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THE PROFITABILITY OF COLONIALISM

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ABSTRACT

This paper develops an analytical framework for studying colonial investment from the perspective of neoclassical political economy. The distinguishing feature of colonial investment in this model is that the metropolitan government restricts the amount of investment in the colony in order to maximize the net profits earned in the colony. The model explicitly includes the threat of extralegal appropriative activities by the indigenous population in the colony.

The analysis of this model identifies the conditions, where these conditions include both the technology of production and the technology of extralegal appropriation, that determine the profitability of colonialism. The analysis suggests why historically some countries but not others became colonies and why many colonies that were initially profitable subsequently become unprofitable and were abandoned. The model also has implications for the amount of investment, the allocation of resources between productive and appropriative activities, and the distribution of income in colonies.

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This paper develops an analytical framework for studying colonial investment from the perspective of neoclassical political economy. The analysis focuses on instances of colonialism, perhaps best exemplified by modern European and Japanese colonialism in parts of Asia, in which, as suggested by Peter Svedberg (1981, 1982), the primary motivation for establishing colonies was the monopolization of investment. In the analysis metropolitan countries export capital to colonies in order to work with indigenous labor, but each metropolitan government limits the opportunity to invest in its colonies to its own citizens, or perhaps to a politically favored subset of its citizens, and, more importantly, restricts the amount of investment in each colony in order to maximize the net profits earned in the colony.[1] These restrictions distinguish colonial investment from generic international investment. Svedberg (1981) describes how these restrictions on investment actually were enforced in modern European and Japanese colonies.[2]

An important innovation in this paper is the explicit inclusion of the threat of extralegal appropriative activity in a colony. We model extralegal appropriation as an attempt by elements of the indigenous population, who engage in activities like banditry, to steal the profit income of the colonial firms.[3]

The central objective of the analysis is to discover the conditions, where these conditions include both the technology of production and the technology of extralegal appropriation, that determine the profitability of colonial investment. We want especially to

[1] The analysis abstracts from indigenous natural resources. Hence, it does not address instances of colonialism in which metropolitan countries exported either capital or labor in order to exploit natural resources in their colonies.

[2] Svedberg (1982) finds that from 1938 to 1957 the rate of return to British investment was significantly higher in British colonies than in other LDC's. Lance Davis and Robert Huttenback (1988) find that from 1860 to 1880 the rate of return to British investment was higher in British colonies than in Great Britain itself, but that this difference did not persist from 1880 to 1914. The literature on colonialism also discusses possible monopolization of colonial trade, but Svedberg (1981) finds that "the metropolitan countries' shares of foreign direct investment in their colonies were markedly higher than their shares in trade" (p. 25). In any event, extending our analysis to allow for colonial trade as well as investment would not change the main results.

[3] An alternative would be to model extralegal appropriation as an attempt by the indigenous population, possibly in the form of an independence movement, to expropriate the capital of the colonial firms. The main results of the analysis would obtain in this alternative framework as well.

determine why historically some countries but not others became colonies and why many colonies that initially were profitable subsequently became unprofitable and were abandoned. A further objective is to understand the amount of investment, the allocation of resources between production and appropriative activities, and the distribution of income in colonies.[4]

Colonial Firms

In this model there are two countries: a metropolis and a potential or actual colony. The essential actors in the model are the metropolitan government, the metropolitan capitalists whose firms invest in the colony, and the indigenous colonial population. The metropolitan government licenses K firms to invest in the colony, $K \geq 0$. Each colonial firm invests one unit of capital. Other capital imports into the colony are prohibited. (Capital can include some human capital necessary to manage the physical capital.)

Once capital is in place in the colony, it cannot be removed and it does not depreciate. Thus, disinvestment is not possible and capital in place has no alternative cost. Extending the analysis to consider both depreciation as well as possible repatriation of capital would be conceptually straightforward. The colonial firms hire indigenous labor for wages in a competitive labor market.[5]

Output per colonial firm is h^α, $0 < \alpha < 1$, where h is units of labor time employed by each firm. Given this technology, gross profits of each colonial firm are

$$\pi = h^\alpha - wh \tag{1}$$

where w is the wage rate per unit of labor time. Each firm takes the wage rate as given

[4] In this respect the present model adds to the growing literature on general equilibrium models of resource allocation and income distribution with both productive and appropriative activities. See, for example, Grossman (1991) and Grossman (1994), which also provide additional references.

[5] In practice, colonial firms, with the support of the metropolitan government, sometimes also monopsonized the labor market. The analysis with a noncompetitive labor market would be more complex, but our main conclusions would not change.

and selects h to maximize π. This maximization implies that h satisfies

$$h^{1-\alpha} = \frac{\alpha}{w}. \tag{2}$$

The average indigenous worker family supplies L units of wage labor time. There are N indigenous worker families. Thus, the market-clearing condition for the labor market is

$$Kh = NL. \tag{3}$$

Taken together, equations (1), (2) and (3) imply that the market-clearing wage rate satisfies

$$w = \frac{\alpha}{\left(\frac{NL}{K}\right)^{1-\alpha}}, \tag{4}$$

and that the resulting gross profits of each colonial firm are

$$\pi = (1-\alpha)\left(\frac{NL}{K}\right)^{\alpha}. \tag{5}$$

Equations (4) and (5) show that the wage share of output is α and that the profit share of output is $1-\alpha$. Total gross profits of the colonial sector are

$$K\pi = (1-\alpha)Y, \tag{6}$$

where $Y = K^{1-\alpha}(NL)^{\alpha}$ is the total output in the colonial sector.

The colonial firms also face the threat of extralegal appropriative activities. Let β, $0 \leq \beta \leq 1$, represent the fraction of the profits that colonial firms lose to extralegal appropriation. Then, the profits of the colonial sector net of extralegal appropriation are given by

$$(1-\beta)K\pi = (1-\beta)(1-\alpha)Y. \tag{7}$$

A natural assumption is that, for $\beta < 1$, β is an increasing function of $\frac{NB}{K}$, where B is the amount of time that the average indigenous family allocates to extralegal appropriation and, hence, $\frac{NB}{K}$ is the total time that indigenous families allocate to extralegal appropriation per colonial firm. A simple technology of extralegal appropriation that incorporates this assumption is

$$\beta = \begin{cases} \phi \frac{NB}{K} & \text{for } \frac{NB}{K} < \frac{1}{\phi} \\ 1 & \text{for } \frac{NB}{K} \geq \frac{1}{\phi} \end{cases} \tag{8}$$

where $\phi \geq 0$. In equation (8), the parameter ϕ determines the effectiveness of time allocated to extralegal appropriative activities. As long as β is less than unity, the larger is ϕ the larger is both the average and marginal effect of $\frac{NB}{K}$ on β.

Indigenous Labor

The indigenous families divide their time among working for wages in the colonial sector, self employment in an indigenous sector, or engaging in extralegal appropriation. Specifically, each indigenous family is endowed with one unit of time of which it allocates the fraction ℓ, $0 \leq \ell \leq 1$, to wage employment, the fraction f, $0 \leq f \leq 1$, to self employment, and the fraction b, $0 \leq b \leq 1$, to extralegal appropriative activities. In equilibrium, because all indigenous families are identical, the vector (ℓ, f, b) will be the same for all indigenous families as the vector (L, F, B), where L, F, and B represent the amount of time that the average family allocates to wage employment, to self employment, and to extralegal appropriate activities, respectively.

The return from self-employment is f^{α}. (The assumption that the elasticity of the marginal product of labor equals α in both the colonial sector and the indigenous sector is a convenient simplification.) The returns from extralegal appropriations are divided among the indigenous worker families proportionately to time allocated by each family to appropriative activities. Accordingly, an individual family's income from extralegal appropriation is $\beta \frac{K\pi}{N} \frac{b}{B}$, which, from equation (8), is equivalent, for $\beta < 1$, to $\phi \pi b$.

Each indigenous family takes w and $\phi\pi$ as given and selects ℓ, f, and b, subject to the constraint $\ell + f + b = 1$, to maximize its income, i. The above assumptions imply that

$$i = w\ell + f^{\alpha} + \phi\pi b. \tag{9}$$

Given equation (9), the marginal returns to time allocated to wage employment, self employment and appropriation are w, $\alpha f^{\alpha-1}$, and $\phi\pi$, respectively.

The Kuhn-Tucker conditions for this maximization problem imply

$$f = \begin{cases} \max\left[\left(\frac{\alpha}{w}\right)^{\frac{1}{1-\alpha}}, \left(\frac{\alpha}{\phi\pi}\right)^{\frac{1}{1-\alpha}}\right] & \text{for} \quad \alpha < \max(w,\ \phi\pi) \\ 1 & \text{for} \quad \alpha \geq \max(w, \phi\pi) \end{cases} \tag{10}$$

$$\ell = \begin{cases} 0 & \text{for} \quad w < \phi\pi \\ [0, 1-f] & \text{for} \quad w = \phi\pi \\ 1-f & \text{for} \quad w > \phi\pi \end{cases} \tag{11}$$

$$b = 1 - f - \ell. \tag{12}$$

According to equations (10) - (12), indigenous families allocate time to self employment either until the marginal return to self employment equals the marginal return to wage employment or the marginal return to extralegal appropriation, whichever is greater, or until all time is allocated to self employment. Moreover, if either wage employment or extralegal appropriative activities has a higher marginal rate of return, then indigenous families allocate all of their remaining time to that activity. Indigenous families allocate time to both wage employment and extralegal appropriation only if the marginal returns to these activities are equal.

From equations (10) - (12), which describe the behavior of each individual indigenous family, we can infer the behavior of the average indigenous family. Equations (10) - (12) imply that, if $w > \phi\pi$, then $\ell = 1 - f$, $f = (\frac{\alpha}{w})^{\frac{1}{1-\alpha}}$, and $b = 0$. Equations (10) - (12) also imply that, if $w = \phi\pi$, then $\ell \leq 1 - f$, $f = (\frac{\alpha}{w})^{\frac{1}{1-\alpha}}$, and $b = 1 - \ell - f \geq 0$. (We can ignore the possibility of $w < \phi\pi$ because this inequality would imply $\ell = 0$, but would be inconsistent with $L = 0$.)

Then, replacing (ℓ, f, b) by (L, F, B) in equations (10) - (12), defining a variable $\theta \equiv \frac{\phi}{1+\phi}$, and using equations (4) and (5) for w and π, we see that the behavior of the average indigenous family falls into one of three cases depending on the value of K :

I) If $\frac{K}{N} > \frac{\theta-\alpha}{\alpha(1-\theta)}$, then we have $w > \phi\pi$ and we have $L = \frac{K}{K+N}$, $F = \frac{NL}{K} = \frac{N}{K+N}$, and $B = 0$. Note that, if $\alpha > \theta$, then case I applies for all $K \geq 0$. In case I, L is increasing concave function of $\frac{K}{N}$, F is a decreasing convex function of $\frac{K}{N}$, and B equals zero and is independent of $\frac{K}{N}$. Moreover, $B = 0$ implies $\beta = 0$. In case I, the wage rate is high enough relative to the marginal return to time allocated to extralegal appropriation that indigenous families choose to allocate no time to extralegal appropriation.

II) If $\frac{\theta-\alpha}{\alpha(1-\theta)} \geq \frac{K}{N} > \frac{\theta-\alpha}{1-\theta}$, then we have $w = \phi\pi$ and we have $L = \frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha}\frac{K}{N}$, $F = \frac{NL}{K} = \frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha}$, and $B = 1 - \frac{K+N}{K}L = 1 - \frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha}\frac{K+N}{N}$. In case II, L is an increasing linear function of $\frac{K}{N}$, F is independent of $\frac{K}{N}$, and B is a decreasing linear function of $\frac{K}{N}$. The value of B in case II is such that $0 \leq \beta < 1$. Note that case II, as well as case III, can apply only if $\theta \geq \alpha$. Let $\overline{K}$, which equals $\frac{\theta-\alpha}{\alpha(1-\theta)}N$, denote the value of K that, with $\theta > \alpha$, is just large enough to induce the indigenous families to choose $B = 0$. Note that $\overline{K}$ is a decreasing function of α and an increasing function of θ.

III) If $\frac{\theta-\alpha}{1-\theta} \geq \frac{K}{N} > 0$, then we have $w = \phi\pi$ and we have $L = (\frac{N}{K} + \frac{1}{\alpha})^{-1}$, $F = \frac{NL}{K} = (1 + \frac{1}{\alpha}\frac{K}{N})^{-1}$, and $B = \frac{1-\alpha}{\alpha}L$. In case III, L is an increasing convex function of $\frac{K}{N}$, F is a decreasing convex function of $\frac{K}{N}$, and B is an increasing convex function of $\frac{K}{N}$. Moreover, the value of B is such that $\beta = 1$. In case III, the wage rate is sufficiently low relative to the marginal return to time allocated to extralegal appropriation that indigenous families allocate enough time to extralegal appropriation to appropriate all profits.

The Decision to Create a Colony

Let M denote the profits of the colonial sector net of extralegal appropriation and net of the opportunity cost of capital, rK. Thus,

$$M = (1 - \beta)K\pi - rK, \tag{13}$$

where $(1 - \beta)K\pi$ is given by equation (7). The metropolitan government chooses the number of firms, K, to license to invest in the colony in order to maximize M. The constraints on this maximization are the technology of extralegal appropriation, given by equation (8), and the behavior of the average indigenous family in the three cases described above. Let K^* represent the value of K the maximizes M.

Consider first a situation of $\alpha > \theta$. With $\alpha > \theta$, as noted above, case I for the behavior of the average indigenous family applies for all $K \geq 0$. In this case, we have $\beta = B = 0$ and equation (13) becomes

$$M = K\pi - rK = (1 - \alpha)K^{1-\alpha}(NL)^{\alpha} - rK, \tag{14}$$

where $L = \frac{K}{K+N}$. From equation (14), we calculate

$$\frac{dM}{dK} = (1 - \alpha)(\frac{N}{K + N})^{\alpha}(1 - \frac{\alpha K}{K + N}) - r \tag{15}$$

and

$$\frac{d^2M}{dK^2} = -\frac{(1 - \alpha)^2}{K + N}(\frac{N}{K + N})^{\alpha}. \tag{16}$$

Equations (15) and (16) show that, with $\alpha > \theta$, M is a concave function of K. Moreover, if $1 - \alpha \leq r$, then this function is decreasing in K, but, if $1 - \alpha > r$, then this function has an interior maximum at which $\frac{dM}{dK} = 0$ and K is positive. Let $\hat{K}$ denote the value of K at this interior maximum if it exists. With $\alpha > \theta$, the Kuhn-Tucker conditions for the maximization of M imply that, if $1 - \alpha \leq r$, then $K^* = 0$, whereas, if $1 - \alpha > r$, then $K^* = \hat{K} > 0$. In addition, equation (15) implies that $\hat{K}$ is a decreasing function of α and r, but that $\hat{K}$ increases proportionately with N.

Consider next the alternative situation of $\theta \geq \alpha$. With $\theta \geq \alpha$, as noted above, cases I, II or III for the behavior of the average indigenous family can apply. In case III, which applies if $\frac{\theta-\alpha}{1-\theta} > \frac{K}{N} \geq 0$, we have $\beta = 1$, and equation (13) becomes

$$M = -rK. \tag{17}$$

From equation (17), we calculate

$$\frac{dM}{dK} = -r. \tag{18}$$

Equation (18) implies that, with $\theta \geq \alpha$, over the range $\frac{\theta-\alpha}{1-\theta} > \frac{K}{N} \geq 0$, M is a decreasing function of K.

In case II, which applies if $\overline{K} \geq K \geq \frac{\theta-\alpha}{1-\theta}N$, we have $L = \frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha}\frac{K}{N}$ and $B = 1 - \frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha}\frac{K+N}{N}$, and equation (13) becomes

$$M = (K - \frac{\theta-\alpha}{1-\theta}N)(\frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha})^{\alpha} - rK. \tag{19}$$

Recall that $\overline{K} = \frac{\theta-\alpha}{\alpha(1-\theta)}N$ is the value of K just large enough, with $\theta > \alpha$, to induce $B = 0$. From equation (19), we calculate

$$\frac{dM}{dK} = (\frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha})^{\alpha} - r. \tag{20}$$

Equations (19) and (20) imply that, with $\theta \geq \alpha$, if $(1-\alpha)(\frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha})^{\alpha} > r$, then over the range $\overline{K} \geq K > \frac{\theta-\alpha}{1-\theta}N$, M is an increasing function of K and M is positive at $K = \overline{K}$.

In case I, which applies if $K > \overline{K}$, equations (14), (15), and (16) are relevant. Equation (15) implies that, with $\theta \geq \alpha$, in the limit as K approaches $\overline{K}$, M is an increasing or decreasing function of K — that is, the interior maximum $\hat{K}$, if it exists, is larger or smaller than $\overline{K}$ — as $(\frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha})^{\alpha}[1-\alpha(2-\frac{\alpha}{\theta})]$ is larger or smaller than r.

Taking cases I, II, and III together, with $\theta \geq \alpha$, the Kuhn-Tucker conditions for the maximization of M imply the following:

First, if $(1-\alpha)(\frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha})^{\alpha} \leq r$, then $K^{*} = 0$.

Second, if $(1-\alpha)(\frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha})^{\alpha} > r \geq (\frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha})^{\alpha}[1-\alpha(2-\frac{\alpha}{\theta})]$, then $K^* = \overline{K} > 0$.
Third, if $(\frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha})^{\alpha}[1-\alpha(2-\frac{\alpha}{\theta})] > r$, then $K^* = \hat{K} > \overline{K}$.
In all three cases, K^* is sufficiently large to induce indigenous families to choose $B = 0$.

In sum, K^* is positive — that is, colonial investment is profitable — either if $\alpha > \theta$ and $1-\alpha > r$ or if $\theta \geq \alpha$ and $(1-\alpha)(\frac{1-\theta}{\theta}\frac{\alpha}{1-\alpha})^{\alpha} > r$. With $\alpha > \theta$, the wage share is high enough relative to the effectiveness of time allocated to extralegal appropriative activities that, regardless of the amount of investment, indigenous families allocate no time to extralegal appropriation. Nevertheless, for colonial investment to be profitable, neither α nor the cost of capital, r, can be too large.

In contrast, with $\theta \geq \alpha$, in order for indigenous families to choose to allocate no time to extralegal appropriation, investment in the colony must be large enough to make the wage rate higher than the marginal return to extralegal appropriation. As we have seen, a decision to create a colony would always imply at least this amount of investment. Nevertheless, for colonial investment to be profitable, neither θ nor r can be too large.

If K^* is positive, then K^* is proportionate to N and is decreasing in α. Moreover, if K^* equals $\hat{K}$, then K^* is decreasing in r but is independent of θ. Alternatively, if K^* equals $\overline{K}$, then K^* is independent of r but is increasing in θ. In this situation an increase in the effectiveness of time allocated to appropriative activities causes an increase in amount of investment necessary to induce indigenous families to allocate no time to appropriative activities. Thus, although for too large values of θ the metropolitan government does not create a colony, for intermediate values of θ a larger θ causes more investment in the colony.

With $K^* = 0$, the net profits of the colonial sector, M, are zero and the income of each indigenous family, i, equals unity. But, with $K^* = \overline{K}$, M is positive and i is larger than unity. Thus, a decrease either in θ or in r that makes colonial investment profitable benefits both the colonial firms and the indigenous families.

It is also easy to show that with $K^* = \overline{K}$, M is a decreasing function of θ and

i is an increasing function of θ. In this situation an increase in the effectiveness of time allocated to extralegal appropriative activities requires an increase in investment in order to induce the average indigenous family to allocate no time to extralegal appropriation. Because, with $K^* = \overline{K}$, K^* is larger than $\hat{K}$, this increase in investment reduces net profits. Moreover, because the increase in investment raises the wage rate, it increases the income of the average indigenous family.

The Decision to Abandon a Colony

Suppose that the amount of investment that maximizes net profits is in place in the colony. Now, suppose that there is an unexpected parametric change. To take an interesting example, consider an exogenous and unexpected increase in the effectiveness of time allocated to extralegal appropriative activities. Specifically, assume that θ increases from θ_0 to θ_1.

Let K_0^* denote the amount of investment that maximized M given $\theta = \theta_0$ and let K_1^* denote the amount of investment that would maximize M with $\theta = \theta_1$. In addition, let $\overline{K}_0$ denote the value of $\overline{K}$ given $\theta = \theta_0$ and let $\overline{K}_1$ denote the value of $\overline{K}$ with $\theta = \theta_1$, where $\overline{K}_1 > \overline{K}_0$. Recall that $\hat{K}$ does not depend on θ. In analyzing the effect of this unexpected increase in θ, there are three main cases to consider.

i) Suppose that $K_0^* = K_1^* = \hat{K}$. In this case, K^* equals $\hat{K}$ both before and after the increase in θ. Case i arises if both θ_0 and θ_1 are small. In case i, the increase in θ has no effect. Investment in the colony, resource allocation in the colony, the net profits of the colonial sector, and the income of the representative indigenous family are all unchanged.

ii) Suppose that either $K_0^* = \hat{K}$ or $K_0^* = \overline{K}_0$ and that $K_1^* = \overline{K}_1$. In this case, K^* equals either $\hat{K}$ or $\overline{K}_0$ before the increase in θ but equals $\overline{K}_1$ after the increase in θ. Case ii arises if θ_1 is larger than in case i, but is not too large. In case ii, because $\overline{K}_1$ is larger than both $\hat{K}$ and $\overline{K}_0$, the increase in θ causes an increase in investment in the colony. This increase in investment is just sufficient to keep $B = 0$.

iii) Suppose that either $K_0^* = \hat{K}$ or $K_0^* = \overline{K}_0$ but that $K_1^* = 0$. In this case, K^* equals either $\hat{K}$ or $\overline{K}_0$ before the increase in θ but equals zero after the increase in θ. Case iii arises if θ_1 is larger than in case ii. In this situation, if repatriation were possible, the colonial firms would repatriate their capital. But, with repatriation not possible, the options of the metropolitan government are to increase investment in the colony to $\overline{K}_1$, to maintain the colony with amount of capital unchanged at K_0^*, or to abandon the colony.

With the amount of capital K_0^* in place, the alternative cost of this capital is zero. Accordingly, the relevant maximand for the metropolitan government is now $\tilde{M}$, where

$$\tilde{M} = (1-\beta)K\pi - r(K - K_0^*), \tag{21}$$

and where $(1-\beta)K\pi$ is given by equation (7). Let $\tilde{K}$ represent the value of K that maximizes $\tilde{M}$, subject to $K \geq K_0^*$, with K_0^* predetermined. If the maximum value of $\tilde{M}$ is positive, then the metropolitan government sets K_1 equal to $\tilde{K}$. Alternatively, if the maximum value of $\tilde{M}$ is not positive, then the metropolitan government abandons the colony.[6]

Now suppose that θ_1 is such that $\left(\frac{1-\theta_1}{\theta_1}\frac{\alpha}{1-\alpha}\right)^\alpha > r$. In this subcase, equation (21) implies that, over the range $\overline{K}_1 > K > \frac{\theta_1-\alpha}{1-\theta_1}N$, $\tilde{M}$ is an increasing function of K. Consequently, the metropolitan government chooses either to increase K to $\overline{K}_1$ or to abandon the colony.

Equation (21) also implies that, with K equal to $\overline{K}_1$, the value of $\tilde{M}$ would be

$$\tilde{M}\Big|_{K=\overline{K}_1} = (\overline{K}_1 - \frac{\theta_1-\alpha}{1-\theta_1}N)(\frac{1-\theta_1}{\theta_1}\frac{\alpha}{1-\alpha})^\alpha - r(\overline{K}_1 - K_0^*),$$

where $\overline{K}_1 = \frac{\theta_1-\alpha}{\alpha(1-\theta_1)}N$. Thus, if $rK_0^* > [r - (1-\alpha)(\frac{1-\theta_1}{\theta_1}\frac{\alpha}{1-\alpha})^\alpha]\overline{K}_1$, a condition that would obtain if K_0^* is large and θ_1 is not too large, then $\tilde{M}|_{K=\overline{K}_1}$ is positive and the

[6] If the metropolitan government abandons the colony, then an indigenous sovereign takes over the enforcement of property rights. Our analysis implicitly assumes that the best deal that existing colonial firms could make with the new indigenous sovereign would allow them zero net profits. In general, the correct comparison is between the maximum value of $\tilde{M}$ and the net profits that colonial firms anticipate under the new indigenous sovereign.

metropolitan government chooses to increase K to $\overline{K}_1$. Otherwise, $\tilde{M}|_{K=\overline{K}_1}$ is not positive, and the metropolitan government abandons the colony.

If the metropolitan government maintains the colony with K increased to $\overline{K}_1$, then indigenous families continue to allocate no time to appropriative activities. But, the increase in investment in response to the threat of extralegal appropriative activities cause an increase in the wage rate and the income of the average indigenous family.

Now suppose, alternatively, that θ_1 is such that $(\frac{1-\theta_1}{\theta_1}\frac{\alpha}{1-\alpha})^\alpha \leq r$. In this subcase, equation (21) implies that, over the range $\overline{K}_1 > K \geq K_0^*$, $\tilde{M}$ is a decreasing function of K. Thus, the metropolitan government chooses either to keep K unchanged at K_0^* or to abandon the colony.

Equation (21) also implies that, with K equal to K_0^*, the value of $\tilde{M}$ would be

$$\tilde{M}|_{K=K_0^*} = (K_0^* - \frac{\theta_1-\alpha}{1-\theta_1}N)(\frac{1-\theta_1}{\theta_1}\frac{\alpha}{1-\alpha})^\alpha.$$

Thus, if $K_0^* > \frac{\theta_1-\alpha}{1-\theta_1}N$, a condition that also would obtain if K_0^* is large and θ_1 is not too large, then $\tilde{M}|_{K=K_0^*}$ is positive and the metropolitan government chooses to maintain the colony with K unchanged at K_0^*. Otherwise, $\tilde{M}|_{K=K_0^*}$ is not positive and the metropolitan government abandons the colony.

If the metropolitan government maintains the colony with K unchanged at K_0^*, then the increase in θ causes indigenous families to reallocate time from both wage employment and self employment to appropriative activities. Accordingly, production in the colony and the profits of the colonial sector net of extralegal appropriation are decreased, but still positive, and the income of the average indigenous family is increased.

Summary

The theory sketched above provides us with a suggestive set of implications about the economics of colonial investment. We have derived conditions that determine the profitability of colonial investment and that suggest why historically some countries but not others became colonies. The technologies available for production in the colonial sector and for extralegal appropriation of the profits of the colonial firms determine whether or not extralegal appropriation presents a potential obstacle to profitable colonial investment. If extralegal appropriation is not a potential problem, then colonial investment is profitable as long as the profit share of output in the colonial sector is larger than the opportunity cost of capital.

Alternatively, if extralegal appropriation is a potential problem, then colonial investment is profitable only if the return to time allocated to extralegal appropriative activities would not be too large. Moreover, if colonial investment is profitable, then the optimal amount of investment in the colony is sufficiently large to make wage employment more attractive than extralegal appropriation.

The establishment of a colony raises the income of the indigenous population. Thus, a decrease in the opportunity cost of capital or a decrease in the effectiveness of time allocated to extralegal appropriative activities that makes colonial investment profitable benefits the indigenous population as well as the metropolitan capitalists who invest in the colony. (Of course, the policy of the metropolitan government of restricting the amount of investment in the colony in order to maximize net profits results in a lower income for the indigenous population that would obtain under unrestricted international investment.) But, if the opportunity cost of capital and the technologies of production and extralegal appropriation are such that colonial investment is profitable, then increased effectiveness of time allocated to extralegal appropriative activities would imply an unchanged or higher income for the indigenous population. In other words, the indigenous population benefits from better possibilities for extralegal appropriation unless these possibilities are so good as to make colonial investment unprofitable.

We have also explored the possibility that a colony that was initially profitable can become unprofitable, in which case the colony is abandoned. We focused on the example of an unexpected exogenous increase in the effectiveness of time allocated to extralegal appropriative activities. Depending on initial conditions and the size of the innovation, such a disturbance either can cause no change in investment in the colony, or can cause increase investment in the colony to keep wage employment more attractive than extralegal appropriation, or can cause the metropolitan government to abandon the colony. Abandonment occurs if the increase in the effectiveness of time allocated to extralegal appropriative activities is large.

In addition, even if the colony remains viable, a moderate increase in the effectiveness of time allocated to extralegal appropriative activities can result in an equilibrium in which a positive amount of time is allocated to extralegal appropriation activities. This result obtains if the cost of capital is too high to warrant increased investment, but the return to capital already in place net of losses of extralegal appropriation remains positive. As we have seen, when a colony is established, the amount of investment is large enough and the resulting wage rate is high enough to deter extralegal appropriative activities. But, if there is a subsequent unexpected increase in the effectiveness of time allocated to extralegal appropriative activities, then the metropolitan government and the colonial firms can find themselves willing to tolerate permanent losses of profits to extralegal appropriation.

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