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"Colonial Experience and Postcolonial Underdevelopment in Africa"

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Colonial Experience and Postcolonial Underdevelopment in Africa*

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Abstract

In this paper, we analyze the connection between the history of colonial rule and postcolonial development in Africa. We focus on the fact that many African colonies were governed by indirect rule. Under indirect rule, indigenous people are divided into two groups: a privileged ruling group and an unprivileged ruled group. Our model assumes that the ruled group cannot observe how their deprived resources are divided between the metropolitan ruler and the ruling group. In this economy, a large level of exploitation by the metropolitan ruler yields distrust among indigenous groups and creates a negative effect on postcolonial economic and political development.

Keywords: Africa, colonialism, indirect rule, colonial legacies, ethnic conflict
JEL Codes: D74; N47; O10

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1 Introduction

Many researchers have studied the connection between colonial legacies and postcolonial development. In relation to these connections, Bertocchi and Canova (2002) found that exploitation activities by a metropolitan ruler have a negative impact on the growth rates of postcolonial African countries. They also found that the identity of the colonial power is directly related to growth rates after independence in these countries. Lange (2004) focused on the distinction between direct and indirect rule, and found that the degree of indirect rule has a negative impact on postcolonial political development in British colonies.

Motivated by these empirical studies, this paper builds a model to highlight the relationship between colonial experience and economic and political development after independence in Africa. We focus on the fact that most African colonies were governed by indirect rule in the colonial era. We show that, under indirect rule, exploitation activities by the metropolitan ruler yield distrust between the indigenous privileged class and other people, harming postcolonial economic and political development in Africa. The argument of this paper is highly motivated by the history of colonial and postcolonial Africa. We link poor economic performance after independence to the history of African politics and provide a plausible explanation on the causes of some historical events such as the conflicts in Rwanda, Burundi, and Zanzibar.

The basic ideas of the model are as follows. We consider an economy which reflects African history during the colonial period and after independence. In the colonial period, which corresponds to the first stage in the model, there exist a metropolitan ruler and two indigenous groups. The metropolitan ruler appoints one group to a ruling position. Therefore, the indigenous people are divided into a privileged ruling group and an unprivileged ruled group. The metropolitan ruler instructs the ruling group to transfer the resources of the indigenous people to the metropolitan ruler. This setup captures the indirect rule in the colony.

Using the political power given by the metropolitan ruler, the ruling group can exploit the resources of the ruled group for its own consumption. Therefore, the resources of the ruled group are transferred to both the metropolitan ruler and the ruling group. The level of exploitation by the ruling group depends upon the ruling group's preferences, and, most importantly, its "altruism" for the ruled group.

The information structure of the economy is as follows. The ruled group cannot observe how many resources are transferred to the ruling group, but can observe the total amount of deprived resources. This is because the resources of the ruled group that are transferred to the metropolitan ruler are collected by the ruling group. The degree of altruism of the ruling group is also assumed not to be observable by the ruled group. The ruled group infers the degree of altruism of the ruling group by observing the total amount of deprived resources. Harsh exploitation by the metropolitan ruler yields the ruled group's distrust of the ruling group.

In the period after independence, which corresponds to the second stage in the model, the metropolitan ruler leaves the economy. The ruling group retains political power and controls the government. The ruled group takes over the belief from the colonial period and, based on this belief, forms expectations about the policy which the ruling group adopts. The tyranny of the metropolitan ruler makes the ruled group suspicious of the ruling group and leads to inefficient activities of the ruled group, such as underinvestment and revolt.

This paper is related to several works that focused on the connection between colonial experience and economic development. In addition to Bertocchi and Canova (2002) and Lange (2004), Acemoglu et al. (2001), Grier (1999), and Nunn (2007) investigated the effect of colonial legacies on economic performance. Acemoglu et al. (2001) and Grier (1999) showed clear channels in which experience in the colonial era affects postcolonial development. Acemoglu et al. (2001) argued that extractive institutions were built by colonial powers in regions such as Africa where there was little settlement of Europeans, and that the colonial institutions shape current institutions and affect income per capita. Grier (1999) found that former British colonies have better economic performance than former French colonies, and that the difference can be largely explained by the educational level at independence. In this paper, we consider an alternative channel that connects the colonial experience with economic and political development after independence in Africa. Nunn (2007) provided a model explaining the connection between colonial experience and underdevelopment in Africa adopting a different mechanism than ours. In Nunn's multiple equilibrium model, indigenous people choose between production and being rent-seekers. Nuun has shown that when exploitation by the metropolitan ruler is severe, those who engage in production gradually convert to rent-seeking. Since high rent-seeking (low production) equilibrium is stable, the economy continues to converge to the high rent-seeking equilibrium even after independence.

The remainder of this paper is organized as follows. Section 2 describes the history of colonial and postcolonial Africa that is related to the argument of this paper. Section 3 includes the construction and analyses of the model. Finally, Section 4 presents the conclusions of the paper.

2 History of colonial and postcolonial Africa

In this section, we describe the history of Africa relevant to the argument presented in the following sections. First, we describe the form of colonial rule exercised by the European countries and then discuss how the legacies of the colonial period have affected the economic and political development of postcolonial African countries.

2.1 Colonial rule in Africa

The feature of colonial rule in Africa that is relevant for the discussion in this paper is indirect rule, which is the manner of rule in which a metropolitan ruler appoints local chiefs to conduct administrative tasks such as tax collection and maintenance of law and order in their territory. In some cases, traditional local authorities in Africa were reorganized for such governance, and in other cases, the positions of the chiefs were newly imposed (Mamdani 1996; Betts and Asiwaju 1985).

As argued by many scholars, most African colonies were governed by indirect rule [1](Beck 2001; Betts and Asiwaju 1985; Crowder 1964; Mamdani 1996). Although Crowder (1964) pointed out differences in the manner of British and French colonial rule, he stated that "both powers had little alternative to the use of existing political authorities as a means of governing their vast African empires, and in most cases these authorities were headed by chiefs"(p.197). [2] Lange (2004) stated that "While the British–and particularly, Lord Lugard–have been credited with inventing indirect rule, the French, Portuguese, and Belgians all used indirect forms of

[1]Although indirect rule was broadly used in colonial Africa, there are some examples of direct rule, such as Lagos, Freetown, and Dakar, among others. Direct rule was used in the beginning of colonial administration and urban civil society (Mamdani 1996).

[2]French colonial policy shifted from direct rule to indirect rule in the late 19th and early 20th centuries (Bleich 2005; Mamdani 1996).

rule"(p.908). Beck (2001) also stated that "indirect rule was practised in varying forms throughout colonial Africa" and that this view is "now widely accepted"(p.604).

Indirect rule was the general method adopted to govern the African colonies for several seasons. Since the territory of the African colonies covered a large area and expanded rapidly, it was too expensive for metropolitan rulers to rule the colonies directly by sending officers from the home countries. The climate of most of the African continent, which the Europeans did not find suitable for intensive settlement with exceptions such as Algeria and South Africa[3], and the geographically dispersed distribution of the local population were also reasons for the prevalence of the indirect rule (Betts and Asiwaju 1985). As Young (2004) stated, indirect rule was required for the low-cost management of the colonies.

The chiefs who occupied the ruling positions in the indirectly ruled regions earned revenue from the direct exploitation of inhabitants in those regions. The metropolitan ruler empowered the chiefs in administrative, legislative, and judicial aspects, and local governance was based on informal customary law. Therefore, the chiefs were able to use their power for their own interests. Since the chiefs occupied intermediary positions that connected the metropolitan ruler and the local population, they were able to extract the resources transferred between the local population and the metropolitan ruler (Lange 2004). These characteristics of the position and power of chiefs would particularly apply to British colonies. Crowder (1964) compared British indirect rule to that of France and pointed out the following differences. In British colonies, the chiefs and the officer from the metropolitan country had an "advisory relationship". Interference with the administration of chiefs was minimized, and local tradition and customs were respected. On the other hand, in French colonies, chiefs were subordinated to the officer from the metropolitan country, and the duties and power of chiefs were clearly defined. Lange (2004), however, stated that, although French indirect rule was more formal concerning the characteristics of chiefs and had less respect for the local tradition compared to British indirect rule, "formalization still placed chiefs in an intermediary position and gave them extreme power over local affairs while leaving the central administration incapacitated" (p.917).

[3] In 1920, about 4,000 British immigrants, who were financially supported by the British government, arrived on South Africa, and large numbers of immigrants followed them (Thompson 2001). In Algeria, many French immigrants arrived in the colonial era, and their share of the population reached 9.1% in 1921 (Miyaji 1978).

The fact that chiefs could make use of their intermediary position to extract the resources of indigenous masses is important for the argument in the following sections.

2.2 The political structure in postcolonial Africa

In many postcolonial states in Africa, the local elites formed by indirect rule in the colonial era retained their privileged positions. Acemoglu et al. (2001) wrote that "In many cases where European powers set up authoritarian institutions, they delegated the day-to-day running of the state to a small domestic elite. This narrow group often was the one to control the state after independence and favored extractive institutions"(p. 1376). The power and authority of the local elites were secured by postcolonial African governments because the central governments in postcolonial Africa depended on the local powerholders to gain electoral support (Boone 1998; Beck 2001). Furthermore, as in the cases of European colonial powers, postcolonial African states needed to cooperate with the local powerholders to take control of the rural regions (Berman 1998; Gennaioli and Rainer 2007).

There are many examples of African states sharing power with local elites who served as intermediaries between colonial powers and indigenous people under indirect rule. Under British rule, the Sierra Leone Protectorate was ruled indirectly and administration was delegated to paramount chiefs and sub-chiefs. [4] In spite of the British attempt to lower the power of chiefs in the end of colonial era, the postcolonial government strengthened and protected the authority of the paramount chief in each chiefdom after independence. This is because national politicians required the electoral support of the paramount chiefs, who had a strong influence on the local population, in order to take the helm of the state (Fanthorpe 2001).

A similar structure existed in postcolonial Senegal. Beck (1997, 2001) argued that the local authorities, who served as intermediaries between the French and the indigenous people in the colonial period, were tied to the central government and retained their authority after independence. Boone (1998) stated that, under the postcolonial regime in Senegal, "a great deal of discretion in policy implementation, and real prerogative over the use of state authority and resources, was devolved to local powerbrokers"(p.14). A

[4] A paramount chief was a primary position in a chiefdom, which was a basic administrative unit, and a sub-chief conducted administrative tasks, such as tax collection, in smaller administrative unit.

similar connection between local powerholders and the central government also existed in Mauritania, Niger, Chad, Nigeria, and Zaire under the rule of Mobutu (Gennaioli and Rainer 2007; Nwaubani 1994; Tull 2003).

2.3 Postcolonial underdevelopment in Africa

Many studies have highlighted weak governance in Africa as a factor of poor economic performance after independence. Accountability of the government, democratic competition, property rights protection, prevention of corruption, and rule of law were lacking in many African countries, which made politics in African countries favorable only for narrow elite groups. According to the argument of Acemoglu et al. (2001), the extractive institutions built by colonial powers during the colonial period were inherited by the indigenous elite, and the resources of the masses were extracted by the elite as in the colonial period. In such a situation, where the elite can exploit the resources of the population with discretionary powers, the expectation of producers that a large share of future output will be exploited by the elite causes underinvestment and hinders economic development. Many studies have shown significant and substantial effects of institutions (protection of property right against infringement by the government or private agents) on income and investment (Knack and Keefer1995; Mauro 1995; Hall and Jones 1999; Acemoglu et al. 2001; Rodrik et al. 2004). In this paper, we show that the more tyrannical the policy of the metropolitan ruler during the colonial period, the greater the producers' expectations of exploitation by the elite, resulting in a smaller level of investment after independence. This paper is complementary to the studies mentioned above since the argument of this paper shows that the colonial experience of severe exploitation by colonial powers worsens the negative impact of bad institutions.

The argument of this paper is one possible explanation for the formation of distrust among indigenous groups. This distrust originating from experiences in the colonial period would be an important factor responsible for some cases of postcolonial conflict in Africa. After a formal description of the model, we demonstrate that the model can explain the conflicts in Rwanda, Burundi, and Zanzibar.[5]

[5] There is a large literature on the causes of civil war and political instability in Sub-Saharan Africa (see e.g. Sambanis 2002 for survey). Studies show a robust relationship between poverty and the risk of insurgency (Collier and Hoeffler 2004; Fearon and Laitin 2003). Collier and Hoeffler (2004) found that natural resource dependence also matters

3 The model

We consider a two-stage model where the first stage represents the colonial period in Africa and the second stage represents the period after independence. We assume that the independence is an exogenous and unexpected event.[6] There exist a metropolitan ruler and two indigenous groups. Since all members of the same group are identical, we can treat each group as one agent. The indigenous Group $i = 1, 2$ owns endowments e_i in each stage.

The members of each group live for two stages. In the first stage, each agent is unconcerned with the second stage since independence is unexpected for the agents. The utility function for Group i, u_i, is common to both of the stages and is given by:

$$\begin{aligned} u_1 &= c_1 + \beta^* c_2, \\ u_2 &= c_2, \end{aligned} \tag{1}$$

where c_i is the consumption level of Group i. Note that the utility of Group 1 depends on the consumption level of Group 2. Group 1 is concerned with the consumption level of Group 2 because of altruism for Group 2. The parameter β^* is the weight that Group 1 gives for Group 2. We can interpret this parameter as the degree of altruism of Group 1. We assume that the parameter β^* is not observable for Group 2 and that Group 2 infers the value of β^* by observing the behavior of Group 1 as we will see below. [7] The degree of altruism of Group 2 is assumed to be zero for simplicity.

3.1 First stage: Colonial period

In the first stage, the metropolitan ruler appoints Group 1 to a ruling position and requires the group to pay a certain amount of resources. Group 1 deprives the endowments of Group 2 to meet the requirement of the metropolitan ruler. In addition, using the political power given by the metropolitan ruler,

for civil war risk. One of the most surprising findings is that ethnic diversity does not matter for civil war (Elbadawi and Sambanis 2000; Collier and Hoeffler 2004). In this paper, we consider another hypothesis, which is that colonial experience affects conflicts in postcolonial Africa.

[6] We will briefly discuss on this assumption in conclusion.

[7] The key mechanism of our model depends on the assumption that Group 2 does not know the degree of altruism of Group 1. Therefore, it is not crucial whether Group 1 is altruistic. That is, we do not exclude the case where β^* is zero or negative.

Group 1 can privately exploit the resources of Group 2. This setup captures the system of indirect rule explained in the previous section.

Let τ and t denote the proportion of the endowments of Group 2 that is transferred to the metropolitan ruler and Group 1, respectively. The level of exploitation by the metropolitan ruler is given exogenously; therefore τ is an exogenous variable. The private exploitation involves costs, and the cost function is given by $\frac{t^2}{2\Delta}e_2$. This cost captures various costs specific to the private exploitation by Group 1. Group 1 may be punished if private exploitation is detected by the metropolitan ruler. Δ is a parameter that represents how easy it is for Group 1 to exploit the resources of Group 2. The larger Δ is, the easier Group 1 can exploit the resources of Group 2. The cost of private exploitation is proportional to the amount of endowments of Group 2, e_2. Then, the consumption of Group i, c_i, can be written as:

$$\begin{aligned} c_1 &= e_1 + \left(t - \frac{t^2}{2\Delta}\right)e_2, \\ c_2 &= (1 - t - \tau)e_2. \end{aligned} \tag{2}$$

Since Group 1 determines the level of exploitation to maximize its utility without considering the effect of the decision on circumstances after independence, the problem of Group 1 is given by:

$$\max_{t\in[0,1-\tau]} \quad e_1 + \left(t - \frac{t^2}{2\Delta}\right)e_2 + \beta^*(1 - t - \tau)e_2.$$

From the first-order condition, the solution of the above problem is given by:[8]

$$t = \Delta(1 - \beta^*). \tag{3}$$

Hence the amount of exploitation by Group 1 decreases in the degree of altruism of Group 1, β^*. Since the altruistic ruling group takes the welfare loss of the ruled group due to exploitation seriously, the amount of exploitation by the altruistic ruling group is relatively small.

3.2 Inference on the degree of altruism

Group 2 cannot observe how its deprived resources are divided between the metropolitan ruler and Group 1. This is because the resources from Group

[8] We assume an interior solution. Note that the second-order condition is also satisfied.

2 that are transferred to the metropolitan ruler are also collected by Group 1. That is, Group 2 can observe the sum of the two rates $t + \tau$, but cannot observe these rates separately.

Here, we assume that Group 2 builds its belief about the degree of altruism of Group 1 according to the following process: Group 2 has a prior belief about the amount of exploitation by the metropolitan ruler. Observing the sum of the two rates, Group 2 builds a belief about the degree of altruism, β^*, so as to be consistent with the prior belief.

Let $\hat{\tau}$ be the random variable representing the prior belief of Group 2 about the value of τ, and we assume that the distribution of $\hat{\tau}$ is given by:

$$\hat{\tau} \sim U[\underline{\tau}, \overline{\tau}].$$

Since the rate of exploitation by Group 1 is $t = \Delta(1 - \beta^*)$, the observed sum of the two rates is $\Delta(1 - \beta^*) + \tau$. Therefore, the inferred degree of altruism $\hat{\beta}$, which is a random variable, satisfies the following condition:

$$\Delta(1 - \beta^*) + \tau = \Delta(1 - \hat{\beta}) + \hat{\tau}.$$

The belief of Group 2 is built to be consistent with the entire amount of exploitation that is observable for Group 2 and the prior belief of Group 2 about τ. By rewriting this equation, we have:

$$\hat{\beta} = \beta^* + \frac{\hat{\tau} - \tau}{\Delta}.$$

Hence, the belief of Group 2 about the degree of altruism (the distribution of $\hat{\beta}$) can be represented by:

$$U\left[\beta^* + \frac{\underline{\tau} - \tau}{\Delta}, \beta^* + \frac{\bar{\tau} - \tau}{\Delta}\right], \tag{4}$$

where its expected value is:

$$\begin{aligned} E[\hat{\beta}] &= \beta^* + \frac{1}{\Delta}(E(\hat{\tau}) - \tau) \\ &= \beta^* + \frac{1}{\Delta}\left(\frac{\bar{\tau} + \underline{\tau}}{2} - \tau\right). \end{aligned} \tag{5}$$

Note that the distribution of $\hat{\beta}$ and its expected value depend on τ. As τ increases, the entire amount of exploitation observable for Group 2 increases, and the ruled group confuses the larger observed exploitation with the larger private exploitation by the ruling group. Hence, in such a case, the ruled group infers that the ruling group has less altruism toward the ruled group.

Equations (4) and (5) imply the following lemma.

Lemma 1. *The distribution of the inferred degree of altruism and its expected value shift downward as the metropolitan ruler's exploitation increases. The tyranny of the metropolitan ruler yields the ruled group's suspicion against the ruling group.*

3.3 Second stage: After independence

In the second stage, the metropolitan ruler leaves the economy, and the colony becomes independent. In this section, we investigate two situations. In Section 3.3.1, we assume that Group 1 continues to be the ruling class and controls the government. As explained in the previous section, it is often the case that the privileged class in the colonial period persistently has political power after independence. We also assume that Group 2 has an investment opportunity but Group 1 can tax the return of it ex-post. Group 1 can exploit the resources of Group 2, just as it did in the first stage. This reflects the extractive institutions of African states persisting from the colonial period, which is argued in Acemoglu et al. (2001). Group 2 determines the level of investment expecting how proportion of the return of investment is exploited by Group 1.

In Section 3.3.2, although Group 1 occupies the ruling position at the beginning of the stage, Group 2 can overturn the government of Group 1 before Group 1 decides the level of exploitation of the resources of Group 2.

In both cases, the optimal strategy of Group 2 depends on the policies adopted by Group 1. Since the optimal policy for Group 1 depends on its degree of altruism, which is private information of Group 1, the equilibrium outcome depends on the belief of Group 2. We formulate a strategic relationship between Group 1 and Group 2 in the form of a Bayesian game and assume that the belief of Group 2 is the one formed during the colonial period. We investigate how the equilibrium outcome is related to the level of exploitation by the metropolitan ruler during the colonial period through the belief of Group 2.

3.3.1 Investment

We consider the situation where Group 2 has an investment opportunity such that x amount of investment yields Rx amount of consumption goods.[9] The cost of the investment is given by $c(x) = \frac{cx^2}{2}$.

The government controlled by Group 1 taxes the income of Group 2 and transfers the tax revenue to Group 1. Let t denote the tax rate, and assume that the cost of taxation is given by $\frac{t^2}{2\Delta} y_2$, where y_2 is the income of Group 2 and Δ represents the efficiency of taxation. [10]

Then, the resource constraint of each group is given by:

$$c_1 = e_1 + \left(t - \frac{t^2}{2\Delta}\right)(e_2 + Rx), \tag{6}$$

$$c_2 = (1 - t)(e_2 + Rx) - \frac{cx^2}{2}. \tag{7}$$

The timing of events is as follows: [11]

1. Group 2 decides the amount of investment x.

2. Group 1 (the government) decides the tax rate.

As in the first stage, Group 1 (the government) maximizes the weighted sum of the consumption of each group. Since the degree of altruism of Group 1, β^*, is the private information of Group 1, this game is a Bayesian game, where the type (degree of altruism) of Group 1 is not known by Group 2.

We define the equilibrium by the pair of strategies $(t(\beta, x), x)$ satisfying the following conditions.

(a) For any x, the tax rate $t(\beta, x)$ maximizes the payoff of Group 1 of type β given that Group 2 takes the strategy x.

(b) The strategy x maximizes the expected payoff of Group 2, which is evaluated based on the belief formed in the colonial period, given that Group 1 takes the strategy $t(\beta, x)$.

[9] We ignore the investment opportunity of Group 1 for simplicity.

[10] The cost of taxation is represented by the same function as the cost of private exploitation in the first stage. This is merely for simplicity and does not affect the results of this section.

[11] We derive the same results if the decisions are made simultaneously because the optimal strategy of Group 1 does not depend on the actions of Group 2, as explained in the following text.

The equilibrium corresponds to the Perfect Bayesian Equilibrium in which the belief of Group 2 about the type of Group 1 is the one formed in the colonial period. Since Group 1 moves after observing the action of Group 2, the strategy of Group 1 depends on both the type of Group 1 and the action of Group 2.

After observing the amount of investment of Group 2, Group 1 of type β solves the following maximization problem:

$$\max_{t\in[0,1]} \quad e_1 + \left(t - \frac{t^2}{2\Delta}\right)(e_2 + Rx) + \beta\left((1-t)(e_2+Rx) - \frac{cx^2}{2}\right)$$

By the first-order condition, the interior solution of the above problem is given by:

$$\forall x \quad t(\beta, x) = \Delta(1-\beta) \equiv t(\beta). \tag{8}$$

As in the colonial period, the optimal tax rate which Group 1 sets negatively depends on the degree of altruism, β. Note that the optimal tax rate does not depend on the action of Group 2.

The belief of Group 2 about the type of Group 1 was formed in the colonial period (i.e. the distribution given by (4)). Since Group 2 expects that Group 1 of type β sets the tax rate at $t(\beta)$ regardless of the amount of investment, the maximization problem for Group 2 is given by:

$$\max_{x} \quad \left(1 - E(t(\hat{\beta}))\right)(e_2 + Rx) - \frac{cx^2}{2}.$$

By the first-order condition, the amount of investment of Group 2 is given by:

$$\begin{aligned} x &= \frac{\left(1 - E(t(\hat{\beta}))\right)R}{c} \\ &= \frac{R}{c}\left(1 - \Delta(1-\beta^*) - \tau + \frac{\bar{\tau} + \underline{\tau}}{2}\right). \end{aligned} \tag{9}$$

Therefore, the equilibrium of the model is the pair of strategies satisfying (8) and (9).

From Equation (9), the amount of investment is decreasing in τ. This is because the large amount of exploitation by the metropolitan ruler makes Group 2 underestimate the degree of altruism and decreases the level of investment since Group 2 expects a high tax rate.

Proposition 1. *The amount of investment of the ruled group after independence is decreasing in the amount of exploitation by the metropolitan ruler during the colonial period.*

To evaluate economic performance after independence, we consider the aggregate income of this economy, $Y = c_1 + c_2$. From the resource constraint of each group, Y can be written as:

$$Y = e_1 + \left(1 - \frac{t^2}{2\Delta}\right)(e_2 + Rx) - \frac{c}{2}x^2.$$

Therefore, Y is strictly concave in x.

In order to focus on the effect of exploitation by the metropolitan ruler on aggregate income after independence, we fix the tax rate at $t = \Delta(1-\beta^*)$, which is chosen by Group 1 regardless of the amount of exploitation by the metropolitan ruler.

Let $\tilde{x}$ denote the amount of investment that maximizes the aggregate income under the tax rate $t = \Delta(1 - \beta^*)$. Then, $\tilde{x}$ is given by:

$$\tilde{x} = \frac{R}{c}\left(1 - \frac{\Delta}{2}(1 - \beta^*)^2\right). \tag{10}$$

Let x^e denote the amount of investment that is achieved in the equilibrium, then x^e is given by:

$$x^e = \frac{R}{c}\left(1 - \Delta(1 - \beta^*) + \frac{\bar{\tau} + \underline{\tau}}{2} - \tau\right). \tag{11}$$

When the level of exploitation by the metropolitan ruler is sufficiently large so that $\tau > \frac{\bar{\tau}+\underline{\tau}}{2}$ and the degree of altruism takes a plausible value ($\beta^* \in (-1, 1)$), x^e is less than $\tilde{x}$, and the distance between x^e and $\tilde{x}$ becomes larger as τ increases. The large level of τ makes the belief of Group 2 about β^* shift downward, reducing the expected return of investment for Group 2 and lowering the level of x^e. The harsh policy of the metropolitan ruler during the colonial era causes the ruled group's distrust of the ruling group as explained in subsection 3.2. The distrust causes the ruled group to form pessimistic expectations for the future exploitation of the ruling group, and such expectations reduce the amount of investment. Since Y is strictly concave in x, a larger distance between x^e and $\tilde{x}$ yields a larger loss of aggregate income. Therefore, the larger the amount of exploitation by the metropolitan ruler, the larger the loss of aggregate income after independence.

3.3.2 Revolt

In this section, we analyze how the experience in the colonial period affects political stability after independence. We focus on the situation where Group 1 continues to be the ruling class but Group 2 can challenge to overturn the government controlled by Group 1 and establish a new government. As in the previous sections, the group that controls the government can exploit the resources of another group, and Group 2 takes over the belief from the colonial period.

We consider the following game. First, Group 2 decides whether to revolt against the government. If Group 2 decides to revolt against the government, Group 2 can overturn it with probability one and control the new government they established.[12] Since the revolution involves destructive action and leads to disorder, it decreases the endowments of each group to μe_i, where $\mu \in (0, 1)$. The new government can choose tax rate on the resources of Group 1. On the other hand, if Group 2 decides not to revolt, Group 1 continues to control the government.

The equilibrium of this game can be defined in the same way as in the previous game, whereas the strategy of Group 2, $x \in \{R, P\}$, now represents the choice of whether or not to revolt. The strategy R refers to a revolt against Group 1 and the strategy P means subjection to the current government.

Group 1 with type β sets the tax rate that solves the following maximization problem:

$$\max_{t\in[0,1]} \quad e_1 + \left(t - \frac{t^2}{2\Delta}\right) e_2 + \beta(1-t)e_2.$$

From the first-order conditions, Group 1 with weight β sets the tax rate at $t = \Delta(1-\beta)$.

Therefore, when Group 2 does not revolt against Group 1, the expected amount of consumption of Group 2, c_2^P, can be written as a function of τ:

$$\begin{aligned} c_2^P(\tau) &= \left(1 - \Delta(1 - E(\hat{\beta}))\right) e_2 \\ &= \left(1 - \Delta(1-\beta^*) - \tau + \frac{\bar{\tau} + \underline{\tau}}{2}\right) e_2. \end{aligned} \tag{12}$$

[12]The results of this section do not change if we introduce uncertainty about the success of revolution.

Note that the expected amount of consumption when Group 2 does not revolt is decreasing in the amount of exploitation by the metropolitan ruler. This is due to the same reason discussed in the previous section. A large level of exploitation by the metropolitan ruler yields suspicion of Group 2 against Group 1, which makes Group 2 underestimate their expected amount of consumption.

When Group 2 revolts against Group 1, Group 2 establishes a new government and exploits the income of Group 1. The tax rate set by Group 2 is derived by solving the following problem:

$$\max_{t\in[0,1]} \quad \mu\left(e_2 + \left(t - \frac{t^2}{2\Delta}\right)e_1\right),$$

and the solution to this problem is $t = \Delta$. Therefore, the amount of consumption of Group 2 when they choose to revolt against Group 1, c_2^R, is given by:

$$c_2^R = \mu\left(e_2 + \frac{\Delta}{2}e_1\right). \tag{13}$$

Group 2 chooses to revolt against Group 1 if $c_2^R > c_2^P(\tau)$. Since $c_2^P(\tau)$ is decreasing in τ, there is a threshold $\tilde{\tau}$ which satisfies $c_2^R = c_2^P(\tilde{\tau})$. That is, when the amount of exploitation by the metropolitan ruler during the colonial period is $\tilde{\tau}$, Group 2 is indifferent between raising a revolt and not raising a revolt.

From $c_2^R = c_2^P(\tilde{\tau})$, $\tilde{\tau}$ can be written as:

$$\tilde{\tau} = 1 - \Delta(1-\beta^*) + \frac{\bar{\tau} + \underline{\tau}}{2} - \mu\left(1 + \frac{\Delta}{2}\frac{e_1}{e_2}\right).$$

Then, the action of Group 2 in equilibrium is as follows

- if $\tau > \tilde{\tau}$, then Group 2 chooses to revolt against Group 1;
- if $\tau < \tilde{\tau}$, then Group 2 chooses not to revolt against Group 1 and endures the exploitation by Group 1.

Proposition 2. *When the amount of exploitation by the metropolitan ruler during the colonial period is sufficiently large, the ruled group revolts against the ruling group after independence.*

Proposition 2 showed that the ruled group rationally chooses revolt against the government of ruling group if the ruled group has intense distrust of the ruling group, which is caused by the harsh policy of the metropolitan ruler during the colonial era. This is because the ruled group fears that the government of ruling group would extract a lot of resources of the ruled group. The belief of ruled group, which is formed during the colonial period, affects such expectation.

3.4 The conflicts in Rwanda, Burundi, and Zanzibar

The implication of the model gives us one possible explanation for the conflicts in Rwanda, Burundi, and Zanzibar. These nations were governed by indirect rule, and the colonial experience created the ruled group's distrust of the ruling group, leading to a revolt against the ruling group just before or after independence.

In Rwanda and Burundi, the German and Belgian colonial powers identified the Tutsis and Hutus as different groups although there were few cultural differences between the two groups before colonial rule, and the colonial powers treated the former as superior to the latter.[13] The colonial state delegated the local authority to local chiefs and appointed the Tutsi elite to these posts. The Tutsi elite occupying the posts of the chief abused their power to exploit the inhabitants in their territory. As many researches have pointed out, these colonial policies led to the friction between the Hutus and Tutsis (Adekanye 1996; Newbury 1988; Mamdani 2001; Takeuchi 2004).

After World War II, criticism against colonial rule by European countries arose in the United Nations, and the Belgian colonial authority reformed the governance structure to enhance the political participation of indigenous people. This political reform enhanced the political power of the Hutus because they made up a majority of the indigenous people, and conflict between the Tutsi elite and the Hutus became overt. In 1959, a Hutu subchief in Rwanda was killed by a supporter of the Union Nationale Rwandaise, which was a political party representing the Tutsi elite, triggering widespread violence by the Hutus toward the Tutsis. Although this turbulence was short-lived, it drove many Tutsi elite to escape to neighboring countries. After this

[13] The boundary between the Tutsis and Hutus was not clear before colonial era, and, in some regions, people were unconscious of the identity of the Tutsi or Hutu (Takeuchi 2004). Adekanye (1996) also stated that there were many cultural elements shared by the Tutsis and Hutus before the colonial era.

period of political instability, the administrative structure dominated by the Tutsi elite changed completely, and the Hutu elite seized political power following independence (Takeuchi 2004). In Burundi, the rule by the Tutsi elite continued after independence. The Hutus attempted to revolt against the rule by the Tutsi several times, but the revolts were repressed severely by the government (Adekanye 1996; Uvin 1999).

The postcolonial history of Zanzibar is similar in structure to the experience in Rwanda and Brundi. In Zanzibar, the Arabs ruled over the indigenous Africans from the 17th century, although the rule was nominal and geographically restrictive during the majority of the precolonial period. The superiority of the Arabs over the Africans was reinforced under British rule after the 19th century (the formal British rule prevailed since 1890). The relationship between the Arabs and Africans became more hierarchical, and the indigenous authorities were replaced by Arab officials. Thus, the autonomy of non-Arab indigenous groups was very restricted in the colonial period. Zanzibar achieved independence in 1963. At first, the Zanzibar Nationalist party (ZNP), which represented the Arabs, controlled the government with the Zanzibar and Pemba People's party (ZPPP). Immediately after independence, military coup by the Africans occurred, the government was overthrown, and the Arabs were eliminated from the country (Newbury 1983).

These cases are alike in that the metropolitan ruler gave superiority to one group (Group 1 in the model) over the other group (Group 2 in the model) and the ruled group revolted against the ruling group just before or after independence. In these cases, the postcolonial conflict had its roots in the colonial experience. The model presented in this paper can allow for an interpretation of these cases as the result of rational choice based on the belief that is endogenously linked to the colonial policy of the metropolitan ruler. The Hutus in Rwanda and Burundi and Africans in Zanzibar formed pessimistic expectations for the policy of post-independence government of the ruling group due to the colonial experience, and such expectations led to a revolt against the ruling group.

4 Conclusions

Recent empirical studies show an important connection between the history of colonial rule and economic development after independence. In this paper, we developed a model to analyze this connection in African countries focusing on the fact that many African countries were ruled by indirect rule during the colonial era. Under indirect rule, the metropolitan ruler divides the indigenous people into a privileged ruling group and an unprivileged ruled group. The ruling group deprives the resources of the ruled group for both themselves and the metropolitan ruler. Therefore, the ruled group cannot observe how its deprived resources are divided between the metropolitan ruler and the ruling group. Since the ruled group infers the degree of altruism of the ruling group after observing the total amount of deprived resources, large levels of exploitation by the metropolitan ruler yield the ruled group's distrust of the ruling group. We showed that such distrust among indigenous groups could be a cause of underdevelopment and political instability in postcolonial Africa. Interacting with poor institutions of postcolonial African states, the expectation of the ruled group that the elite, who retain political power from the colonial era, will extract their profit decreases the amount of investment by the ruled group. In some cases, such an expectation could trigger a revolt of the ruled group against the ruling group. The model presented here provides one possible explanation for the conflicts in Rwanda, Burundi, and Zanzibar, where the postcolonial conflict was rooted in the colonial experience.

In this paper, we assumed that independence is unexpected by the agents. Since the consolidated authority of colonial states was unchallenged before World War II, as stated in Young (2004), this assumption would be plausible for the period before World War II. After World War II, however, independence could be expected as stated in Young (2004). We still make this assumption for the following reasons. [14]

First, since the period where independence is unforeseeable makes up the majority of colonial era, the legacies of this period are very important. The foreseeability of independence matters only through the formation of the beliefs of indigenous people in our model. Although our model does not describe the the formation of beliefs in a dynamic manner, it will take a lot

[14]Even if the independence is expected to the ruling group, the key results of this paper do not change when the ruling group is myopic. In the first stage, the myopic agent thinks little of the payoff in the next stage, so the expectation of independence has little effect on the action in the first stage. By similar logic, assuming that the agents in the second stage are children of the agents in the first stage and that the children take over the degree of altruism and belief from their parents, who are assumed to have no altruism for their children, we retain the main results of this paper.

of time for beliefs to change in the real world. If change in beliefs takes a lot of time to change, the experience before WWII would have a dominant effect on the beliefs of indigenous people in the postcolonial period, even if the interaction among indigenous groups after WWII has some effects on beliefs. This is because the former period is longer.

Second, the assumption that independence is unexpected by the agents allows us to show a very simple and clear mechanism. Incorporating the interaction between indigenous groups during the period where independence is foreseeable makes the analysis of this paper complicated. Of course, we do not think that the period after World War II, where independence is foreseeable, is unimportant, and analysis of the legacies of this period is left for future work.

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