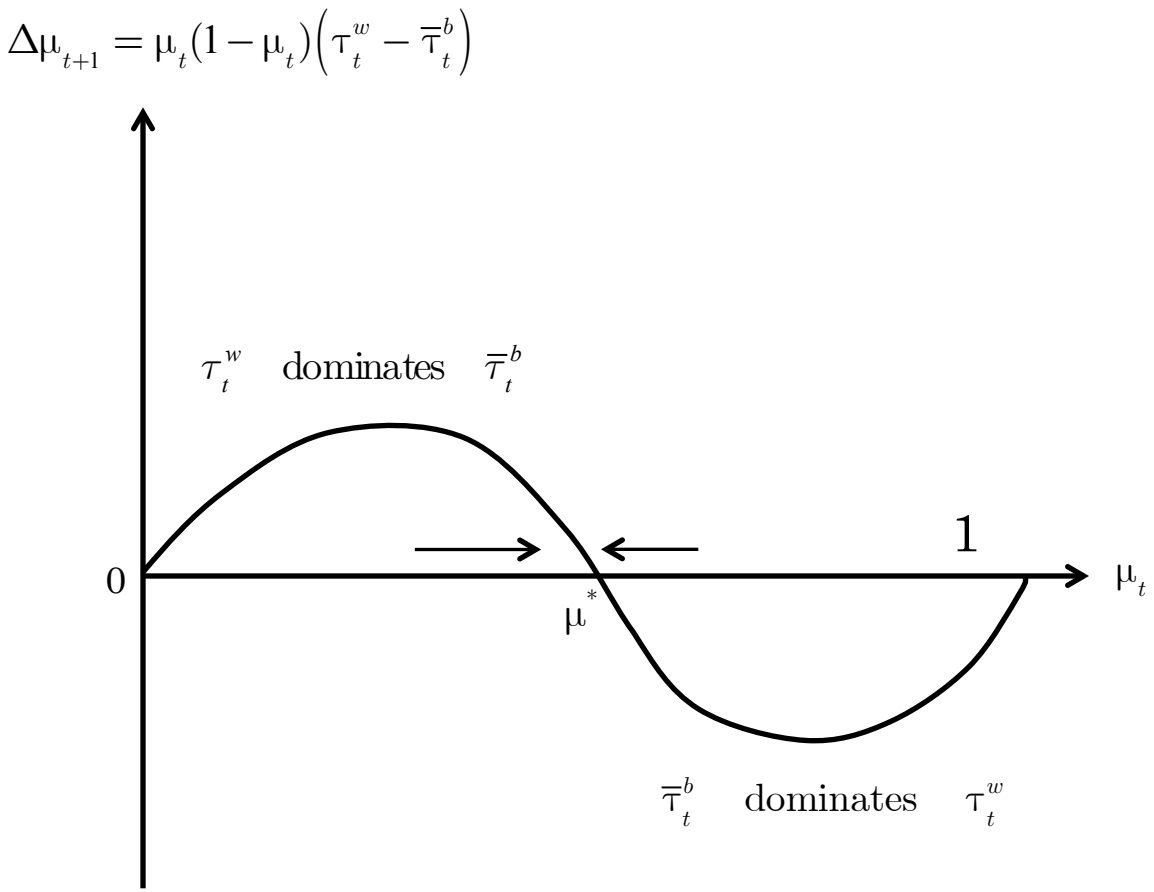

Figure 2: Dynamics of Preferences