

A Theory of Colonial Governance^{*}

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Abstract

This paper presents a simple model of elite formation emanating from a coloniser's quest to maximise extracted output from its colonies. Under alternative specifications of the production function, the results of the model suggests multiple equilibria associated with varying combinations of elite dimension and human capital transfers that maximise the coloniser's objective function, depending on both the technology of governance chosen by the coloniser, as well as on the parameterisation of the productivity distance between elites and the population masses and on the returns to human capital. Under an additively separable production function, these equilibria range from (1) high human capital transfers to a fairly large elite under a governance technology by numbers, to (2) either high or low human capital transfers to a fairly large elite under a governance technology by quality, to (3) high human capital transfers to a relatively small elite or low human capital transfers to either a fairly small or large elite under a composite governance technology. This insight is useful in understanding why the pace of, and the approaches to decolonisation might have varied considerably across colonial experiences.

Keywords: Governance technology, human capital, elite, productivity.

JEL Codes: O43, I21, O15.

1 Introduction

The beginning of the twentieth century marked a different phase in the metropolitan powers' scramble for Africa. Having expended much resources in acquiring colonies, European powers came to the stunning reality that prospects of making wealth were not after all going to be immediate. How to make the colonies financially self-sufficient preoccupied the colonial powers who resorted to seemingly similar governance strategies.

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This paper suggests that in order to raise output produced in the colonies, the colonisers' had to selectively transfer human capital to the indigenous population, resulting in the formation of a distinct group of individuals called the 'elite'. The coloniser's power to appropriate the colony's resources is postulated to be a function of three types of governance technologies namely, a technology of numbers, a technology of quality and a composite technology of numbers and quality. Under alternative specifications of the production function, the results of the model reveal multiple equilibria associated with varying combinations of elite dimension and human capital transfers that maximise the coloniser's objective function, depending on the technology of governance chosen by the coloniser, and depending also, on the parameterisation of the productivity distance between elites and the population masses and on the returns to human capital. Under an additively separable production function, these equilibria range from high human capital transfers to a fairly large elite under a governance technology by numbers, through either high or low human capital transfers to a fairly large elite under a governance technology by quality, to high human capital transfers to a relatively small elite or low human capital transfers to either a fairly small or large elite under a composite governance technology. An alternative set of multiple equilibria is obtained using a Cobb-Douglas form of the production function.

A quick review of the historical data presented in figure 1 in the appendix suggests that on average across most former colonies in sub-Saharan Africa (SSA), the colonisers' tended to choose differing proportions of the elite population¹ though never really attaining 15% of the population, and also the quality of education (thought of in terms of the average number of years of formal schooling) transferred to the elite varied considerably across colonies and from one metropolitan power to the other. The evidence in figure 1 suggests that the British colonial power generally transferred low quality human capital (in other words, averagely fewer years of schooling) to a relatively broader segment of the population in its former SSA colonies, whilst the French seemed to have transferred on average, high quality human capital to a highly restricted number of elite. This historical evidence provides independent support for the relevance of my model.

The implications of the present analysis is that, a few elite with high human capital endowment enjoys high rents and the income distance between them and the populace is wider, which inturn implies that, this elite stands to gain more from a coalition with the coloniser than with the population masses (because redistribution that will ensue from a

¹I proxy the elite population by the percentage gross secondary enrolment rate in the year of independence of the colony.

coalition with the masses lowers its rents). Consequently, a few elite with high human capital is likely to be strongly co-opted, ensuring that the coloniser enjoys returns over a longer timespan and the decolonisation process in this scenario might be somewhat sluggish.

On the other hand, a large elite with relatively low human capital endowment enjoys smaller rents and the income distance between them and the populace is narrow, which suggests why such an elite is more likely to enter a coalition with the masses than with the coloniser. It can be expected that such coalition between the elite and the masses will accelerate the pace of decolonisation. This insight may be helpful in understanding why France has apparently maintained a strong grip over its former colonies in sub-Saharan Africa even in the aftermath of independence whilst British control over its former colonies has almost eroded completely.

The tasks of this paper are two fold – on the one hand, I present a simple model of elite formation emanating from the coloniser’s quest to maximise extracted output from the colony and on the other hand, I show that the coloniser’s choice of elite characteristics also affects the pace of, and approach to decolonisation.

The next sections discuss the motives of colonisation, and the primacy of strategic human capital transfers in a coloniser’s extraction strategy. Thereafter, I present the model and its core predictions. A discussion of the results concludes the section.

2 Motives of Colonisation

A vast literature explains the motives for conquest of overseas colonies by the European metropolitan powers and though these motives differ slightly from one colonial power to another, traces of each can be identified with all the colonial powers. These motives can be regrouped under three main categories namely, economic, religious and strategic geopolitical reasons. The economic motives for imperialism usually cited in the literature include avenues for extraction of raw materials for use in production in the imperialist economy, setting up of new markets for the imperialist power, and providing super-profits for imperialist business firms². Another school of thought, largely backed by neo-marxists ideologies sustains the thesis that imperialism was motivated by a declining rate of profit in Europe. But as Douglas (1978:268) argues, the objections to this thesis are rather the absence of empirical evidence that the rate of profit in Europe was declining before or during the colonial period and of satisfactory theoretical explanation why it should decline.

²See Rhoda (1973:19), Bolton (1973:24) and Douglas (1978:265).

A few authors³ have highlighted the particular emphasis that the British metropolitan power, as opposed to other European powers, gave to the economic motives of Empire. They argue that as of the late nineteenth century, Britain was the only metropolitan power that was committed to free trade, whilst other European powers were building up their rival industries through protective tariffs. As such, the British Crown had an added incentive to 'take out insurance'⁴ by securing potential sources of raw materials and markets in a larger Empire. A more radical view of the motive for Empire, propagated by Lenin, suggests that Britain acquired colonies in order to provide her moneyed interests with outlets for surplus capital, and the unemployable products of her public schools with jobs. However, Bolton (1973:23), argues that many of the colonies annexed during the grabs for Africa and the Pacific provided Britain with little scope for markets or investment and the emphasis laid on economic growth was to ease the drain on the British taxpayer by making the colonies financially self-supporting. Even Rhodesia, which was one of the choicest additions to the Empire at that time yielded no dividends for the British South Africa Company for thirty years, claims Bolton (op.cit).

Against this backdrop, recent historians have tended to emphasize the late nineteenth century geo-strategic considerations for empire-building. International tensions have sprung up following a series of events - namely, the rise of a powerful Germany, the strivings of France after prestige⁵, the ambitions of Belgium's Leopold II, and the need to buttress India at a time of Russian expansion in Asia and the Balkans. As such, the scramble for colonies could have been seen as a way of distancing the rivalries between European powers and hence a safety-valve for international crisis. Bolton (1973:24) affirms that "while tracts of land in Africa and the Pacific, however valueless, remained to be squabbled over, there was a reduced danger of European war"⁶.

Finally, religious motives and the quest to expand Christian civilisation also prompted some European powers to acquire colonies and in this regard, the Portuguese and Spanish were more dedicated and fanatical than the French, or even less the British. However, the French (and later the Americans), showed much enthusiasm for cultural diffusion in their colonies than the British who remained pragmatic on their economic objective.

³See for instance, Maddison (1971:35), Bolton (1973: 24) and Duignan & Gann (1975).

⁴I acknowledge a semantic debt to Bolton (1973).

⁵According to Cohen (1971:204), France seem to have placed emphasis on prestige resulting from the fact that their language was to become the language of communication in its overseas territories.

⁶Following the same reasoning, it can be argued that the tensions that led to the First World War heightened only after the scramble for colonies has ended and all the European powers returned to the Mediterranean for the partitioning of the Turkish Empire.

In spite of the different motives that might have driven the conquest for colonies by European metropolitan powers, and in spite of the extensive criticisms that have been levied against imperialism⁷, it suffices to mention some of its benefits to the colonies. For instance, there is plenitude of evidence of material progress in Africa between 1870 and 1960, the most compelling of which is demographic evidence of increasing population and rising life expectancy⁸. The population boom was sustained by advances in medical technology that the colonial powers brought with them and by increasing employment opportunities that the colonial exchange economy introduced and it can be argued that this population expansion contributed to economic growth in the colonies owing to the highly labour-intensive structure of these economies. Among the other benefits of imperialism include, the provision of transport and communication facilities that previously did not exist, the formation and enhancement of human capital of the colonies, as well as, the facilitation of the integration of these economies into the world market through monetary convertibility and trading opportunities.

3 The Primacy of Strategic Human Capital Transfers in a Coloniser's Extraction Strategy

A legitimate question to ask is why and to what extent should a coloniser educate citizens of a territory that it has colonised? What were the similarities and differences in approach to this question by the different European powers? With regards to the first question, there is unconflicting evidence in the literature suggesting that investment in human capital enhances productivity which potentially raises society's output, and consequently, the amount of extraction that a coloniser can appropriate. Furthermore, African economies are heavily dependent on natural resource extraction which is labour-intensive, hence the question of labour productivity can not be over-emphasized in a coloniser's extraction strategy. Another major strategic reason for transferring human capital it was thought, was to minimise the costs of administration of the colonies, owing to the stunning realisation that prospects of making wealth in most of the colonies acquired in Africa were not

⁷Some of the most vocal criticisms include the fact that imperialism destroyed irrevocably, the existing pre-colonial African traditional institutions, replacing them with the bureaucratic structures that the independent African states have maintained with but few changes, Cohen (1971), Suret-Canale (1971), Huillery (2006), and Martin (2005).

⁸Holland (1985) in Grossman & Iyigun (1997:491) refers to a population explosion almost everywhere in the colonial world, while Matras (1973) in Grossman & Iyigun (1997:491), estimates that total population in all of Africa, which apparently was not growing prior to the colonial period, increased by more than 150% from 1900 to 1971.

after all going to be immediate. Colonial governments thus became primarily concerned with making their colonies financially self sufficient. One of the means of achieving this, was to give advanced education to a few elites, who would become co-opted agents in the colonial administrative machinery⁹. Co-optation in governance (or 'indirect rule'¹⁰) is an idea first explored by Sir Arthur Gordon at Fiji (1874-80), 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 to only 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 being that the newly educated chiefs are more likely to favourably appreciate British civilization 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 chiefs¹¹. This narrowly 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. Some of the merits of 'indirect rule' it is claimed, are that it was inexpensive and less distortionary on pre-existing traditional political institutions but as Foster (1965:140-141) argues, the British were never really consistent in their choice of indirect rule¹² and, British colonisation also did enhance the erosion of African traditional institutions via

⁹The envisaged administrative role of co-opted agents is to ensure law and order, collect taxes and supply labour.

¹⁰Indirect rule meant the retention of traditional African authorities as agents of local government entrusted with power by the British colonial administration and it based on the philosophy that it was possible to utilise traditional political institutions in development.

¹¹See Foster (1965)

¹²For instance, at inception of 'indirect rule' the British emphasized the role of traditional African chieftaincy institutions in the administration of the colonies at the expense of the educated African elites. But when discontent starting mounting from the latter, the British reluctantly resorted to using the elites in administration, as the French originally did, although most of the elites utilised in the British colonies were not sons of Chiefs as was the original plan.

the channel of Western-type education that was introduced in the colonies¹³. The main criticism of British 'indirect rule' is that, by upholding traditional forms of hierarchical authority, it insulated Africans from social change, and in particular, it blocked the influence of the educated and the urbanised. Notwithstanding, British 'indirect rule' was similar to French 'indirect rule' in that, both strategies pursued an 'aristocratic' policy of recruitment into special institutions that trained elites for use in colonial administration, and both maintained a relatively small administrative bureaucracy¹⁴.

However, it can be argued that the two strategies differed in their approaches to educational policies. 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 prudent management of educational turn-over than the British. Wallerstein (1959:59) once remarked¹⁵ :

“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’.

In this light, it has been argued that the British colonial power provided low quality education to a broader segment of the indigenous populations in its former colonies,

¹³Other authors, see for instance, Cohen (1971), Suret-Canale (1971), and Huillery (2006) believe that British colonisation in Africa was superior to the French in that French colonial rule had more detrimental consequences on existing pre-colonial African traditional institutions. Suret-Canale (1971) affirms further that French colonisation not only destroyed irrevocably, the earlier institutions of Africa, but it also made the African territories economic appendages of France.

¹⁴For instance, the British colonial power governed the whole of British tropical Africa where some 43 million people lived with a staff of only 1,200 administrators (about 0.03% of the population), Martin (2005:5). In India, the ratios were even more dramatic - in 1805, India was at least 200 million people but the British raj was operated by 24,000 British (of which 22,000 were in the military and 2000 in civil government). This number only increased after the mutiny in 1857 but it was never more than 0.05% of the population. See Maddison (1971:44). A similar situation is observed in French West Africa, where in 1958 the French administered a territory comprising of a total estimated population of 173 million inhabitants with a staff of about 10,600 (roughly 0.06% of the population). The Ivorian case was also dramatic with a colonial civil service of less than 0.03% of the population in 1958. Source: 'Etat Nominatif des Fonctionnaires du Haut Commissariat, par territoire en 1958' available at the *Afrique Orientale Française* Office in Dakar.

¹⁵Hailey (1957:1197) also notes that the most characteristic features of French educational policy were - the universal use of French as the medium of instruction; a consistent policy of linking the provision of more advanced type of education to existing demand for it and its zero tolerance policy on vocational training.

whereas the French colonial power transferred relatively high quality education to a highly restricted segment of the population in its former colonies. Two important factors explain why the British tolerated a broad-based educational policy. Firstly, as already emphasized, the British initially left education in the hands of the missionaries who educated without any restrictions. Secondly, education was administered at the elementary and primary levels in British former colonies in the vernacular languages of the indigenous population of the colonies, hence it was much easier to expand in scope. However, in spite of its widespread provision in British former colonies, it can be argued that educational transfers were provided at a much higher quality in former French colonies than in British former colonies¹⁶. What column 19 of figure 1 tells us is that, however few elites the French colonial power managed to train, they were really trained to a high level, in comparison with the many that the British colonial power educated at lower levels. This important difference helps in distinguishing two scenarios. On the one hand, a few elite that receive high quality education, thus strongly co-opted, and less likely to be subversive and on the other hand, a relatively broader elite composition which is endowed with relatively low quality education, thus weakly co-opted and more likely subversive. As figure 1 illustrates further, the pattern of educational transfers also later affected the distribution of incomes in the former colonies, with British former colonies having fairly lesser inequalities in income distribution, whilst French educational policies created highly unequal societies in its former colonies.

Besides the afore-mentioned economic incentives for educational transfers, education has also been traditionally regarded as a powerful instrument for forging a strong and homogenous society, for encouraging social mobility, for eliminating religious superstition and for uplifting the status of women. The cultural homogenisation role of education is what Durkheim stressed when he said:

¹⁶Though by the 1960s there existed yet no universities in French SSA colonies, the few indigenous elite from these colonies that France co-opted were trained at the best metropolitan 'Ecoles' such as Soborne, whereas the British attempted this type of high level co-optation only sparingly - the first attempt at this strategy by the British colonial government on the Gold Coast in 1831 having been abortive. Foster (1965:60) and McWilliam & Kwamena-Poh (1978:23-24) document the first abortive attempt at co-opting two Asante Princes (Ansa - son of the former Asantehene; and Inkwantabissa - son of the incumbent, who were sent to England for education in 1831) as 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 chiefdom, choosing rather to settle permanently in Cape Coast on British government pensions. Elsewhere in British India, Maddison (1971:42) recounts that the higher education system operated by the British was ill-sophisticated resulting in the production of a bunch of graduates with a half-baked knowledge of English.

Society can survive only if there exists among its members a sufficient degree of homogeneity; education perpetuates and reinforces this homogeneity by fixing in the child from the beginning the essential similarities which collective life demands....Society finds itself with each new generation faced with a tabula rasa, very nearly, on which it must build anew.

Whether this was a primordial motive for educational transfers by the colonial powers remains debatable. Notwithstanding, these cultural factors were important for the East Asia colonies as well as for colonies in Africa which were (and are still) highly ethnolinguistically heterogenous.

No matter how important educational transfers might have been to the colonisers, there was definitely a threshold level of human capital transfers that any colonial power would allow. Firstly because, it is financially costly and because education raises aspirations, it is socially and politically costly as well, to educate everyone in society. Thus, Western education was a strategic instrument in the coloniser's extraction strategy and it was never meant for the masses as Macaulay (1967) confirms:

'It is impossible for us, with our limited means to attempt to educate the body of the people. We must at present do our best to form a class who may be interpreters between us and the millions whom we govern; a class of persons, Indian in blood and colour, but English in taste, in opinion, in morals, and in intellect. To that class we may leave it to refine the vernacular dialects of the country, to enrich those dialects with terms of science borrowed from the Western nomenclature, and to render them by degrees fit vehicles for conveying knowledge to the great mass of the population'

An obvious question that economists ask is to know why a coloniser would prefer a co-optation policy of governance over a policy of absolute subjugation (or military dictatorship). The answer to this question can not be completely dissociated from the coloniser's fundamental motive for Empire. Where this motive was mainly economic, as in the case of the British colonial power, the coloniser was particularly sensitive when it came to costs associated with military expenditure¹⁷ and furthermore, the lessons of

¹⁷The costs of military dictatorship might well be convex considering that the presence of a military might provoke resistance from the indigenous population, necessitating the deployment of further resources to quell.

the Indian revolt in 1857 made the option of military presence less attractive to most metropolitan powers¹⁸.

4 Theoretical Framework

I now outline a simple model to formalise the ideas discussed in the preceding sections, the hope being to determine the likely feasible combinations of elite size and quality that maximises the coloniser's objective function - which is to appropriate the maximum possible output that is produced in the colony. The model rests on the following key assumptions:

- 1) Human capital transfers to the elite raises their productivity and output, which in turn raises the amount of extraction that the coloniser appropriates from the colony.
- 2) Members of the elite or mass population groups are homogenous
- 3) Military dictatorship and Co-optation strategy are incompatible
- 4) The coloniser & elites monopolise power while masses hold no power.
- 5) The model abstracts from remuneration of factors of production.

4.1 The Model

Consider a society that has been colonised by a foreign power. Suppose that initially the society is comprised of mainly one group of individuals - the indigenous population masses (D); and 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 called 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:

¹⁸The 1857 Indian revolt was provoked by 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 noted 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.

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

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 denotes the population of the elite group and the new size of the population mass group respectively.

I assume that at any point in time, the size of the elite population, L^e is endogenously 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 number of years of basic elementary education attained by each member of the indigenous population.

I assume that the primary objective of the coloniser is to maximise extraction of the colony's resources for the furtherance of its own empire. I assume further that the coloniser prefers a strategy of elite co-optation over a strategy of absolute subjugation (or military dictatorship which entails zero redistribution to the population). Under an elite co-optation extraction strategy, the coloniser selectively redistributes some of the colony's resources to the indigenous population with the dual intentions of raising the latter's productivity for optimal extraction, as well as minimising its monitoring costs. Thus in this model, the coloniser transfers human capital (δ) to only the elites who wind up with a higher endowment of human capital resources $(1 + \delta)\bar{h}$ as opposed to the ordinary population masses. It is worth emphasizing that the distinction between the elite and population mass groups is made solely in terms of their relative endowments in human capital, which stems from the fact that the coloniser redistributes human capital, δ , to the elite group only. This maybe the case for instance, that the elite are granted more years of formal schooling (at the secondary or tertiary levels) beyond the basic educational level attained by the population masses. However, human capital transfers made to the elite can be either of low quality (*low* δ) implying fewer years of post-primary education or of high quality (*high* δ), implying a higher number of years of post-primary education.

I also assume that the coloniser takes as exogenous, the costs of human capital transfers

it makes to the elite, but I abstract from the costs of labour (wages to the elite and subsistence wages paid to the agrarian population) and from the costs of sustaining a military presence in the colony¹⁹. Co-optation of the elite also has the associated risks of diminishing the power of the coloniser as a result of rising political aspirations of the elites associated with the human capital transfers made to them. In this model, I abstract from the cost of losing power by the coloniser and only considers the costs of educational transfers to the elite.

In pursuing its extraction strategy, the coloniser factors in two main concerns namely, the returns from production in the colony as a result of human capital transfers to the elite, and it's ability to appropriate output that is produced in the colony. I refer to this ability as the coloniser's power.

Firstly, the returns from productive activity in the colony. For simplicity, I start with an additively seperable production function and then later consider a more general form of the production function.

4.1.1 Independent Production

Following Hirschleifer (1995) and Fedderke & Kularatne (2008), I assume a society with two differentiated sectors - an agrarian versus an industrialised sector - wherein members of each sector do completely different things²⁰. Assuming a simple growth model with human capital as the only factor of production, net output obtained from productive activity in the colony is given as:

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

where A_e and A represents the technology that is available to the elite and mass sectors of the population respectively, and definitionally, $A_e > A$, Y denotes net output²¹, C is an aggregate fixed cost relating to the cost of human capital transfers to the elite. Finally, θ represents returns to human capital; such that:

¹⁹It can be the case that the cost of human capital transfers to the elite are borne from the surplus of production in the colony, impling that the coloniser is seeking to appropriate a portion of the net surplus.

²⁰This seems plausible since the population masses are by definition, incapable of using the technology of the elite whilst the elite will feel deprived if obligated to use the primitive technology of the agrarian sector.

²¹Observe 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.

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

One deduces from equation 1 above that a high return from production in the colony is obtained by transferring a high quality of human capital (*high* δ), to as many elite (L^e), as possible and low quality transfers of human capital produces low return²².

Secondly, the coloniser considers its ability to appropriate output produced in the colony.

Conceptualisation of the notion of Power The coloniser's aim is to appropriate the maximum possible proportion of net output produced in the colony and this is a function of his power. This power of the coloniser can be expressed as a function of three different types of governance technologies namely - technology by numbers ($\frac{L^e}{L}$), technology by quality (stock of human capital held by the elites relative to that held by the masses) and lastly as a composite technology which is a combination of numbers and quality.

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 aspiring to power 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 as²³:

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

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.

²²See that as long as $A_e > A$, $\frac{\partial Y}{\partial L^e} > 0$ and $\frac{\partial Y}{\partial \delta} > 0$.

²³I neglect the power of the population masses because, according to my assumptions, the poorer masses hold a negligible amount of human capital implying that their associated political aspirations might be very low.

Given the net output from productive activity in the colony as:

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

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:

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

where $A_e > A$.

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

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

Solving equation 4 above gives the following relationship:

$$\frac{L^{e*}}{L} = \frac{2A - A_e(1 + \delta)^\theta - C}{2A - 2A_e(1 + \delta)^\theta} \quad (5)$$

where after normalising $A = 1$ and $C = 2$ gives:

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

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

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

Equation 6 above enables us to simulate the behaviour of elite dimension $\frac{L^{e*}}{L}$, under a governance technology by numbers, the results of which are presented in figure 2 in the appendix. Figure 2 shows that, for any given level of the productivity distance between elites and masses, $\frac{A_e}{A}$, elite dimension, $\frac{L^{e*}}{L}$, tends to decrease as the returns to human

capital, θ , rises. Also, for any given θ , elite dimension, $\frac{L^e}{L}$, tends to decrease as the productivity distance between elites and masses, $\frac{A_e}{A}$, rises. Furthermore, for any given amount of human capital transfers, δ , elite dimension, $\frac{L^e}{L}$, tends to decrease as the returns to human capital, θ , rises. Finally, figure 2 suggests that the likely feasible range of elite dimension that maximises the coloniser's objective function is always going to be above 50% of the population.

Considering this feasible range of the elite dimension under the defined conditions of $\frac{A_e}{A}$ and θ , and normalising $A = 1$, $L = 10$, $\bar{h} = 5$, and $C = 2$, I simulate equation 3 above for the optimal combination of elite dimension and human capital transfers (δ), that maximises net output. The simulated results are summarised in figure 3 in the appendix. The results reveal that net output is always maximised by transferring high human capital to a fairly large elite dimension, irrespective of the range of possible values that θ and $\frac{A_e}{A}$ take. This outcome is presented in figure 4 in the appendix.

These simulated results are further confirmed by equations 7 and 8 above. Equation 7 suggests concavity in the relationship between elite dimension and productivity distance between the elite and the masses, implying in principle, that a large elite dimension is feasible whenever the ratio $\frac{A_e}{A}$ is large enough. Equation 8 above suggests that, all other things being equal, an increase in the amount of human capital transfers, δ , will necessitate a reduction in the elite dimension. In other words, quality has a price.

Technology of Governance by Quality Here the concept of power is characterised in terms of the total stock of human capital that the group aspiring to power holds relative to that held by the total population. Hence, the elites' power in this case is defined as:

$$r^e = \frac{\delta}{1 + \delta} \text{ and } r^c(\delta) = 1 - r^e = \frac{1}{1 + \delta} < 1 \quad (9)$$

Observe from equation 9 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.

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

$$U(\delta) = \bar{h}^\theta \left(\frac{1}{1 + \delta} \right) \left[A_e L^e (1 + \delta)^\theta + A(L - L^e) - C \right] \quad (10)$$

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

The coloniser takes $A_e, A, L, C, L^e, \theta$ and \bar{h} as given and selects δ to maximise equation 10 above with the relevant first order condition being:

$$\frac{\bar{h}^\theta \left[A(L^e - L) + A_e(1 + \delta)^\theta L^e(\theta - 1) + C \right]}{(1 + \delta)^2} = 0 \quad (11)$$

Solving equation 11 above gives the following relationship:

$$\frac{L^{e*}}{L} = \frac{1 - \frac{C}{LA}}{1 + (\theta - 1) \frac{A_e}{A} (1 + \delta)^\theta} \quad (12)$$

where after normalising $A = 1$ as before gives:

$$\frac{L^{e*}}{L} = \frac{1 - \frac{C}{L}}{1 + (\theta - 1) A_e (1 + \delta)^\theta} \quad (13)$$

$$\frac{\partial \frac{L^{e*}}{L}}{\partial A_e} = - \frac{\left(1 - \frac{C}{L}\right) (\theta - 1) (1 + \delta)^\theta}{\left[1 + A_e (1 + \delta)^\theta (\theta - 1)\right]^2} < 0, \text{ iff } \theta > 1 \text{ and } \frac{C}{L} < 1 \quad (14)$$

$$\frac{\partial \frac{L^{e*}}{L}}{\partial \delta} = - \frac{\left(1 - \frac{C}{L}\right) (\theta - 1) A_e \theta (1 + \delta)^{\theta-1}}{\left[1 + A_e (1 + \delta)^\theta (\theta - 1)\right]^2} < 0, \text{ iff } \theta > 1 \text{ and } \frac{C}{L} < 1 \quad (15)$$

Equation 13 above enables us to simulate the behaviour of elite dimension $\frac{L^{e*}}{L}$, under a governance technology by quality, the results of which are presented in figure 5 in the appendix. Figure 5 shows that, the likely feasible range of elite dimension occur only at constant or increasing returns to human capital and the behaviour of the feasible elite dimension is similar to that observed under a governance technology by numbers presented above. Furthermore, figure 5 suggests the following likely feasible range of elite dimension that maximises the coloniser's objective function: $0.004 \leq \frac{L^{e*}}{L} \leq 0.8$

Considering the above feasible range of the elite dimension under the defined conditions of $\frac{A_e}{A}$ and θ , and normalising $A = 1, L = 10, \bar{h} = 5$, and $C = 2$, as before, I simulate equation 10 above for the optimal combination of elite dimension and human capital transfers (δ), that maximises net output. The simulated results are summarised in figure 6 in the appendix. The results show two types of equilibria depending on the parameterisation of θ and $\frac{A_e}{A}$.

Scenario One: High human capital transfers to a fairly large elite. The first equilibrium shows that net output is maximised by transferring high human capital to a fairly large elite dimension, under constant or increasing returns to human capital and as long as the ratio $\frac{A^e}{A} \geq 1$. This outcome is presented in figure 7 in the appendix.

Scenario Two: Low human capital transfers to a fairly large elite. The other equilibrium suggests that net output is maximised by transferring low human capital to a fairly large elite dimension under decreasing returns and $\frac{A^e}{A} \geq 1$. This outcome is presented in figure 8 in the appendix.

These simulated results are further confirmed by equations 14 and 15 above. Equation 14 suggests that whenever there are increasing returns to human capital ($\theta > 1$), and as long as the per capita cost of human capital transfers, $\frac{C}{L} < 1$, an increase in the productivity distance between elites and the masses ($\frac{A^e}{A}$), under a governance technology by quality, will necessitate a reduction in the elite dimension. The intuition for this is that the emphasis on quality comes at the expense of numbers. Equation 15 above suggests also that, whenever there are increasing returns to human capital ($\theta > 1$), and as long as $\frac{C}{L} < 1$, an increase in the amount of human capital transfers, δ , will necessitate a reduction in the elite dimension.

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

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

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

$$r^c(\delta, L^e) = 1 - r^e = \frac{L - L^e}{L + \delta L^e} < 1 \tag{16}$$

Equation 16 above shows that $\frac{\partial r^c}{\partial L^e} < 0$ and $\frac{\partial r^c}{\partial \delta} < 0$ and:

$$\frac{\partial^2 r^c}{\partial L^e \partial \delta} = \frac{2LL^e(1 + \delta) - L(L + \delta L^e)}{(L + \delta L^e)^3} > 0 \text{ if and only if, } \delta + 2 > \frac{L}{L^e}$$

implying that the rate of change in the coloniser's power due to the change in elite

dimension will rise at high levels of transfer, δ .

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 net output produced in the colony. The extraction function of the coloniser under a composite governance technology is given as:

$$U(\delta, L^e) = \bar{h}^\theta \left(\frac{L - L^e}{L + \delta L^e} \right) \left[A_e L^e (1 + \delta)^\theta + A(L - L^e) - C \right] \quad (17)$$

The coloniser takes A^e, A, L, C, θ and \bar{h} as given and selects δ and L^e to maximise equation 17 above with the relevant first order conditions being²⁴:

With respect to δ :

$$-\left\{ \frac{\bar{h}^\theta L^e (L - L^e) \left\{ A(L - L^e) + A_e (1 + \delta)^\theta L^e \right\}}{(L + \delta L^e)^2} \right\} + \frac{\bar{h}^\theta A_e \theta (1 + \delta)^{\theta-1} (L - L^e) L^e}{L + \delta L^e} = 0 \quad (18)$$

and with respect to L^e :

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

Solving equations 18 and 19 for the optimal δ^* and L^{e*} gives the following relationship:

$$\frac{L^{e*}}{L} = \frac{1 - \frac{\delta^* \theta}{1 + \delta^*} - \frac{2}{(1 + \delta^*)^\theta} \left(\frac{A_e}{A} \right)^{-1}}{2 - \frac{\delta^* \theta}{1 + \delta^*} - \frac{2}{(1 + \delta^*)^\theta} \left(\frac{A_e}{A} \right)^{-1}} \quad (20)$$

where

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

and

²⁴For simplicity, I have dropped the fixed cost term C which does not alter the results.

$$\frac{\partial^2 \left(\frac{L^{e^*}}{L} \right)}{\partial \left(\frac{A_e}{A} \right)^2} < 0 \quad (22)$$

Also

$$\frac{\partial \left(\frac{L^{e^*}}{L} \right)}{\partial \delta} = - \frac{\frac{A_e}{A} \theta (1 + \delta)^\theta \left[\frac{A_e}{A} (1 + \delta)^\theta - 2 - 2\delta \right]}{\left[2(1 + \delta) + \frac{A_e}{A} (1 + \delta)^\theta [\delta(\theta - 2) - 2] \right]^2} \quad (23)$$

which implies that:

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

Equation 24 above also implies that the relationship $\frac{\partial \left(\frac{L^{e^*}}{L} \right)}{\partial \delta} > 0$ is obtained only at values of $\frac{A_e}{A} < \frac{2(1+\delta)}{(1+\delta)^\theta}$. This suggests that there is a range of feasible values of the elite dimension over which an increase in human capital transfers necessitates an increase in the elite dimension and another range over which it reduces the elite dimension. Also, equations 21 and 22 tell us that there is concavity in the relationship between elite dimension and productivity distance between the elites and the masses.

Equation 20 above enables us to simulate the behaviour of elite dimension $\frac{L^{e^*}}{L}$, under a composite governance technology, the results of which are presented in figure 9 in the appendix. Figure 9 suggests the following likely feasible range of elite dimension that maximises the coloniser's objective function: $0.006 \leq \frac{L^{e^*}}{L} \leq 0.44$

Considering the above feasible range of the elite dimension under the defined conditions of $\frac{A_e}{A}$ and θ , and normalising $A = 1$, $L = 10$, $\bar{h} = 5$, and $C = 2$, as before, I simulate equation 17 above for the optimal combination of elite dimension and human capital transfers (δ), that maximises output. The simulated results are summarised in figure 10 in the appendix. The results show three types of equilibria depending on the parameterisation of θ and $\frac{A_e}{A}$.

Scenario One: High human capital transfers to a relatively few elite. The first equilibrium shows that net output is maximised by transferring high human capital to a relatively small elite dimension (about 16% of the population), under constant or increasing returns to human capital and as long as the ratio $\frac{A_e}{A} \geq 2$. This outcome is presented in figure 11 in the appendix.

Scenario Two: Low human capital transfers to a fairly small elite. The second equilibrium suggests that net output is maximised by transferring low human capital to a fairly small elite dimension (about 8% of the population) under decreasing returns and $\frac{A_e}{A} = 2$. This outcome is presented in figure 12 in the appendix.

Scenario Three: Low human capital transfers to a fairly large elite. The third equilibrium suggests that net output is maximised by transferring low human capital to a fairly large elite dimension (about 45% of the population) under decreasing returns and $\frac{A_e}{A} > 5$. This outcome is presented in figure 13 in the appendix.

It can be observed as in the previous cases, that these simulated results are in conformity with the analytical results shown by equations 21, 22 and 24 above.

4.1.2 Interdependent Production

Continuing to use a simple growth model with human capital as the only factor of production, I now assume that the elites and population masses are dependent on one another, represented by the interaction of their respective productions. This feature is obtained by using a Cobb-Douglas form of the production function wherein net output produced in the colony is given as:

$$Y = [A_e L^e (1 + \delta) \bar{h}]^\alpha [A (L - L^e) \bar{h}]^\beta - C \quad (25)$$

Where after simplification gives:

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

where also, A_e and A represents the technology that is available to the elite and mass sectors of the population respectively, and definitionally, $A_e > A$, Y denotes net output, C is an aggregate fixed cost relating to the costs of human capital transfers to the elite. Finally, α and β represents returns to human capital in the elite and mass sectors of society respectively; such that:

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

I assume as before that the power of the coloniser is a function of three different kinds of governance technologies.

Technology of Governance by Numbers Under this technology, the coloniser maximises the following extraction function:

$$Max U(L^e) = \left(\frac{L - L^e}{L} \right) \left\{ \bar{h}^{\alpha+\beta} A^* \left\{ [L^e (1 + \delta)]^\alpha [L - L^e]^\beta \right\} - C \right\} \quad (27)$$

solving equation 27 above gives the following relationship:

$$\frac{L^{e^*}}{L} = \frac{1}{2 + \beta} \quad (28)$$

Equation 28 above suggests that the optimal elite dimension depends solely on the returns to human capital in the mass sector of society and doesn't 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. Taking values of β in the range, $\beta = \{0, 0.5, 1, 1.5, 2\}$, I obtain the feasible range of elite dimension as: $\frac{L^{e^*}}{L} = \{0.25, 0.28, 0.3, 0.4, 0.5\}$. Assuming the range of human capital transfers, $\delta = \{0, 0.5, 1, 2, 5, 10\}$ and simulating these parameters into equation 27 above reveals that output is always maximised by transferring high human capital to a range of elite dimensions that is determined by the returns to human capital in the mass sector of society. In particular, high human capital is transferred to a relatively small elite if the returns to human capital in the mass sector of society are high and correspondingly, high human capital is bestowed on a large elite if the returns to human capital in the mass sector are low.

Technology of Governance by Quality Here the extraction function of the coloniser is given as:

$$Max U(\delta) = \left(\frac{1}{1 + \delta} \right) \left\{ \bar{h}^{\alpha+\beta} A^* \left\{ [L^e (1 + \delta)]^\alpha [L - L^e]^\beta \right\} - C \right\} \quad (29)$$

and the result of the first order condition is:

$$\frac{L^{e^*}}{L} = 1 \quad (30)$$

which implies that, in principle the likely feasible range of elite dimension is $0 \leq \frac{L^{e^*}}{L} \leq 1$

Assuming the range of human capital transfers, $\delta = \{0, 0.5, 1, 2, 5, 10\}$ and simulating

these parameters into equation 29 above to determine the conditions of maximisation of output, reveals that output is always maximised by transferring low human capital to a fairly large elite (about 50% of the population), irrespective of the conditions of return to scale to human capital and irrespective of the technological parameters of the model. However, as in the previous technology of governance, whenever the returns to human capital in the mass sector rises relative to that in the elite sector, it pays to reduce the elite dimension and vice versa.

Composite Technology of Governance The extraction function of the coloniser under a composite governance technology is given as:

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

Solving the first order conditions results in the following relationship:

$$\frac{L^{e*}}{L} = \frac{1}{\left[(1 + \beta) \delta + \frac{(2+\beta)[1+(1-\alpha)\delta]}{\alpha} \right]^{\frac{1}{2}}} \quad (32)$$

which is defined for:

$$\left[(1 + \beta) \delta + \frac{(2 + \beta) [1 + (1 - \alpha) \delta]}{\alpha} \right] > 0 \quad \text{or} \quad \delta > \frac{2 + \beta}{\alpha - \beta - 2}$$

where,

$$\frac{\partial \left(\frac{L^{e*}}{L} \right)}{\partial (\delta)} = \frac{\frac{1}{2}(\alpha - \beta) - 1}{\alpha \left[\frac{2+\beta+\delta(2+\beta-\alpha)}{\alpha} \right]^{\frac{3}{2}}} > 0 \quad \text{when} \quad \alpha < 2 + \beta \quad \text{and} \quad \delta > \frac{2 + \beta}{\alpha - \beta - 2} \quad (33)$$

Also

$$\frac{\partial \left(\frac{L^{e*}}{L} \right)}{\partial \alpha} = \frac{1 + \delta \left(1 + \frac{\beta}{2} \right) + \frac{\beta}{2}}{\alpha^2 \left[\frac{2+\beta+\delta(2+\beta-\alpha)}{\alpha} \right]^{\frac{3}{2}}} > 0 \quad \text{provided} \quad \delta > \frac{2 + \beta}{\alpha - \beta - 2} \quad (34)$$

and

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

Taking values of α in the range, $0.1 \leq \alpha \leq 1.5$ and the range of human capital transfers, $\delta = \{0, 0.5, 1, 2, 5\}$ I obtain the range of feasible elite dimension as: $0.07 \leq \frac{L^{e^*}}{L} \leq 0.71$

Simulating these parameters into equation 31 above reveals that output is maximised under three different scenarios:

Scenario One: High human capital transfers to a fairly small elite (about 7% of total population) - under decreasing returns to scale ($\alpha + \beta < 1$).

Scenario Two: High human capital transfers to a relatively small elite (about 12% of total population) - under constant returns to scale ($\alpha + \beta = 1$).

Scenario Three: High human capital transfers to a relatively large elite (about 22% of total population) - under increasing returns to scale ($\alpha + \beta > 1$).

It can be observed further that in either scenario, as α rises relative to β , output tends to be increasingly maximised by having a relatively larger elite dimension and vice versa.

4.2 Discussion and conclusion

This paper has shown that the transfer of human capital from a coloniser to the elite raises the potential amount of output that the coloniser can appropriate from the colony and the coloniser's power to appropriate the colony's resources is a function of three types of governance technologies namely, a technology of numbers, a technology of quality and a composite technology of numbers and quality. Using an additively separable production function, I have shown that there exists multiple equilibria associated with varying combinations of elite dimension and human capital transfers that maximise the coloniser's objective function, depending on the technology of governance chosen by the coloniser, and depending also, on the parameterisation of the productivity distance between elites and the population masses and on the returns to human capital. These equilibria range from high human capital transfers to a fairly large elite under a governance technology by numbers, through either high or low human capital transfers to a fairly large elite under a governance technology by quality, to high human capital transfers to a relatively small elite or low human capital transfers to either a fairly small or large elite under a composite governance technology. An alternative set of multiple equilibria arises under a

Cobb-Douglas form of the production function.

A review of historical data confirms across most former colonies that on average, the colonisers' tended to choose differing proportions of the elite population though never really attaining 15% of the population, and also the quality of education transferred to the elite has varied considerably across colonies and from one metropolitan power to the other. Whilst the British generally tolerated a relatively broader elite dimension in their former colonies, in contrast with the French, the evidence suggests that the former equally transferred relatively low quality human capital to its former colonies (compared to what the French did in theirs). The implications of this analysis is that, a few elite with high human capital endowment enjoys high rents and the income distance between them and the populace is much wider, which in turn implies that, this elite stands to gain more from a coalition with the coloniser than with the population masses (because redistribution that will ensue from a coalition with the masses lowers its rents). Consequently, a few elite with high human capital is likely to be strongly co-opted, ensuring that the coloniser enjoys returns over a longer timespan and the decolonisation process in this scenario might be somewhat sluggish.

On the other hand, a large elite with relatively low human capital endowment enjoys smaller rents and the income distance between them and the populace is narrow, which explains why such an elite is more likely to enter a coalition with the masses than with the coloniser. It can be expected that a coalition between the elite and the masses will most likely accelerate the pace of decolonisation.

This insight may be helpful in understanding why France has apparently maintained a strong grip over its former colonies in sub-Saharan Africa even in the aftermath of independence whilst British control over its former colonies has almost eroded completely. With the exception of Algeria where French imperialism was strongly resisted, almost everywhere in former French colonial Africa there continue to exist a strong tie between the ruling elite and France. A typical illustration is Cote d'Ivoire, where the relationship between France and its former colony paradoxically improved dramatically after independence with the number of French residents in that country rising from 10,000 to 50,000 at the dawn of independence making Cote d'Ivoire home to one of the largest French communities living outside France. Evidence suggests that until the 1980s, there were still about 12,000 French personnel in government service in the Cote d'Ivoire and Cote d'Ivoire employed the highest number of French teachers and technicians in Africa and also sent the highest number of students to French universities. This sharply contrasts

with the situation in British former colonies where on the most, relations nearly collapsed with Britain. Furthermore, unlike in former British West Africa where everyone who was politically conscious was automatically a nationalist of some kind, in French West Africa on the contrary, the elite never campaigned for independence from France, instead they pressed for a '*Union Francaise*' - a new political federation between France and Africa²⁵.

One of the most emblematic figures of French assimilation policy in Africa is Leopold Senghor of Senegal who is quoted to have declared that: '*To be "a Frenchman above all" is an excellent prescription on the political level*'. Evidently, the French were more successful in cultivating a small black elite to whom they accorded full rights of citizenship in France on condition ofcourse, that these elites accept assimilation into French society and reject their African heritage, family law and customs. No wonder these elites saw themselves and were seen, as Frenchmen²⁶, brought up in a tradition of loyalty to France, willingly accepting its government, its language and culture, which was not the case in former British colonies. How else could one explain the radical stance of many former British colonies against Britain as opposed to the continued allegiance of former French colonies to France? If the success of colonisation could be measured uniquely in terms of a sustained influence and extraction, then French colonisation might have been more successful than the British.

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²⁵Cohen (1971:204) notes that 'independence has by no means broken the close ties between France and it's former colonies. The legacy of assimilation has continued. France, more than any other former colonial power feels committed to aiding her ex-dependencies. The French government gives her former colonies in Black Africa more aid than does Britain to her entire commonwealth, which contains fifteen times as large a population'.

²⁶The other emblematic figure of French assimilation in Africa is Felix Houphouet-Boigny of Cote d'Ivoire, who together with Senghor became ministers in the French government and staunch supporters of the '*Union Francaise*', ensuring that French influence prevailed even when the empire started crumbling. Houphouet is reputed to have raised a wager, in April 1957 - a month after Ghana obtained its independence from Britain - between his country, Cote d'Ivoire (which remained attached to its former colonial master France), and Ghana, which chosed the opposite route, to see which of the two countries will be more successful in the following ten years and ofcourse history vindicated him.

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Figure 1: Comparative statistics on educational provision and income distance between elites and the masses, by colonial experience for selected SSA countries.

British Former Colonies in SSA										French Former Colonies in SSA									
Country	Ind Date	% Gross Pri Enrol			% Gross Sec Enrol			%Terc	Income	Country	Ind Date	% Gross Pri Enrol			% Gross Sec Enrol			%Terc	Income
		1950	1960	Yr/Indep	1950	1960	Yr/Indep	1965	Dist/Indep			1950	1960	Yr/Indep	1950	1960	Yr/Indep	1965	Dist/Indep
Botswana	1966	0	42	65	0	1	3.8	NA	210.5	Benin	1960	13	27	27	0	2	2	0.1	9.39
Gambia, The	1965	0	12	21	0	3	6	NA		Burkina Faso	1960	NA	NA	NA	NA	NA	NA	0.1	362
Ghana	1957	0	38	19.4	0	5	0.2	1	38.16	Cameroon	1960	7	65	65	0	2	2	0.1	67.75
Kenya	1963	33	47	51.2	0	2	3.2	0.1	50.86	Cape Verde	1960	NA	NA	NA	0	2	2	NA	NA
Lesotho	1966	61	83	92.6	1	3	4.6	0.1	41.89	Central African R.	1960	0	32	32	0	1	1	NA	102.96
Malawi	1964	27.64	38.54	42.91	0	1	1.8	0.1	16.91	Chad	1960	0	17	17	NA	NA	NA	NA	9.59
Nigeria	1960	44	36	36	2	4	4	0.1	30.64	Congo, Rep.	1960	6	78	78	0	4	4	1	NA
Sierra Leone	1961	11	23	24.2	0	2	2.6	0.1	14.92	Cote d'Ivoire	1960	18	46	46	0	2	2	0.1	14.52
Sudan	1956	17	25	21.8	1	3	2.2	NA	17.37	Guinea	1958	NA	NA	NA	NA	NA	NA	0.1	131.62
Swaziland	1968	26	58	81.8	0	5	14	NA	50.2	Madagascar	1960	26	52	52	0	4	4	1	22.09
Tanzania	1961	11	25	26.4	2	2	2	0.1	19.37	Mali	1960	0	10	10	0	1	1	0.1	348.17
Uganda	1962	13	49	56.2	1	3	3.4	0.1	12.79	Mauritania	1960	0	8	8	NA	NA	NA	NA	705.11
Zambia	1964	20	42	50.8	0	2	6	NA	16.92	Niger	1960	0	5	5	1	1	1	NA	47.43
Zimbabwe	1980	68	96	88	6	6	8	0.1	26.82	Senegal	1960	1	27	27	0	3	3	1	39.83
										Somalia	1960	7	9	9	0	1	1	0.1	23.73
										Togo	1960	22	44	44	0	2	2	0.1	NA
Average		23.69	43.9	48.38	0.93	3	4.41	0.2	42.1	Average		7.69	35.31	35.31	0.08	2.08	2.08	0.34	144.9

Sources: Alesina et al (1992) for Primary & Secondary Enrolments; Global Development Finance & World Development Indicators for Tertiary Enrolment (Terc) data.
Income distance at independence(Income dist/Indep) is got by taking the ratio of income of top 10% and bottom 10% of population available from World Income Inequality datasets
Yr/Indep: figure obtained in the year of independence, NA: data not available, hence not included in sample average

Figure 2: Simulated behaviour of elite dimension under a governance technology by numbers

Delta = 0					Delta = 0.5				
Ae/A	1	2	5	10	Ae/A	1	2	5	10
Theta					Theta				
0.1	UD	1	0.6	0.5	0.1	NF	0.9	0.6	0.5
0.5	UD	1	0.6	0.5	0.5	NF	0.8	0.6	0.5
1	UD	1	0.6	0.5	1	NF	0.7	0.6	0.5
1.5	UD	1	0.6	0.5	1.5	NF	0.7	0.6	0.5
UD: Undefined					NF: Not Feasible (Above 1)				
Delta = 1					Delta = 2				
Ae/A	1	2	5	10	Ae/A	1	2	5	10
Theta					Theta				
0.1	NF	0.9	0.6	0.5	0.1	NF	0.9	0.6	0.5
0.5	NF	0.7	0.6	0.5	0.5	NF	0.7	0.6	0.5
1	1	0.7	0.6	0.5	1	0.7	0.6	0.6	0.5
1.5	0.8	0.6	0.6	0.5	1.5	0.6	0.5	0.6	0.5
NF: Not Feasible (Above 1)					NF: Not Feasible (Above 1)				
Delta = 5					Delta = 10				
Ae/A	1	2	5	10	Ae/A	1	2	5	10
Theta					Theta				
0.1	NF	0.8	0.6	0.5	0.1	NF	0.8	0.6	0.5
0.5	0.8	0.6	0.6	0.5	0.5	0.7	0.6	0.6	0.5
1	0.6	0.5	0.6	0.5	1	0.5	0.5	0.6	0.5
1.5	0.5	0.5	0.6	0.5	1.5	0.5	0.5	0.6	0.5
NF: Not Feasible (Above 1)					NF: Not Feasible (Above 1)				

Figure 3: Conditions of output maximisation under Technology of governance by numbers

Conditions of Output Maximisation under Governance Technology by Numbers					
Delta	Low		High		
Elite Size					
Small					
Large (50% of Pop)	Irrespective of A_e/A and Theta				

Figure 4: Output maximisation under governance technology by numbers (high human capital transferred to a fairly large elite)

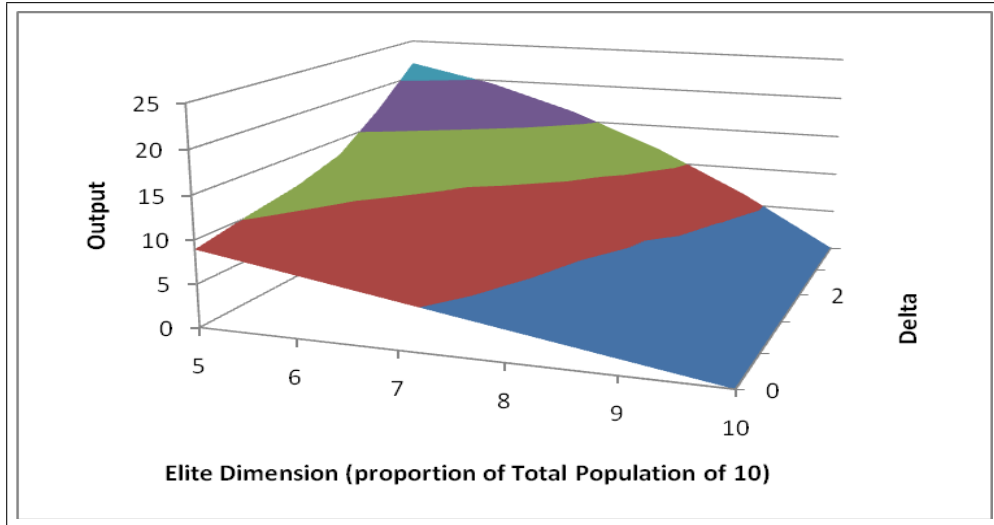


Figure 5: Simulated behaviour of elite dimension under technology of governance by quality

Delta = 0					Delta = 0.5				
Ae/A	1	2	5	10	Ae/A	1	2	5	10
Theta					Theta				
1	0.8	0.8	0.8	0.8	1	0.8	0.8	0.8	0.8
1.1	0.7	0.6	0.5	0.4	1.1	0.7	0.6	0.4	0.3
1.3	0.6	0.5	0.3	0.2	1.3	0.5	0.4	0.2	0.1
1.5	0.5	0.4	0.2	0.1	1.5	0.4	0.3	0.1	0.08
Delta = 1					Delta = 2				
Ae/A	1	2	5	10	Ae/A	1	2	5	10
Theta					Theta				
1	0.8	0.8	0.8	0.8	1	0.8	0.8	0.8	0.8
1.1	0.6	0.5	0.3	0.2	1.1	0.6	0.5	0.3	0.2
1.3	0.5	0.3	0.1	0.09	1.3	0.3	0.2	0.1	0.06
1.5	0.3	0.2	0.09	0.05	1.5	0.2	0.1	0.06	0.03
Delta = 5					Delta = 10				
Ae/A	1	2	5	10	Ae/A	1	2	5	10
Theta					Theta				
1	0.8	0.8	0.8	0.8	1	0.8	0.8	0.8	0.8
1.1	0.5	0.3	0.2	0.1	1.1	0.3	0.2	0.1	0.05
1.3	0.2	0.1	0.05	0.02	1.3	0.1	0.05	0.02	0.01
1.5	0.09	0.05	0.02	0.01	1.5	0.04	0.02	0.008	0.004

Figure 6: Conditions of output maximisation under technology of governance by quality

Conditions of Output Maximisation under Governance Technology by Quality			
Delta	Low		High
Elite Size			
Small			
Large	Ae/A greater than or equal to 1 and Theta=0.5		Both Ae/A and Theta greater than or equal to 1

Figure 7: Output maximisation under governance technology by quality (high human capital transferred to a fairly large elite)

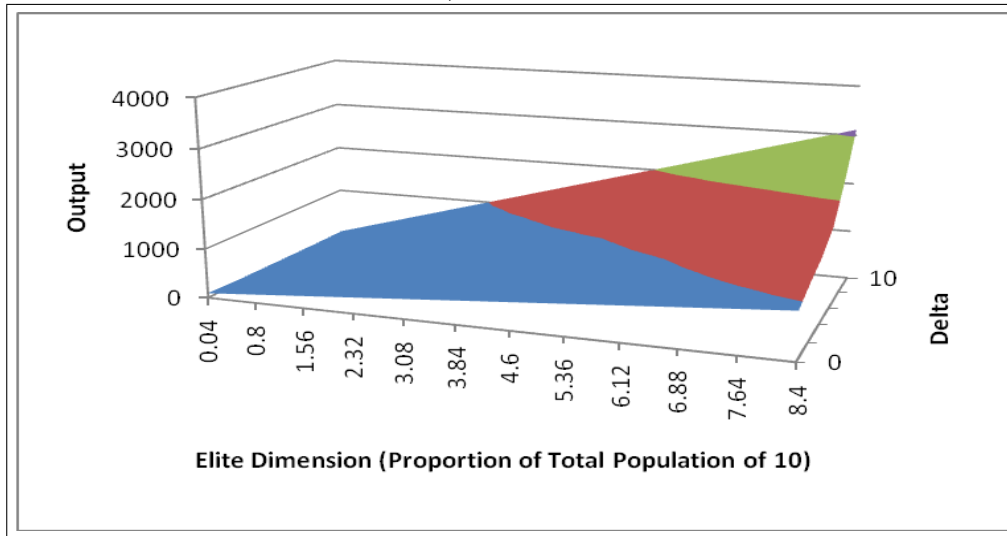


Figure 8: Output maximisation under governance technology by quality (low human capital transferred to a fairly large elite)

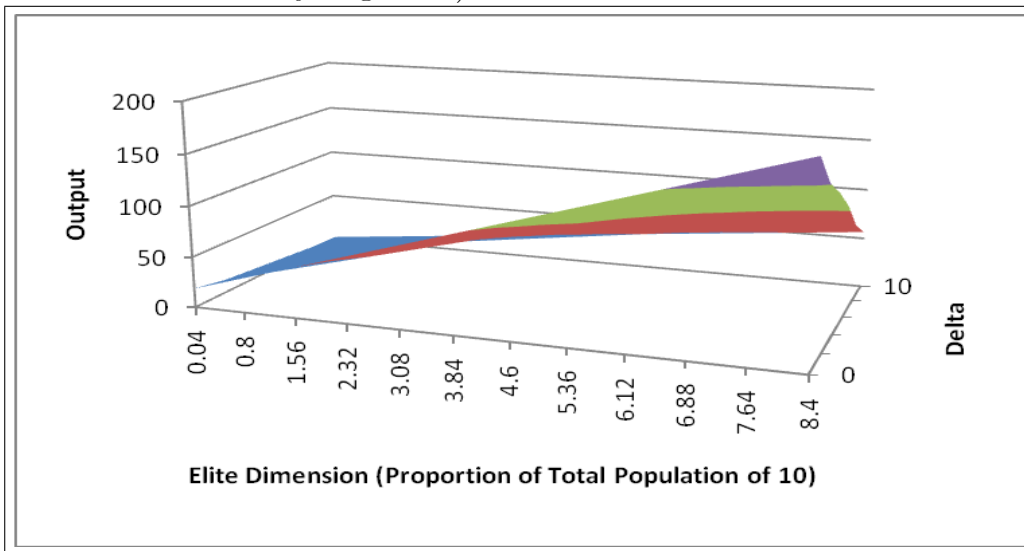


Figure 9: Simulated behaviour of elite dimension under a composite governance technology

Delta = 0					Delta = 0.5				
Ae/A	2	5	8	10	Ae/A	2	5	8	10
Theta					Theta				
0.1	0	0.4	0.4	0.4	0.1	0.006	0.37	0.42	0.44
0.5	0	0.4	0.4	0.4	0.5	0.02	0.34	0.38	0.4
1	0	0.4	0.4	0.4	1	NF	0.28	0.33	0.35
1.5	0	0.4	0.4	0.4	1.5	NF	0.22	0.27	0.28
NF: Not Feasible (or taking negative values)					NF: Not Feasible (or taking negative values)				
Delta = 1					Delta = 2				
Ae/A	2	5	8	10	Ae/A	2	5	8	10
Theta					Theta				
0.1	0.02	0.36	0.42	0.43	0.1	0.04	0.36	0.41	0.44
0.5	0.04	0.32	0.36	0.38	0.5	0.08	0.3	0.34	0.35
1	0	0.23	0.27	0.28	1	NF	0.17	0.2	0.21
1.5	NF	0.09	0.14	0.15	1.5	NF	NF	NF	NF
NF: Not Feasible (or taking negative values)					NF: Not Feasible (or taking negative values)				
Delta = 5					Delta = 10				
Ae/A	2	5	8	10	Ae/A	2	5	8	10
Theta					Theta				
0.1	0.07	0.37	0.41	0.43	0.1	0.11	0.37	0.42	0.43
0.5	0.15	0.29	0.32	0.33	0.5	0.19	0.29	0.32	0.33
1	NF	0.09	0.11	0.12	1	NF	NF	0.06	0.07
1.5	NF	NF	NF	NF	1.5	NF	NF	NF	NF
NF: Not Feasible (or taking negative values)					NF: Not Feasible (or taking negative values)				

Figure 10: Conditions of output maximisation under a composite technology of governance

Conditions of Output Maximisation under a Composite Technology of Governance			
Delta	Low		High
Elite Size			
Fairly Small(8% of Pop)	Ae/A =2 and Theta=0.5		
Relatively Small(16% of Pop)			Ae/A greater than or equal to 2 and Theta greater or equal to 1
Large(45% of Pop)	Ae/A greater than 5 and Theta=0.5		

Figure 11: Output maximisation under composite governance technology (high human capital transferred to a fairly large elite)

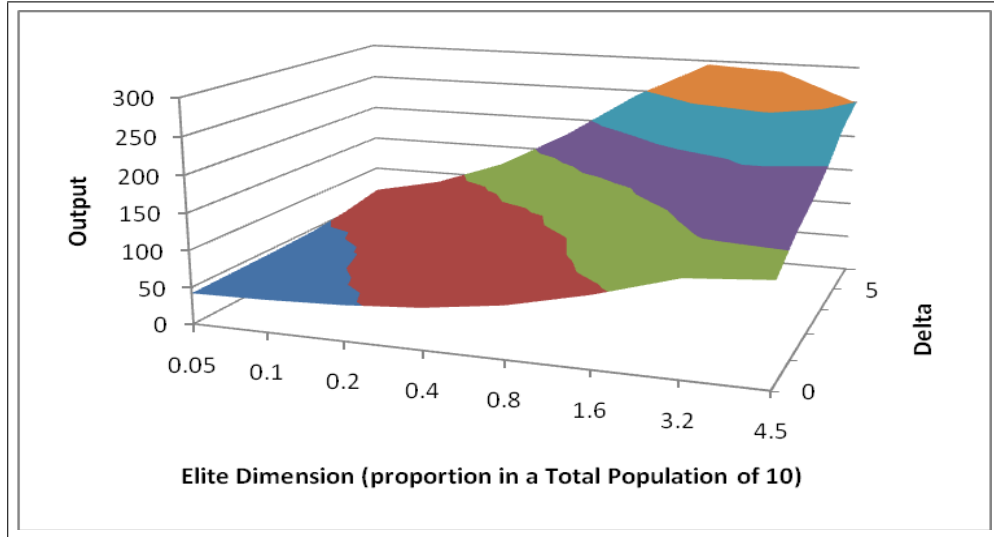


Figure 12: Output maximisation under composite governance technology (low human capital transferred to a relatively small elite)

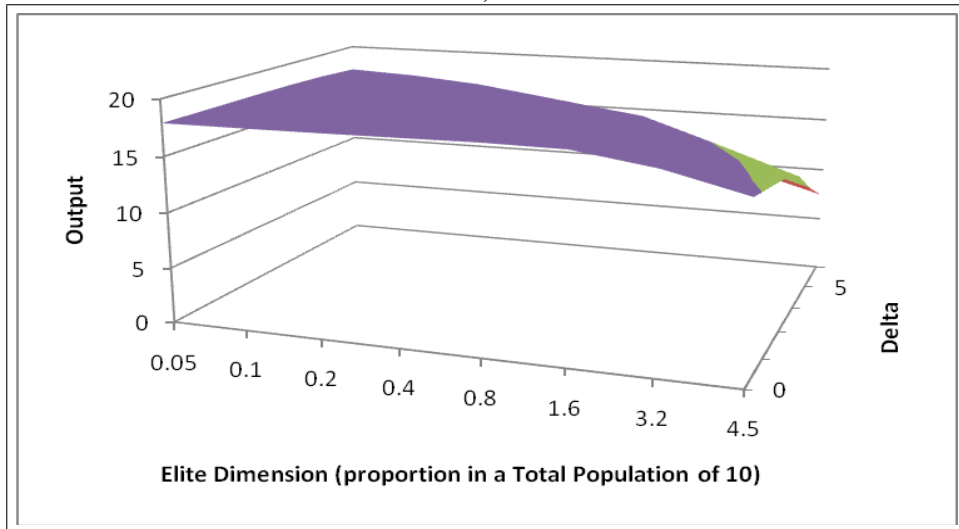


Figure 13: Output maximisation under composite governance technology (low human capital transferred to a fairly large elite)

