



# A Theory of Colonial Governance<sup>1</sup>

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# A Theory of Colonial Governance\*

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## Abstract

This paper considers conditions of optimality in a co-optive strategy of colonial rule. It proposes a simple model of elite formation emanating from a coloniser's quest to maximise extracted rents from its colonies. The results suggest multiple optimal solutions, depending on the specification of the production function, the governance technology chosen by the coloniser and the technological parameters of the model. For instance, in agrarian colonial societies, the results suggest that under a technology of governance by numbers, a large elite population is a direct reflection of a high productivity-enhancing technology by the coloniser. In contrast, under a governance technology by quality, the better the productivity-enhancing technology, the lower the quality of human capital that is transferred to the elite. Additionally, under a composite governance technology, and given non-linearity conditions defined by the productivity distance ( $\frac{A_e}{A}$ ) threshold, the better the productivity-enhancing technology, the smaller the optimal elite size that is chosen by the coloniser. An alternative set of results is obtained assuming an industrial economic set-up (or interdependent production). These results suggest that the long debate about the apparent superiority of one European colonisation experience over the other is much more intricate than is often perceived in the literature. The insight from the model is also useful in understanding why the stock of human capital available in countries emerging from colonisation varied considerably across colonial experiences and from one country to another.

Keywords: Optimality Conditions, Governance technology, human capital, elite, productivity. JEL Codes: F54, I20, O15, N47.

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# 1 Introduction

This paper examines optimality conditions in a co-optive strategy of colonial rule in agrarian and industrial African economies. It assumes rationality on the part of all agents, namely - the colonisers, the indigenous elites and the general population. It assumes further that human capital transfers from the colonisers to the elites of the colonies occupy *centre-stage* in a co-optive governance strategy. The purpose of human capital transfers is to enhance the productivity of the elites, which in turn, increases the rents that accrue to the colonisers. However, human capital transfers to the elite also raises their aspirations to a greater wellbeing, which effectively reduces the rent flow to the colonisers.

This suggests that in the transfer of human capital to the elite, the colonisers face a choice tension between enhancing productivity gains for the economy on the one hand, and minimising power losses as a result of the rising aspirations of the elite on the other hand. How this choice tension is handled depends on a number of parameters, namely - the choice of governance technology, the productivity distance between elites and masses, the returns to human capital and the specification of the production function. The coloniser's choice of governance technology is assumed to be a function of its pattern of human capital transfers, which in turn depends on its colonial educational ideology. To differentiate the governance technology options of the colonisers, we focus on the contrasting approaches to human capital transfers in the British and French sub-Saharan African empires in general, although specific reference is made to West Africa. But first a brief historical introduction is necessary to set the stage for the subsequent sections of the chapter.

## 1.1 Historical Background

The debate preceding the scramble for Africa suggests that colonies offered an expected return to the colonisers.<sup>1</sup> Once territories were acquired, it became imperative for the colonisers to choose the governance strategy that maximised their expected return. Historical evidence points to two major strategies of colonial governance, namely - absolute

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<sup>1</sup>Whilst on most occasions these payoffs could be expressed in economic terms, in other instances - they were cultural or geo-strategic.

subjugation<sup>2</sup> and co-optation in governance.<sup>3</sup>

It is believed that towards the late nineteenth century, orthodox colonial ideology in Africa had shifted from absolute subjugation to the co-optation of elites.<sup>4</sup> Co-optation in governance - is presumably an idea first explored by Sir Arthur Gordon in Fiji (1874-80),<sup>5</sup> but it was not until Frederick Lugard governed in Nigeria during the first two decades of the twentieth century that it became orthodox colonial ideology, Bolton (1973:69). In its original conception, the British co-optation strategy aimed to provide western education only to the sons of chiefs, who would later inherit traditional authority as educated chiefs capable of intermediating between the British government and the indigenous population, Foster (1965), and McWilliam & Kwamena-Poh (1978).

The idea was that the newly educated chiefs were more likely to favourably appreciate British civilisation and defend the interests of the Crown in the colony. As such, Article 9 of the treaty of 1817 signed by the Kings of Ashanti and Juaben required that:

*‘The kings agree to commit their children to the care of the Governor-in-Chief for education at Cape Coast Castle, in full confidence of the good intentions of the British Government and of the benefits to be derived therefrom’.*

Just as the British established the Castle School for sons of chiefs at Cape Coast, the French also created the "Ecole des Hôtages" in 1854 in Senegal for the sons of chiefs.<sup>6</sup> This

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<sup>2</sup>Absolute subjugation or military dictatorship generally entails the use of repression to appropriate the resources of the colonies, and is assumed to involve minimal redistribution to the population of the colonies. For instance, it is popularly claimed that the pioneer colonial governance strategy was by direct military rule.

<sup>3</sup>Co-optation in governance or better still, *indirect rule*, meant the retention of traditional authorities as agents of local government entrusted with power by the colonial administration and is based on the philosophy that it was possible to utilise traditional political institutions in development. The envisaged administrative role of co-opted agents was to ensure law and order, collect taxes and supply labour.

<sup>4</sup>It can be argued that this shift was a rational decision on the part of the colonisers, owing to the increasing costs associated with military dictatorship. These costs were rising rapidly as the presence of a military provoked resistance from the indigenous population, which necessitated the deployment of further resources to quell the rebellion. Furthermore, the lessons of the Indian revolt in 1857 made the option of military dictatorship even less appealing to the metropolitan powers. It is to be recalled that the 1857 Indian revolt was provoked by the British attempt at taking over native Indian states whose rulers had left no heirs. This provoked sections of both the Hindu and Muslim communities into rebellion. Martin (2005), Piers Brendon (2005) and Maddison (1971:42) have argued that the Indian revolt in 1857, though unsuccessful, signalled to the British colonial power that the option of military intervention is not always optimal and the lessons of the revolt raised awareness that sparked off early nationalist activism in most parts of the British empire.

<sup>5</sup>Prior to this date, sources reveal that attempts were already made at training the to-be co-opted elites but the actual utilisation of these elites in governance was supposedly first experimented by Sir Arthur Gordon.

<sup>6</sup>See Foster (1965)

suggests that both the British and French colonial administrations pursued an "aristocratic" policy of recruitment into special institutions that trained elites for use in colonial administration. In addition, both British and French colonial masters maintained a relatively small administrative bureaucracy. This similarity naturally blurs the distinction usually made between "indirect rule" as administered by the British and "direct rule" as administered by the French colonial powers in their respective colonies.<sup>7</sup>

Furthermore, historical sources,<sup>8</sup> claim that during the 1920's and 1930's, there was a trend towards convergence in both theory and practice in the British and French west African colonial empires, and colonial administrators in both empires worked under similar material limitations. For instance, until very late in the colonial period, the colonies of both empires were expected to be financially self-sufficient, and the administrators had to manage their districts with meagre resources in money and technical personnel.

In spite of the observed similarities in the practice of co-optation, there were nevertheless some marked differences between the British and French approaches. It has been argued that the British system of co-optation differed from that of the French mainly in the area of educational transfers. The British had initially relegated educational provision to missionary bodies, who trained without regard for placement, whereas, the French administered education through state-owned schools and thus had a more strict management of educational turn-over than the British. Wallerstein (1959:59) notes that:<sup>9</sup>

*"British educational policy was haphazard and neglected placement, in part because it was largely in the hands of the missions, whereas the French educational policy, conducted largely in state-owned schools, was more systematic. The French trained only those for whom they were willing to find a position in the colonial structure. But the British trained without regard for this, and they did not expand the positions available for African placement to meet the expanded supply".*

Because the British tolerated rival educational institutions, and emphasised village schools and the use of local vernacular languages as medium of instruction in their colonies,

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<sup>7</sup>Foster (1965:140-141) argues that, the British were never really consistent in their choice of "indirect rule". For instance, at the inception of "indirect rule", the British emphasised the role of traditional African chieftaincy institutions in the administration of their colonies at the expense of the educated African elites. But when discontent started mounting from the latter, the British reluctantly resorted to using the elites in administration, as the French originally did, and most of the elites utilised in the British colonies were not sons of Chiefs as was in the original plan.

<sup>8</sup>See for instance, Gann & Duignan (1970) and Gifford & Louis (1971).

<sup>9</sup>Hailey (1957:1197) shares a similar view.

educational turn-over in British colonies tended to be comparatively higher than in French colonies where primary pupils needed to be boarded to far-away schools where they were taught by French teachers, using French textbooks and French language as medium of instruction.

Furthermore, it appears that the British were less stringent than the French in setting and pursuing their educational priorities. For instance, Foster (1965:60) and McWilliam & Kwamena-Poh (1978:23-24) document the first abortive British attempt at co-opting two Asante Princes (Ansa, the son of the former Asantehene and Inkwantabissa, son of the incumbent), who were sent to England for education in 1831 in order to become British agents on the Gold Coast. On return to the Gold Coast in 1841, neither of them agreed to stay in the court of the Asante chieftom, choosing rather to settle permanently in Cape Coast on British government pensions. Hailey (1957:1197) argues that the French, by contrast, were more purposeful than the British in both the provision of advanced education and in utilisation of their trained manpower.

One of the most acclaimed merits of co-optation in governance, is that it was inexpensive and less distortionary on pre-existing traditional political institutions. However, co-optation had a major *unanticipated* consequence on empires, by raising the aspirations to power of the indigenous elites, which partly contributed to the demise of colonisation. A possible reason for this is that, as Fedderke & Kularatne (2008) have argued, educational transfers from the elite (here denoted by the colonisers) to the poor in society (here denoted by the indigenous elite) raises the political aspirations of the latter, which in turn, erodes the power of the former. This suggests that, in the transfer of human capital to the indigenous elites of their colonies, the colonisers faced a trade-off between enhancing the productivity of these elites and minimising power losses to them.

## 1.2 Research Question

On the assumption that co-optive governance entails the transfer of human capital from the colonisers to the indigenous elites, and given the inherent trade-off between productivity gains for the colony and power losses by the colonisers, a fundamental question that needs to be addressed is what *degree* of human capital should be transferred to the indigenous elite. In other words, what format of elite, in terms of size<sup>10</sup> and quality,<sup>11</sup>

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<sup>10</sup>Referring to small or large elite dimension.

<sup>11</sup>Referring to the number of years of education to be given to a representative member of the elite population.

should be chosen by the colonisers?

This paper seeks to answer the above question by presenting a simple model of elite formation emanating from the colonisers quest to maximise extracted rents from its colonies.

The paper is organised as follows. Section 2 presents the theoretical framework, the core predictions of the model and a discussion of the results. Section 3 presents some empirical data in justification of the relevance of the model, while section 4 concludes.

## 2 Theoretical Framework

We now outline a simple model to formalise the ideas discussed in the preceding section, the hope being to determine the likely optimal combinations of elite size and quality that satisfy the coloniser's objective of simultaneously enhancing productivity gains and minimising power losses. But first a note of caution is in order. The model we describe below is a stylisation and is not intended as an accurate representation of historical events.

### 2.1 The Environment

The basic premise is that, acting as rational agents in pursuance of their own self-interest, the colonisers need necessarily to transfer human capital in the form of education to a select portion of the indigenous population of their colonies. The education received by this select group of individuals (whom we henceforth call the elite) distinguishes them from the rest of the population (henceforth referred to as the masses). The purpose of educational transfers to the elite is to raise their productivity and output, which in turn increases the size of the pie from which the coloniser appropriates.

In other words, under an elite co-optation governance strategy, the coloniser selectively redistributes some of its own human capital resources to the indigenous population with the sole intention of raising the latter's productivity for optimal extraction. Although Acemoglu & Robinson (2001b) assume human capital cannot be transferred, it is a legitimate assumption in this paper based on school enrolment levels. However, because educational transfers to the elite raises their aspirations to greater wellbeing, which in turn erodes the power of the colonisers,<sup>12</sup> there is a threshold level of educational transfers that any coloniser would not allow.

The coloniser's aim is to appropriate the maximum possible proportion of output produced in the colony and this is a function of its power. We express this power of

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<sup>12</sup>The coloniser's power is defined in terms of its ability to appropriate the resources of the colony.

the coloniser to appropriate the colony's resources in terms of three different types of governance technologies depending on the specific characteristic of the elite (size, quality or both) that the coloniser emphasises. We refer to these as a technology of governance by numbers, a technology of governance by quality and a composite governance technology respectively.

In a technology of governance by numbers, it is assumed that the coloniser's emphasis is on getting the "right" size of the elite population that will maximise output. Given an elite that is productive, having many of them, as opposed to few, is plausibly a rational option for the colonisers. However, in spite of its potential productivity advantage, it makes sense for the coloniser to control the elite size because the bigger the latter, the more costly (in terms of power loss) it is to the coloniser. Accordingly, the concept of power is hereby defined solely in terms of relative population proportions, that is, the ratio of the population constituting the local elite in the total population.

In a technology of governance by quality, we assume that the emphasis of the coloniser is on transferring the requisite stock of human capital that the elites need in order to produce optimally. This is because the better the quality of human capital endowment of the elites, the more productive they are. However, there is a threshold stock of human capital transfers that the colonisers would not allow, because the greater the elite's endowment of human capital, the smaller will be the power of the colonisers.<sup>13</sup> Thus, in this case the concept of power is characterised in terms of the total stock of human capital which the group constituting the local elite holds relative to that held by the total population.

In a composite governance technology, the emphasis of the coloniser is on both the size of the elite and on the stock of human capital that it holds. Given an elite that is productive, having many of them who are endowed with high quality human capital enhances society's productivity. However, increasing the size or quality dimension of the elite or both dimensions, also potentially decreases the power of the colonisers. Hence the need to specify the optimal level of the size and quality of these transfers.

Finally, the model rests on the following set of assumptions: that all agents are rational, members of each population group (colonisers, indigenous elites and general population) are homogenous, military dictatorship and co-optation strategies are mutually exclusive, and the colonisers and elites monopolise power while the population masses

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<sup>13</sup>A more educated elite potentially has greater aspirations to wellbeing which in turn threatens the power of the coloniser.



hold no power.<sup>14</sup> The model also abstracts from remuneration of factors of production<sup>15</sup> and from the cost of human capital transfers to the elite.<sup>16</sup>

## 2.2 The Model

Consider a society that has been colonised by a foreign power. Suppose that initially the society is comprised of one group of individuals - the indigenous population masses (D). Members of this group are assumed to be homogenous. Assuming that there is no population growth, the total population in the society,  $L$ , is exactly equal to the indigenous population,  $L^d$ , that is:

$$L = L^d$$

After the coloniser arrives, he creates a new group of individuals we term the elite (E), whose members are previous members of the indigenous population mass  $L^d$ , implying that the total population in the society is now given by:

$$L = L^d = L^e + L^p$$

and

$$L^p = (L^d - L^e) = (L - L^e)$$

where by definition:

$$0 < L^e < L^p < L$$

where  $L^e$  and  $L^p$  denote the population of the elite group and the new size of the population mass group respectively. At any point in time, the size of the elite population,  $L^e$  is determined by the coloniser, whereas the total population is exogenously given.

Prior to the arrival of the coloniser, all members of the indigenous population mass group,  $L^d$ , are endowed with a baseline human capital of  $\bar{h}$ . This baseline human capital can be thought of in terms of a fixed stock of basic knowledge acquired through traditional learning methods by each member of the indigenous population.

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<sup>14</sup>This is for purposes of simplification, although from an analytical standpoint, it still makes sense to neglect the power of the population masses, because, according to our assumptions, the masses hold a negligible amount of human capital, implying that their associated aspirations are equally negligible.

<sup>15</sup>For instance, wages to the elite and subsistence wages paid to the agrarian population.

<sup>16</sup>It might be the case that the colonisers transfer some of their own human capital to the elite of the colonies, hence internalising these costs onto themselves.

The primary objective of the coloniser is to maximise extraction of the colony's resources for the furtherance of its own empire.<sup>17</sup> In so doing, it selectively redistributes some of its human capital resources to the indigenous population in order to raise the latter's productivity.

Thus in this model, the coloniser transfers human capital ( $\delta$ ) only to the elites who wind up with a higher endowment of human capital resources  $(1 + \delta)\bar{h}$  relative to the general population masses, who own  $\bar{h}$ . It is worth emphasising that the distinction between the elite and the general population is made solely in terms of their relative endowments of human capital, which stems from the fact that the coloniser redistributes human capital,  $\delta$ , to the elite group only. This is exemplified, for instance, by the fact that the elite are offered the opportunity of formal schooling which is not available to the general population. However, human capital transfers made to the elite can be either of low quality (*low*  $\delta$ ), implying fewer years of formal schooling, or of high quality (*high*  $\delta$ ), implying comparatively higher number of years of formal schooling.

Co-optation of the elite has only one major cost to the coloniser, which is that it reduces the flow of rents to the coloniser, as the elites effectively appropriate some of it. These rent losses translate into diminishing power of the coloniser.

In pursuing its extraction strategy, the coloniser factors in two main concerns: - on the one hand, the returns from production in the colony, which are a function of human capital transfers to the elite. And on the other hand, the coloniser's ability to appropriate output that is produced in the colony, which is a function of its power.

We examine both concerns in turn, starting first with the returns from productive activity in the colony. For simplicity, we start with an additively separable (or independent) production function which depicts a typical agrarian colonial economic set-up wherein the elite and population mass groups do entirely different things. Later, we consider a more advanced or industrial colonial economic set-up whereby the elite and mass sectors depend on each other in production (or better still, interdependent production).

### 2.2.1 Independent Production

Following Hirschleifer (1995) and Fedderke & Kularatne (2008), we assume an agrarian society wherein members of each segment (elite or general population) pursue separable

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<sup>17</sup>Many historical sources have argued that an important motive for empire is the extraction of raw materials for use in production in the imperial economy. See for instance, Rhoda (1973:19), Bolton (1973:24) and Douglas (1978:265).

production. Assuming a simple production function with human capital as the only factor of production, output obtained from productive activity in such an economy is given as:

$$Y = A_e L^e [(1 + \delta) \bar{h}]^\theta + A (L - L^e) \bar{h}^\theta \quad (1)$$

where  $A_e$  and  $A$  represents the technology that is available to the elite and mass sectors of the population respectively, and definitionally,  $A_e > A$ . It makes sense to distinguish the production technology of the elite from that of the masses, because the human capital received by the elites opens them access to new and superior technology of doing things.  $Y$  denotes output.<sup>18</sup> Finally,  $\theta$  represents returns to human capital; such that:

$$\theta = \left\{ \begin{array}{l} > 1 \text{ represents increasing returns} \\ = 1 \text{ represents constant returns} \\ < 1 \text{ represents decreasing returns} \end{array} \right\}$$

One deduces from equation 1 above that a high return from production in the colony is obtained by giving a high number of years of formal schooling (*high*  $\delta$ ), to as many elite ( $L^e$ ), as possible while fewer years of formal schooling produces low return.<sup>19</sup>

The second preoccupation of the coloniser concerns its power or ability to appropriate output produced in the colony.

### 2.2.2 Operationalisation of the Concept of Power

Recalling the initial assumption that only the coloniser and elites hold power while the general population is passive, we characterise the power of the coloniser in terms of its ability to appropriate a proportion of the output produced in the colony. Correspondingly, the power of the elite is a function of its ability to appropriate effectively some of the rents that normally would have accrued to the coloniser.<sup>20</sup>

We express these concepts of power in terms of three different types of governance technologies, namely - technology by numbers, technology by quality and lastly as a composite technology which is a combination of numbers and quality.

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<sup>18</sup>Observe that output under elite co-optation is higher than that obtained in the absence of human capital transfers, as long as the productivity of the elite is higher than that of the masses.

<sup>19</sup>See that as long as  $A_e > A$ ,  $\frac{\partial Y}{\partial L^e} > 0$  and  $\frac{\partial Y}{\partial \delta} > 0$ .

<sup>20</sup>It therefore goes without saying that the power of the coloniser and that of the elites are mutually exclusive. We assume for simplicity that the two sum up to unity.

**Technology of Governance by Numbers** Here the concept of power is defined solely in terms of relative population proportions, that is, the ratio of the population constituting the local elite in the total population. Thus the power of the elites,  $r^e$  is given as:

$$r^e = \frac{L^e}{L^p + L^e} = \frac{L^e}{L - L^e + L^e} = \frac{L^e}{L} < 1$$

Correspondingly, the power of the coloniser as a function of the technology by numbers,  $r^c(L^e)$  is given as:

$$r^c(L^e) = 1 - r^e = \frac{L - L^e}{L} < 1 \quad (2)$$

It is easy to see from equation 2 above that the coloniser's power is a decreasing function of the elite dimension,  $L^e$  whilst, correspondingly, the elites' power is an increasing function of their numbers.

Given the output from productive activity in the colony as:

$$Y = \left[ A_e L^e \left[ (1 + \delta) \bar{h} \right]^\theta + A (L - L^e) \bar{h}^\theta \right]$$

The coloniser uses its power,  $r^c(L^e) = \frac{L - L^e}{L}$ , to appropriate the maximum possible proportion of output. Formally, the extraction function of the coloniser is given as:

$$U(L^e) = \bar{h}^\theta \left( \frac{L - L^e}{L} \right) \left[ A_e L^e (1 + \delta)^\theta + A (L - L^e) \right] \quad (3)$$

where  $A_e > A$ .

The coloniser takes  $A_e$ ,  $A$ ,  $L$ ,  $\delta$ ,  $\theta$  and  $\bar{h}$  as given<sup>21</sup> and selects  $L^e$  to maximise equation 3 above with the relevant first order condition being:

$$\frac{\bar{h}^\theta \left[ 2A(L^e - L) - A_e(1 + \delta)^\theta(2L^e - L) \right]}{L} = 0 \quad (4)$$

Solving for  $\frac{L^e^*}{L}$  in equation 4 above gives the following relationship:

$$\frac{L^e^*}{L} = \frac{1}{2} \left[ \frac{2A - A_e(1 + \delta)^\theta}{A - A_e(1 + \delta)^\theta} \right] < 1 \quad \text{whenever } A_e > 2A \quad (5)$$

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<sup>21</sup>  $\delta$  is not a choice dimension here because it could be the case that the coloniser has a fixed education technology. Say, for instance, it always trains the elite of its colonies in village schools or at the *Grandes Ecoles*.

Equation 5 suggests that the only logic for having an elite under a governance technology by numbers is that the elites are at least twice more productive than the masses.<sup>22</sup> Normalising  $A = 1$  in equation 5 above for simplicity gives:

$$\frac{L^{e*}}{L} = \frac{1 - \frac{A_e}{2} (1 + \delta)^\theta}{1 - A_e (1 + \delta)^\theta}, \quad A_e > 2 \quad (6)$$

$$\frac{\partial \left( \frac{L^{e*}}{L} \right)}{\partial A_e} = \frac{(1 + \delta)^\theta}{2 \left[ A_e (1 + \delta)^\theta - 1 \right]^2} > 0 \quad \text{and} \quad \frac{\partial^2 \left( \frac{L^{e*}}{L} \right)}{\partial A_e^2} < 0 \quad (7)$$

$$\frac{\partial \left( \frac{L^{e*}}{L} \right)}{\partial \delta} = \frac{A_e \theta (1 + \delta)^{\theta-1}}{2 \left[ A_e (1 + \delta)^\theta - 1 \right]^2} > 0 \quad \text{and} \quad \frac{\partial^2 \left( \frac{L^{e*}}{L} \right)}{\partial \delta^2} < 0 \quad (8)$$

$$\frac{\partial \left( \frac{L^{e*}}{L} \right)}{\partial \theta} = \frac{A_e (1 + \delta)^\theta \log(1 + \delta)}{2 \left[ A_e (1 + \delta)^\theta - 1 \right]^2} > 0 \quad \text{and} \quad \frac{\partial^2 \left( \frac{L^{e*}}{L} \right)}{\partial \theta^2} < 0 \quad (9)$$

Equation 7 suggests that there is concavity in the relationship between the optimal elite size  $\left( \frac{L^e}{L} \right)$  and productivity distance between the elite and the masses  $\left( \frac{A_e}{A} \right)$ . Thus, equation 7 suggests that the optimal elite size  $\left( \frac{L^e}{L} \right)$  tends to zero whenever the productivity distance  $\left( \frac{A_e}{A} \right)$  is small, and tends to one, whenever  $\left( \frac{A_e}{A} \right)$  is large.

The same symmetrical interpretation holds for equations 8 and 9 above. *In other words, equations 7, 8 and 9 above suggest that under a governance technology by numbers in agrarian colonial economies, large elite formation is a direct reflection of a sufficiently high productivity-enhancing technology by the coloniser. Symmetrically, a small elite size suggests an inefficient technology of co-optation/governance by the coloniser. The implication of this is that, under a technology of governance by numbers, productivity gains always dominate power loss.*

The intuition behind these results is that, under a technology of governance by numbers in agrarian colonial economies, the coloniser with a more effective technology (represented by high  $\frac{A_e}{A}$ ,  $\theta$ , and  $\delta$ ) is able to co-opt more elites than the one with a less effective technology (represented by low  $\frac{A_e}{A}$ ,  $\theta$ , and  $\delta$ ). In agrarian African societies, where the British, in comparison to the French, are known to have educated a relatively large segment of the

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<sup>22</sup>Observe also that the denominator of equation 5 is always negative. Hence, in order for  $\frac{L^{e*}}{L} > 0$ , the numerator of equation 5 must necessarily be negative as well, and this is defined only for  $\left[ A_e (1 + \delta)^\theta \right] > 2A$ .

population of their colonies, this insight suggests that the British probably had a more effective governance technology than the French.

**Technology of Governance by Quality** Here the concept of power is characterised solely in terms of the total stock of human capital that the group constituting the local elite holds relative to that held by the total population. The elites' power in this case is defined as:

$$r^e = \frac{\delta}{1 + \delta} \text{ and } r^c(\delta) = 1 - r^e = \frac{1}{1 + \delta} < 1 \quad (10)$$

Observe from equation 10 above that the coloniser's power is a decreasing function of the quality of human capital that it transfers to the elite and, correspondingly, the elites' power is an increasing function of the quality of human capital that it receives. In particular, more years of schooling given to the elites enhances their ability to appropriate some of the rents that normally would have accrued to the coloniser.

The coloniser uses its power,  $r^c(\delta) = \frac{1}{1+\delta}$ , to appropriate the maximum possible proportion of output produced in the colony. Formally, the extraction function of the coloniser under a technology of governance by quality is given as:

$$U(\delta) = \bar{h}^\theta \left( \frac{1}{1 + \delta} \right) \left[ A_e L^e (1 + \delta)^\theta + A(L - L^e) \right] \quad (11)$$

where all the parameters are the same as defined in equation 3 above.

The coloniser takes  $A_e$ ,  $A$ ,  $L$ ,  $L^e$ ,  $\theta$  and  $\bar{h}$  as given<sup>23</sup> and selects  $\delta$  to maximise equation 11 above, with the relevant first order condition being:

$$\frac{\bar{h}^\theta \left[ A(L^e - L) + A_e(1 + \delta)^\theta L^e(\theta - 1) \right]}{(1 + \delta)^2} = 0 \quad (12)$$

Solving for  $\delta^*$  in equation 12 above gives the following relationship:

$$\delta^* = \left[ \frac{A(L - L^e)}{A_e L^e (\theta - 1)} \right]^{\frac{1}{\theta}} - 1 \quad (13)$$

where

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<sup>23</sup> $L^e$  is not a choice dimension here. It might be the case, for instance, that an ethnic group is chosen as the elite.

$$\frac{\partial \delta^*}{\partial \left(\frac{L^e}{L}\right)} = -\frac{L \left[ \frac{A(L-L^e)}{A_e L^e (\theta-1)} \right]^{\frac{1}{\theta}}}{\theta L^e (L-L^e)} = \left\{ \begin{array}{l} < 0, \text{ iff } \theta > 1 \\ > 0, \text{ iff } \theta < 1 \end{array} \right\} \quad (14)$$

also

$$\frac{\partial \delta^*}{\partial \left(\frac{A_e}{A}\right)} = \left\{ \begin{array}{l} < 0, \text{ iff } \theta > 1 \\ > 0, \text{ iff } \theta < 1 \end{array} \right\} \quad (15)$$

and

$$\frac{\partial \delta^*}{\partial \theta} < 0 \quad (16)$$

Equation 14 above suggests that under a governance technology by quality in agrarian colonial economies, a bigger elite size  $\left(\frac{L^e}{L}\right)$ , necessarily demands the transfer of low quality human capital under high-productivity conditions ( $\theta > 1$ ). On the other hand, a smaller elite size demands the transfer of high quality human capital under low-productivity conditions ( $\theta < 1$ ).

Similarly, equations 15 and 16 suggest that the better the productivity-enhancing technology (represented by  $\frac{A_e}{A}$  and  $\theta$  respectively), the lower the quality of human capital transferred to the elite of the colonies.

The intuition behind these results is that under a technology of governance by quality in agrarian colonial economies, a coloniser with an effective technology does not need to transfer high quality human capital to the local elite. It might be the case, for instance, that the coloniser is able to adapt technology transfer to local realities.<sup>24</sup> Symmetrically, the coloniser with a less effective technology of governance need necessarily to transfer high quality human capital to the local elite (due, for instance, to poor technological adaptation).

**Composite Technology of Governance** Finally, under a composite technology of governance, both the size of the elite and the quality of human capital given to them matter in the power structure. The power of the elite is expressed as a function of both their numbers and the quality of human capital that they have. Here,  $r^e$  is defined as:

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<sup>24</sup>One way of thinking about this is perhaps, the administration of formal educational instruction in the local vernacular languages of the native populations.

$$r^e = \frac{L^e \bar{h} (1 + \delta)}{\bar{h} (L + \delta L^e)} = \frac{L^e (1 + \delta)}{L + \delta L^e} < 1$$

Correspondingly, the power of the coloniser as a function of a composite governance technology,  $r^c(\delta, L^e)$  is defined as:

$$r^c(\delta, L^e) = 1 - r^e = \frac{L - L^e}{L + \delta L^e} < 1 \quad (17)$$

Equation 17 above shows that  $\frac{\partial r^c}{\partial L^e} < 0$  and  $\frac{\partial r^c}{\partial \delta} < 0$  and:

$$\frac{\partial^2 r^c}{\partial L^e \partial \delta} = \frac{2LL^e(1 + \delta) - L(L + \delta L^e)}{(L + \delta L^e)^3} = \begin{cases} < 0, & \text{iff } \delta + 2 < \frac{L}{L^e} \\ = 0, & \text{iff } \delta + 2 = \frac{L}{L^e} \\ > 0, & \text{iff } \delta + 2 > \frac{L}{L^e} \end{cases}$$

implying that the rate of change in the coloniser's power due to the change in elite size increases at high levels of transfer,  $\delta$ , and decreases otherwise.

The coloniser uses its power,  $r^c(\delta, L^e) = \frac{L - L^e}{L + \delta L^e}$ , to appropriate the maximum possible proportion of output produced in the colony. The extraction function of the coloniser under a composite governance technology is given as:

$$U(\delta, L^e) = \bar{h}^\theta \left( \frac{L - L^e}{L + \delta L^e} \right) \left[ A_e L^e (1 + \delta)^\theta + A(L - L^e) \right] \quad (18)$$

The coloniser takes  $A^e$ ,  $A$ ,  $L$ ,  $\theta$  and  $\bar{h}$  as given and selects  $\delta$  and  $L^e$  to maximise equation 18 above, with the relevant first order conditions being:

With respect to  $\delta$  :

$$- \left\{ \frac{\bar{h}^\theta L^e (L - L^e) \left\{ A(L - L^e) + A_e (1 + \delta)^\theta L^e \right\}}{(L + \delta L^e)^2} \right\} + \frac{\bar{h}^\theta A_e \theta (1 + \delta)^{\theta-1} (L - L^e) L^e}{L + \delta L^e} = 0 \quad (19)$$

and with respect to  $L^e$  :

$$\frac{\bar{h}^\theta (L - L^e) \left\{ -A + A_e (1 + \delta)^\theta \right\}}{L + \delta L^e} - \frac{\bar{h}^\theta \delta (L - L^e) \left\{ A(L - L^e) + A_e (1 + \delta)^\theta L^e \right\}}{(L + \delta L^e)^2}$$



$$-\frac{\bar{h}^\theta \left\{ A(L - L^e) + A_e(1 + \delta)^\theta L^e \right\}}{L + \delta L^e} = 0 \quad (20)$$

Expressing  $\frac{L^{e*}}{L}$  in terms of  $\delta^*$  in equations 19 and 20 gives the following relationship:

$$\frac{L^{e*}}{L} = \frac{1 - \frac{\delta^*\theta}{1+\delta^*} - \frac{2}{(1+\delta^*)^\theta} \left(\frac{A_e}{A}\right)^{-1}}{2 - \frac{\delta^*\theta}{1+\delta^*} - \frac{2}{(1+\delta^*)^\theta} \left(\frac{A_e}{A}\right)^{-1}} > 0 \quad (21)$$

where

$$\frac{\partial \left(\frac{L^{e*}}{L}\right)}{\partial \left(\frac{A_e}{A}\right)} = \frac{2}{(1 + \delta^*)^\theta \left(\frac{A_e}{A}\right)^2 \left[2 - \frac{\delta^*\theta}{1+\delta^*} - \frac{2}{(1+\delta^*)^\theta} \left(\frac{A_e}{A}\right)^{-1}\right]^2} > 0 \quad (22)$$

and

$$\frac{\partial^2 \left(\frac{L^{e*}}{L}\right)}{\partial \left(\frac{A_e}{A}\right)^2} < 0 \quad (23)$$

Also

$$\frac{\partial \left(\frac{L^{e*}}{L}\right)}{\partial \delta^*} = -\frac{\frac{A_e}{A}\theta(1 + \delta^*)^\theta \left[\frac{A_e}{A}(1 + \delta^*)^\theta - 2 - 2\delta\right]}{\left[2(1 + \delta^*) + \frac{A_e}{A}(1 + \delta^*)^\theta [\delta^*(\theta - 2) - 2]\right]^2} = \begin{cases} < 0, \text{ iff } \frac{A_e}{A} > \frac{2(1+\delta)}{(1+\delta)^\theta} \\ > 0, \text{ iff } \frac{A_e}{A} < \frac{2(1+\delta)}{(1+\delta)^\theta} \end{cases} \quad (24)$$

$$\frac{\partial \left(\frac{L^{e*}}{L}\right)}{\partial \theta} = \frac{\frac{A_e}{A}(1 + \delta^*)^{\theta+1} \left[2(1 + \delta^*) \log(1 + \delta) - \frac{A_e}{A}\delta(1 + \delta)^\theta\right]}{\left[2(1 + \delta^*) + \frac{A_e}{A}(1 + \delta^*)^\theta [\delta^*(\theta - 2) - 2]\right]^2} = \begin{cases} < 0, \text{ iff } \frac{A_e}{A} > \frac{2(1+\delta) \log(1+\delta)}{\delta(1+\delta)^\theta} \\ > 0, \text{ iff } \frac{A_e}{A} < \frac{2(1+\delta) \log(1+\delta)}{\delta(1+\delta)^\theta} \end{cases} \quad (25)$$

Equations 22 and 23 tell us that there is concavity in the relationship between elite size and productivity distance between the elites and the masses, implying, in principle, that a large elite size is feasible whenever the productivity distance between elites and masses is large enough. Equation 24 suggests that there is a range of feasible values of the optimal elite size over which an increase in the quality of human capital transfers necessitates an increase in the elite size, and another range over which it reduces the elite

Table 1: Optimality Conditions under Composite Governance Technology in Agrarian Societies (Human Capital Transfers versus Elite Size)

	<b>Low Quality Transfers</b>	<b>High Quality Transfers</b>
Poor Governance Technology $\left(\frac{A_e}{A} < \frac{2(1+\delta)}{(1+\delta)^\theta}\right)$	Small Elite Size, $\frac{L^{e*}}{L}$	Large Elite Size, $\frac{L^{e*}}{L}$
Effective Governance Technology $\left(\frac{A_e}{A} > \frac{2(1+\delta)}{(1+\delta)^\theta}\right)$	Large Elite Size, $\frac{L^{e*}}{L}$	Small Elite Size, $\frac{L^{e*}}{L}$

size.<sup>25</sup>

Equation 24 also enables us to deduce the following analytical results which are summarised in Table 1 above. The results in Table 1 suggest that a coloniser with a poor technology of governance (represented by an  $\frac{A_e}{A} < \frac{2(1+\delta)}{(1+\delta)^\theta}$ ), can either transfer low human capital to a small elite or high human capital to a large elite. On the other hand, a coloniser with an effective governance technology (represented by an  $\frac{A_e}{A} > \frac{2(1+\delta)}{(1+\delta)^\theta}$ ), is able to transfer either low human capital to a large elite or high human capital to a small elite.

Also, equation 25 suggests that there is a range of feasible values of the elite size over which an increase in the returns to human capital necessitates an increase in the elite size and another range over which it reduces the elite size. Furthermore, equation 25 enables us to deduce the following analytical results which are summarised in Table 2 below. The results in Table 2 suggest that a coloniser with a poor technology of governance (represented by an  $\frac{A_e}{A} < \frac{2(1+\delta)\log(1+\delta)}{\delta(1+\delta)^\theta}$ ), is able to constitute a small elite only when the returns to human capital are low. In contrast, when the returns to human capital are high, a coloniser with a poor technology is able to co-opt a large elite. On the other hand, a coloniser with a good or effective governance technology (represented by an  $\frac{A_e}{A} > \frac{2(1+\delta)\log(1+\delta)}{\delta(1+\delta)^\theta}$ ), is able to constitute a small elite only when the returns to human capital are high and a large elite only when the returns to human capital are low.

*These results suggests that the governance-by-quality story also dominates in a composite technology of governance. In general, as the productivity dimensions (i.e.  $\theta$ ,  $\delta$ , and  $\frac{A_e}{A}$ ) rise, the optimal elite size  $\left(\frac{L^{e*}}{L}\right)$  decreases. However, there are now non-linearities defined by the  $\frac{A_e}{A}$  threshold.*

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<sup>25</sup>This suggests that there is a trade-off between the optimal elite size and the quality of human capital transfers that maximise the coloniser's extraction function. Numerical simulations of the optimal combination of elite size and human capital transfers that maximise the coloniser's objective function were also attempted, but, due to the complexity of equation 21, these optimal solutions were difficult to find.

Table 2: Optimality Conditions under Composite Governance Technology in Agrarian Societies (Returns to Human Capital versus Elite Size)

	<b>Low Returns</b>	<b>High Returns</b>
Poor Governance Technology $\left(\frac{A_e}{A} < \frac{2(1+\delta)\log(1+\delta)}{\delta(1+\delta)^\theta}\right)$	Small Elite Size, $\frac{L^{e^*}}{L}$	Large Elite Size, $\frac{L^{e^*}}{L}$
Effective Governance Technology $\left(\frac{A_e}{A} > \frac{2(1+\delta)\log(1+\delta)}{\delta(1+\delta)^\theta}\right)$	Large Elite Size, $\frac{L^{e^*}}{L}$	Small Elite Size, $\frac{L^{e^*}}{L}$

### 2.2.3 Interdependent Production

Continuing to use a simple production function with human capital as the only factor of production, we now assume that the elites and general population are dependent on each other, represented by the interaction of their respective productions.<sup>26</sup> This feature is obtained by using a general form of the production function wherein output produced in the colony is given as:

$$Y = [A_e L^e (1 + \delta) \bar{h}]^\alpha [A (L - L^e) \bar{h}]^\beta \quad (26)$$

which after simplification gives:

$$Y = \bar{h}^{\alpha+\beta} A^* \left\{ [L^e (1 + \delta)]^\alpha [L - L^e]^\beta \right\} \quad \text{where } A^* = A_e^\alpha A^\beta \quad (27)$$

where also,  $A_e$  and  $A$  represent the technology that is available to the elite and mass sectors of the population respectively, and definitionally,  $A_e > A$ , and  $Y$  denotes total output. Finally,  $\alpha$  and  $\beta$  represent returns to human capital in the elite and mass sectors of society respectively; such that:

$$\alpha + \beta = \left\{ \begin{array}{l} > 1 \text{ represents increasing returns} \\ = 1 \text{ represents constant returns} \\ < 1 \text{ represents decreasing returns} \end{array} \right\}$$

We assume as before that the power of the coloniser (or elites) is a function of three different types of governance technologies.

**Technology of Governance by Numbers** As before, under this technology, the coloniser takes  $A_e$ ,  $A$ ,  $L$ ,  $\delta$ ,  $\theta$  and  $\bar{h}$  as given and selects  $L^e$  to maximise the following

<sup>26</sup>Because of specialisation, this production setting might depict an industrial colonial economy.

extraction function:

$$Max U(L^e) = \left( \frac{L - L^e}{L} \right) \left\{ \bar{h}^{\alpha+\beta} A^* [L^e (1 + \delta)]^\alpha [L - L^e]^\beta \right\} \quad (28)$$

with the relevant first order condition being:

$$\frac{A^* (1 + \delta)^\alpha \bar{h}^{\alpha+\beta} (L - L^e) [L - L^e (2 + \beta)]}{L} = 0 \quad (29)$$

solving for  $\frac{L^{e*}}{L}$  in equation 29 above gives the following relationship:

$$\frac{L^{e*}}{L} = \frac{1}{2 + \beta} > 0 \quad (30)$$

Equation 30 above suggests that the optimal elite size depends solely on the *returns to human capital* in the mass sector of society and does not depend on the technological parameters of the model. *In particular, a rise in the returns to human capital in the mass sector necessitates a reduction in the size of the optimal elite population and vice versa. The implications of this result is that under a governance technology by numbers in industrial colonial economies, the optimal elite size never exceeds 50% of the total population. In other words, even if the general population were to be totally unproductive (i.e.  $\beta = 0$ ), the coloniser would still not constitute a 100% elite.*

**Technology of Governance by Quality** As before, under this technology, the coloniser takes  $A_e$ ,  $A$ ,  $L$ ,  $L^e$ ,  $\theta$  and  $\bar{h}$  as given and selects  $\delta$  to maximise the following extraction function:

$$Max U(\delta) = \left( \frac{1}{1 + \delta} \right) \left\{ \bar{h}^{\alpha+\beta} A^* [L^e (1 + \delta)]^\alpha [L - L^e]^\beta \right\} \quad (31)$$

with the relevant first order condition with respect to  $\delta$  being:

$$\frac{(\alpha - 1) A^* \bar{h}^{\alpha+\beta} [L^e (1 + \delta^*)]^\alpha [L - L^e]^\beta}{(1 + \delta)^2} = 0 \quad (32)$$

which simplifies to:

$$(\alpha - 1) A^* \bar{h}^{\alpha+\beta} [L^e (1 + \delta^*)]^\alpha [L - L^e]^\beta = 0 \quad (33)$$

Notice that the first order condition represented by equation 32 above is either always positive (under increasing returns) or always negative (under decreasing returns). Hence,

there is no optimal quality of human capital ( $\delta^*$ ), given  $\frac{L^e}{L}$ , that maximises equation 31 above. In stead, this scenario suggests two extreme outcomes which are to either transfer an infinite amount of human capital to a defined elite size when there are increasing returns, or to transfer no human capital at all when there are decreasing returns.

A plausible intuition behind this result is that, under a technology of governance by quality in industrial colonial societies, the colonisers do not necessarily govern by elite formation. Rather, they could either completely assimilate the colony into the imperial (or metropolitan) population<sup>27</sup> (in which case - they transfer an infinite amount of human capital to the indigenes of the colony) or they could simply adopt a target group (e.g. ethnic group) to whom they do not give any preferential human capital transfers ( $\delta \rightarrow 0$ ).

**Composite Technology of Governance** As before, under this technology, the coloniser takes  $A_e$ ,  $A$ ,  $L$ ,  $\theta$  and  $\bar{h}$  as given and selects  $L^e$  and  $\delta$  to maximise the following extraction function:

$$U(\delta, L^e) = \left( \frac{L - L^e}{L + \delta L^e} \right) \left\{ \bar{h}^{\alpha+\beta} A^* [L^e (1 + \delta)]^\alpha [L - L^e]^\beta \right\} \quad (34)$$

with the relevant first order condition being with respect to  $L^e$ :

$$\frac{\left\{ A^* (1 + \delta^*)^\alpha \bar{h}^{\alpha+\beta} (L - L^e)^\beta \left[ \delta^* L^{e*2} (1 + \beta) + L \{ L^{e*} (2 + \beta) - L \} \right] \right\}}{(L + \delta^* L^{e*})^2} = 0 \quad (35)$$

and with respect to  $\delta$ :

$$\frac{A^* L^{e*} \bar{h}^{\alpha+\beta} (L - L^e)^{1+\beta} (1 + \delta^*)^{\alpha-1} \{ L^{e*} [\delta^* (\alpha - 1) - 1] + \alpha L \}}{(L + \delta^* L^{e*})^2} = 0 \quad (36)$$

Expressing  $\frac{L^{e*}}{L}$  in terms of  $\delta^*$  in equations 35 and 36 above, results in the following relationship:

$$\frac{L^{e*}}{L} = \frac{1}{\left[ (1 + \beta) \delta^* + \frac{(2+\beta)[1+(1-\alpha)\delta^*]}{\alpha} \right]^{\frac{1}{2}}} > 0 \quad (37)$$

which is defined for:

$$\delta^* > 0 \text{ and } \alpha < 1$$

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<sup>27</sup>An example of this might be France's extension into Europe.

where,

$$\frac{\partial \left( \frac{L^{e*}}{L} \right)}{\partial (\delta^*)} = \frac{\frac{1}{2} (\alpha - \beta) - 1}{\alpha \left[ \frac{2 + \beta + \delta^* (2 + \beta - \alpha)}{\alpha} \right]^{\frac{3}{2}}} < 0 \text{ for } \delta^* > 0 \text{ and } \alpha < 1 \quad (38)$$

Also

$$\frac{\partial \left( \frac{L^{e*}}{L} \right)}{\partial \alpha} = \frac{1 + \delta^* \left( 1 + \frac{\beta}{2} \right) + \frac{\beta}{2}}{\alpha^2 \left[ \frac{2 + \beta + \delta^* (2 + \beta - \alpha)}{\alpha} \right]^{\frac{3}{2}}} > 0 \text{ for } \delta^* > 0 \text{ and } \alpha < 1 \quad (39)$$

and

$$\frac{\partial \left( \frac{L^{e*}}{L} \right)}{\partial \beta} = - \frac{\frac{1}{2} (1 + \delta)}{\alpha \left[ \frac{2 + \beta + \delta^* (2 + \beta - \alpha)}{\alpha} \right]^{\frac{3}{2}}} < 0 \text{ for } \delta^* > 0 \text{ and } \alpha < 1 \quad (40)$$

Equation 38 above tells us that under a composite governance technology in industrial colonial economies, it is always optimal to transfer either high human capital to a small elite or human capital to a large elite.

Similarly, equation 39 suggests that under a composite governance technology in industrial colonial economies, whenever the returns to human capital in the elite sector ( $\alpha$ ) are high, the coloniser tends to constitute a large elite and vice versa.

Also, equation 40 suggests that whenever the returns to human capital in the mass sector of society ( $\beta$ ) are high, the coloniser tends to constitute a small elite and vice versa.

*In summary, the results suggest that under a composite governance technology in industrial colonial economies, there is a necessary trade-off between raising the quality of human capital transfers ( $\delta$ ) to the elite, and increasing the optimal elite size  $\left( \frac{L^{e*}}{L} \right)$ .*

### 3 Empirical Data and Relevance of the Model

The results from the model suggest that the optimal elite characteristics that maximise the coloniser's objective function depend on a number of parameters, namely - the choice of governance technology, the productivity distance between elites and masses, the returns to human capital and the specification of the production function. In particular, the optimal elite characteristics vary with the type of production in which the economy is specialised.

For instance, given a technology of governance by numbers or quality in agrarian

colonial economies, the model suggests that whenever the coloniser is in possession of an effective technology of governance (represented by a high  $\frac{A_e}{A}$ ), or whenever the returns to human capital in the colony are high, it generally tends to constitute a bigger elite than otherwise. In contrast, under a composite technology of governance, a coloniser with an effective technology can either transfer low human capital to a large elite or high human capital to a small elite. Similarly, the coloniser with an ineffective technology can either transfer low human capital to a small elite or high human capital to a large elite.

Panel A of Figure 1 below presents some proxies that we use in comparing the sizes of the total elite force in a select sample of former SSA colonies. These are the percentage gross secondary enrolment rate (SEC ENRO), and the percentage of secondary school attained in the total population aged 15 and above (SEC15).<sup>28</sup> We also use the average schooling years in the total population over the age of 15 (TYR15) as a proxy for the quality of human capital transferred to the local elite.

The evidence in Panel A is consistent with the British opening access to education to a greater proportion of the population in their colonies than did the French. Panel A also suggests that the Portuguese and Belgians had the lowest educational transfers to the elite of their former SSA colonies.

In line with the predictions of the model, one might plausibly conclude that in general, the British imperial power had a more effective governance technology in Africa than either their French, Portuguese or Belgians counterparts. However, when considering a case-by-case comparison of former colonies, this statement will have to be properly qualified, as the British were probably more effective (compared to the French) in some colonies but less effective in others. This historical data provides independent support for the relevance of our model.

## 4 Conclusion

In this chapter, we examined the conditions of optimality in a co-optive strategy of colonial rule. The central premise of the chapter is that, as rational agents, the colonisers often had to make decisive choices from amongst conflicting options. One of these choices is the optimal size and quality of the indigenous elite with whom they governed the colonies together. This is as a result of the fact that human capital transfers to the elite engender both productivity gains and power losses to the colonisers.

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<sup>28</sup>Both variables are measured in the year of independence of the country.

Figure 1: Comparative Statistics on Human Capital Transfers in Selected SSA Countries at Independence.

PANEL A - DESCRIPTIVE STATISTICS																		
British Former Colonies in SSA					French Former Colonies in SSA					Portuguese Former Colonies in SSA					Belgian Former Colonies in SSA			
COUNTRY	Ind Date	SEC Enro	SEC15	TYR15	COUNTRY	Ind Date	SEC Enro	SEC15	TYR15	COUNTRY	Ind Date	SEC Enro	SEC15	TYR15	COUNTRY	Ind Date	SEC Enro	SEC15
Botswana	1966	3.8	3.02	1.68	Benin	1960	2	1.3		Guinea Bissau	1975	3	0.4		Rwanda	1962	2	4.86
Gambia	1965	6	5.3		Cameroon	1960	2	9.7	1.74	Mozambique	1975	3	1.6	0.64	Zaire	1960	3	1.4
Ghana	1957	0.2	1.6	0.97	Cape Verde	1960	2											
Kenya	1963	3.2	2.42	1.61	Cen Africa Rep.	1960	1	3.6	0.57									
Lesotho	1966	4.6	1.6	2.99	Congo, Rep.	1960	4											
Malawi	1964	1.8	0.78	1.98	Cote d'Ivoire	1960	2											
Mauritius	1968		19.5	3.92	Madagascar	1960	4											
Nigeria	1960	4			Mali	1960	1	0.1	0.36									
Sierra Leone	1961	2.6	2.64	0.67	Niger	1960	1	0.6	0.28									
Sudan	1956	2.2	1.5	0.41	Senegal	1960	3	4.4	1.74									
Swaziland	1968	14	6.96	2.36	Togo	1960	2		0.22									
Tanzania	1961	2	1.2	3.26														
Uganda	1962	3.4	3.8	1.17														
Zambia	1964	6	5.9	2.81														
Zimbabwe	1980	8	4.9	2.13														
<b>Average</b>		<b>4.41</b>	<b>4.36</b>	<b>1.99</b>	<b>Average</b>		<b>2.18</b>	<b>3.28</b>	<b>0.82</b>	<b>Average</b>		<b>3</b>	<b>1</b>	<b>0.64</b>	<b>Average</b>		<b>2.5</b>	<b>3.13</b>

Sources: World Development Indicators for % Gross Secondary Enrolments (SEC Enro); The Africa Research Program dataset for % Secondary School Attainment in the total Pop aged 15 and above (SEC15), Average Schooling Years in the total Pop aged 15years and above (TYR15).

PANEL B - MEANS BY COLONIAL BACKGROUND				
	FRENCH SSA	BRITISH SSA	PORTUGUESE SSA	BELGIAN SSA
SEC ENRO	2.18	4.41*	3	2.5
SEC15	3.28	4.36	1	3.13
TYR15	0.82	1.99**		

Notes: Asterisks indicate results of t-tests. The null hypothesis is that the mean is the same as the mean for former French SSA.  
 \* Denotes significance at 10%, \*\* denotes significance at 5% and \*\*\*denotes significance at 1%.



We have thus proposed a simple model of elite formation emanating from a coloniser's quest simultaneously to enhance productivity gains and minimise power losses. The results of the model suggest multiple optimal solutions, depending on the specification of the production function, the governance technology chosen by the coloniser, the returns to human capital, as well as the parameterisation of the productivity distance between elites and the population masses.

For instance, in agrarian colonial societies, the results suggest that under a technology of governance by numbers, a large elite population is a direct reflection of a high productivity-enhancing technology by the coloniser. Symmetrically, a small elite size suggests an ineffective technology of co-optation/governance by the coloniser. Under a governance technology by quality in agrarian colonial societies, the better the productivity-enhancing technology, the lower the quality of human capital that is transferred to the elite. Additionally, under a composite governance technology in agrarian societies, and given non-linearity conditions defined by the productivity distance ( $\frac{A_e}{A}$ ) threshold, the better the productivity-enhancing technology, the smaller the optimal elite size that is chosen by the coloniser. An alternative set of results is obtained assuming an industrial economic set up (or interdependent production).

These results suggest that the long debate about the apparent efficacy or superiority of one European colonisation experience over the other is much more intricate than is often perceived in the literature. The insight from the model is also useful in understanding why the stock of human capital available in countries emerging from colonisation varied considerably across colonial experiences and from one country to another.

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