Colonial Distortions: A Model of Extraction and Social Fabric

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Abstract

In this paper, I present a simple game-theoretic model in which a colonizer can both extract resources from local populations and distort the “social fabric” of this local society as a means of suppressing threats of rebellion. This concept of social fabric in turn derives from a primitive notion of cooperation in repeated games played by a continuum of players in the local society. The analysis of social norms and social fabric is motivated by literature in Postcolonialism that emphasizes cultural and social spaces as some of the main sites through which colonization operates.

The game generates a sub-game perfect Nash equilibrium where higher rates of extraction accompany greater distortion of social fabric; economic extraction and social repression operate in simultaneity. In the context of multiple equilibria, social fabric distortion and extraction are positively correlated. The paper concludes with a discussion of historical case studies from South Asia, Nigeria, Algeria, and the Congo that supplement the findings of the model by linking the effects of colonial extraction to the social effects of colonization. By emphasizing “informal” social channels rather than “formal” institutional channels, this paper also provides new ways in which to examine the persistent effects of Colonialism on postcolonial economic growth.

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1. Introduction

Since the resurgence of Institutional Economics at the turn of the century, Economics’ discourse on Colonialism has focused on the effects of formal colonial institutions on economic outcomes within the modern day. This literature mostly derives from Acemoglu, Johnson, and Robinson’s “Colonial Origins of Comparative Development” (2001), which utilizes empirical data analysis to posit that economic gaps in postcolonial states can be explained by the degree of extraction resulting from institutions established by colonizing powers. Via a series of historical studies, Acemoglu and Robinson’s Why Nations Fails suggests that inclusive institutions, characterized by ease of entitlement to property, economic security and involvement in political processes, allow for greater long-run economic prosperity than those with extractive institutions, where a state extracts resources and wealth from one subset of the population for the use of another, reducing incentives for work and investment. These institutions find their origins in the colonial period, and hence serve as the primary means for looking at the effects of past colonial policies on future economic growth.

However, most of this work on Colonialism has been confined to “formal institutions” — usually measured via property rights or corruption indices — and has predominantly utilized empirical rather than theoretical frameworks. This presents two problems. First, there is no basic economic model or “theory of Colonialism.” Second, there is little discussion of the cultural and social effects of Colonialism at either a theoretical or empirical level; such ideas are often mentioned as alternative explanatory factors for underdevelopment, but little has been done to center these perspectives in the literature.

The goal of this work is twofold: to establish a simultaneity in what I call “social fabric distortion” and extraction of resources from colonies by colonizing powers; and to establish this simultaneity via a (game) theoretic approach rather than an empirical one. To complement my findings, I utilize a series of historical case studies from colonized regions that describe the ways in which colonizing nations have used social channels — such as criminalization of social norms, artificial and arbitrary segmentation of populations, religious, linguistic, and educational policies, and outright violence — to supplement the process of resource extraction. Naturally, this line of research constitutes of two components: one that examines the precise nature of resource extraction within colonies, and the other that looks at how notions of culture and social norms can be presented in economic models. I combine these two ideas to describe a model that uses “social fabric” as a means of repressing resistance to colonial rule, thereby easing the process with which a colonizer can extract profit and resources. In turn, these two factors can provide a new insight on the process of long-run economic growth: persistent damage inflicted on the informal institutions governing social behavior within postcolonial nations can stifle long-run economic growth.

Throughout this paper, I use a variety of terms to describe objects and ideas within my model and case studies. Colonization refers to a phenomenon when an outside power (a country, kingdom, or empire), or a colonizer, captures and rules over a piece of foreign land and asserts dominance over the colonized local peoples of that foreign land for the purpose
of gaining resources or benefit. As part of this process, the colonizer establishes a form of colonial governance that oversees these colonies, often a branch of the central government of the colonizer that in practice does not extend the basic laws and institutions of the central government to the colonized people. Simultaneously, the process of colonization warrants a degree of foreign physical presence in the colony. The term Colonialism encompasses discourses, ideologies and philosophies that surround the historical process of colonization. This paper limits its study of Colonialism to the geographic regions of Africa and Asia.

The other set of terminologies in this paper concern culture and social fabric. I define a social norm or a cultural norm to be a collectively acceptable action taken by a contiguous group of people in response to a singular event or situation in a context where deviation is discouraged, frowned upon, and/or punished. A norm may be simple, such as shaking someone’s hand, or complex, such a code of etiquette at a religious ceremony. Consequently, social and cultural norms encode data about ethnic, familial, linguistic, and religious traditions, attitudes revolving around race and gender, or the existence and fluidity of class structures. The collection of a given people’s social and cultural norms are referred to as that people’s social fabric. Different peoples across the globe possess inherently different social norms based on the accumulation of the historical and cultural traditions of a people’s specific region. A distortion to a people’s social fabric occurs when an outside agent creates an incentive for individuals within the population to deviate from a given social norm.

The plan of the paper is as follows. Section 2 presents literature on Colonialism and social norms from Economics and other fields. Section 3 provides a model of social fabric through repeated cooperation within a population and describes a mechanism through which outside powers can disrupt that cooperation. Section 4 utilizes this model as a primitive to set up a basic game between a “colonizer” and colonized “local society,” where the local society can choose to resist colonial rule or accept a given level of extraction. Notably, the colonizer can reduce the threat of successful rebellion by distorting social fabric. After describing the set of of sub-game perfect Nash equilibria to this game and solving a simplified version in Section 5, I venture into a series of historical case studies from South Asia, Nigeria, Algeria, and the Congo that exhibit the nature of Colonialism described by the model. Conclusions of the work are drawn in Section 6, where I also outline future avenues of research.
2. History of Thought

2.1 Economics and Social Norms

A literature on the role of culture and social norms has slowly emerged within Game Theory, motivated by the idea that social norms represent cooperative strategies in repeated games that utilize informal punishment mechanisms for deviant behavior. In the context of this paper, a colonizer’s imposition of alien social norms on colonized societies can be seen to generate a mismatch of economic behaviors that stifles incentives for cooperation among colonized peoples, forcing portions of local populations to adopt behavior which assist the colonial project but are at odds with historical norms.

Kandori (1992) uses the Folk Theorem to define social norms as a subset of the informal enforcement mechanisms that generate cooperation in infinitely played games — i.e. as a finer selection of a larger set of Nash equilibria to a series of games. Voss (2001) claims that an agent adopts such norms if they believe that others will act according to that norm, prefer that social norm conditional on others’ adoption of that norm, or simply observe that others around them are adopting that norm. On the other hand, Binmore and Samuelson (1994) propose that social norms cannot be simply thought of as Nash equilibria selection but must also be considered as a product of drawn-out evolutionary processes that favor certain equilibrium strategies. Postlewaite (2011) argues that the primitives of social norms are based on a combination of both the social gain and practical usefulness of good consumption by agents in a given society, while the persistence of certain norms is based on their stability relative to adopting different customs. Okuno-Fujiwara and Postlewaite (1995) create a new notion of “norm equilibria” where best-responses are chosen by agents based only on knowledge of some prior distribution and a set of pre-defined norms. Mailath and Postlewaite (2006) introduce a matching model with “social assets” that have little intrinsic value but may be desirable based on social institutions, showing that agents may desire to match with partners that have lower wealth but more desirable social traits. Stanish (2017) explores the dynamic behavior of cultural norms in a game theoretic exploration of human cooperation in stateless societies. He takes the view that a rational agent maximizes their long-term utility to achieve an objective involves cooperation with others that gives rise to altruistic behaviors. Differences in these objectives and the degree of cooperation necessary to achieve them generate cultural divides depending on geographic and historical phenomena.

Most notably, Greif (1994) analyzes the role of culture in norm formation through the case study of medieval Maghribi and Genoese traders. Both groups faced a merchant-agent commitment problem: merchants who wanted to trade with foreign clients could either go abroad themselves and ensure transactions, or hire agents as proxies and risk embezzlement of merchandise. Working under Islamic economic and social institutions, the Maghrabis developed a collectivist society built on trust and transparency, generating a horizontal trading structure where merchants helped each other out to trade abroad. Embezzlement would have been punished by the collective. In contrast, the Genoese followed a European model of
individualism and private information, creating a vertical social structure where a class of trading agents was subservient to a rich merchant class. The different cultural structures of these trader societies led to a divergence in their solutions to similar games — different Nash equilibria for different cultures.

The characterization of a social norm as a cooperative mechanism lends itself to the natural creation of a simple model of social norms which encodes information about how social/cultural norms can be expressed within an economic model. Members of a population can choose to take two actions: cooperate based on norms and receive a continuous flow of income for an infinite amount of stages, or refuse to cooperate and receive a one-off reward, possibly through colonial or foreign intervention. The share of the population cooperating based on the norm represents the “social fabric” of that population. Such a model is presented in Section 3 of this paper.

2.2 Economics on Colonialism

In the wake of Acemoglu et al.’s work, a large body of economics literature in the past two decades encompasses empirical studies that examine the impact of colonial policies on formal institutions. Agbor et al. (2010) find that the “indirect” effects of colonial education systems in Sub-Saharan Africa, i.e. outcomes resulting from but not directly caused by colonial policies, had greater effects in the postcolonial world than the “direct” effects of such policies. Beck et al. (2003) show that stronger colonial-era legal systems and higher resource allocations at the point of independence are positively correlated with stock market development and property security post-independence. Heldring and Robinson (2012) examine heterogenous growth patterns amongst ex-African colonies and claim that although Colonialism brought limited technological benefit to colonized regions, these benefits seldom persisted into the postcolonial era and were overshadowed by the arrival of racism, inequality, and warping of local institutions. Michalopoulos and Papaioannou (2013) suggest that modern economic development is positively correlated with precolonial institutions established by ethnicities that have remained in the same places into the modern era. Angeles and Neanidis (2015) point out that, in colonies where Europeans remained minorities, higher rates of settler Colonialism are positively correlated with modern rates of corruption through the formation of local elite class. Banerjee and Iyer (2005) find that Indian provinces with British-instituted landlords in the colonial period do worse in the postcolonial era, which can be attributed to institutional differences and subsequent incentives for investment in areas where the British uprooted local land tenure systems and replaced them with hand-picked landlords. Jain (2017) compares Indian literacy rates in the colonial and postcolonial periods, finding that districts where the language of schooling chosen by British colonizers matched the district’s majority language experienced higher literacy and college graduation rates. Engelbert (2000) displays empirical evidence suggesting that postcolonial Tropical African nations with institutions that were at greater odds with precolonial institutions experienced lower post-independence economic growth than those with a closer connection between post and precolonial institutions. Oto-Peralias and Romero-Avila (2017) show that former British colonies exhibit a strong and significantly negative relationship between modern institutional
quality and internal social conflict through the “divide and conquer” method of British rule.

However, Economics places a narrow emphasis on how formal colonial institutions determine formal postcolonial institutions, without meaningful consideration for the impacts of Colonialism through channels like social fabric. “Culture” and “social fabric” are at best seen as residuals or alternative explanatory factors, and there is yet to be a serious treatment of how distortion of culture and society interact with Colonialism. While a characterization of institutions as a set of formal political laws or bodies is natural, solely examining Colonialism’s impact on these “formal” institutions disregards the set of informal social institutions and norms which govern day-to-day interactions within local populations. In turn, a sole focus on economic actions (property rights, taxation, and resource extraction) leading to economic outcomes (modern property security or output per capita) ignores violent channels, such as the suppression of local religious, social, and cultural practices that impact postcolonial economic livelihood.

Some work in economics examines the impacts of colonial education, ethnic, and religious policies on postcolonial structures. Nathan Nunn’s “Culture and the Historical Process” (2012) calls for formalizing the economic impacts of Colonialism through sociocultural channels. Nunn’s definitions of culture as “decision making heuristics or ‘rules of thumb’ that have evolved given our need to make decisions in complex and uncertain environments” (Nunn 2012, p. S109) informs the notion that Western European colonizers established colonial institutions advantageous to their own needs without regard for how those institutions affected social norms in colonized regions. Ali et al. (2018) suggest that a British colonial system where an individual’s ethnicity determined access to resources was advantageous to British colonizers’ ability to govern, but led to weakened state centralization after colonial independence. Montgomery (2017) shows that while the arrival of Catholic missionaries may have had path-dependent, positive educational effects for modern day East Africans, they may have established gender norms that have resulted in larger modern-day gender inequality. Nunn (2010) shows that populations exposed to Christian missionaries in Colonial Africa are more likely to identify as Christian in the modern day, implying that colonizers shifted local religious values and ideals.

To date, there have been almost no treatments of Colonialism from a theoretical perspective. One of the only game theoretic works is Nunn (2005), who presents a model where colonizers choose a tax and a parameter of institutional strength that affects the output of colonized people. Members of local populations choose to pursue entrepreneurial or rent-seeking behavior. This game has two equilibria, one where a very low rate of taxation accompanies strong institutions, the other where a high rate of taxation accompanies rent-seeking behavior. While the colonizer’s choice of an output tax is similar to the model of this paper, Nunn’s paper focuses on property rights rather than social fabric, the main contribution of this paper to the literature.
2.3 Postcolonialism and Culture

Outside of Economics, there has been extensive work on the interplay between culture and power dynamics within colonial contexts. The field of Postcolonialism engages with the destructive and exploitive impacts of Colonialism and Imperialism on the culture and society of previously colonized peoples and, more broadly, criticizes modern discourses that produce knowledge which frames the world through the eyes of colonizers. This section analyzes some of the foundational literature of Postcolonialism, which often draw from history, critical theory, anthropology, and sociology, with the purpose of motivating exactly why the examination of culture is essential to studies of Colonialism in any discipline.

Edward Said’s *Orientalism* (1979) analyzes the power dynamics underlying Western European Orientalism, or a homogenous othering of the “Orient,” the mass of land stretching from the Middle East through East Asia that Europeans. Historical conceptualization of the “Orient” as savage, backwards, and irrational, creating a binary relation where the West viewed itself as “the actor, the Orient a passive reactor” (Said 1979, p. 109). The Orient’s inhabitants were depicted as “backward, degenerate, uncivilized, and retarded. . . viewed in a framework constructed out of biological determinism and moral-political admonishment” (p. 207). “Orientals” were inherently uncivilized, and a subsequent goal of Western European colonizers was to bring “civilization” to those uncivilized. The term Orientalism simultaneously refers to “a certain will or intention understand, in some cases to control, manipulate, even to incorporate, what is a manifestly different world . . . a discourse that is . . . produced and exists in an uneven exchange with various kinds of power (Said 1979, p. 12). The process of subjugating the “inferior,” colonized, Oriental was inextricably linked to the project of Colonialism on a social, cultural, and civilization level.

The justification and enforcement of Colonialism and Imperialism as carried out by European nations was rooted in notions of Orientalism which not only informed the necessity of colonial rule but evolved as the colonial project grew. Said (1994) writes that “[a]t the heart of European culture during the many decades of imperial expansion lay an undeterred and unrelenting Eurocentrism . . . [that] subordinated [colonized peoples] by banishing their identities, except as a lower order of being . . . This culture process has to be seen as a vital, informing, and invigorating counterpoint to the economic and political machinery at the material center of imperialism” (p. 222). Alatas (2013) writes that characterizations of Southeast Asians as inherently lazy and sluggish was used to justify of colonial rule in the region: “the colonial ideology utilized the idea of the lazy native to justify compulsion and unjust practices in the mobilization of labour in the colonies” (p. 2). While Orientalist depictions of colonized regions enforced the idea of Orientals as savages fit to be ruled and categorized via colonial power, colonial policies were built on these very assumptions, thereby fueling these stereotypes. Processes of social organization based on stereotyping and othering are inherent to the process of Colonialism.

Bhabha (2012) writes that the “objective of colonial discourse is to construe the colonized as a population of degenerate types on the basis of racial origin, in order to justify conquest and
to establish systems of administration and instruction...referring to a form of governmentality that in marking out a ‘subject nation,’ appropriates, directs and dominates its various spheres of activity” (Bhabha 1994, p. 101). The colonizer demarcates the boundaries of what a colonized people can or should be (in terms of race, religion, caste) and rules over peoples precisely in terms of these manufactured boundaries as a process of subjugation. Spurr (1993) echoes this idea when discussing colonizers’ debasement of colonized populations as a means for informing policies of boundary creation and compartmentalization: “[i]ndigenous peoples, like endemic disease, are localized, rooted in a given environment, and easily contained within controllable limits” (p. 89). Bhabha also discuss “mimicry,” wherein a colonized people take on the cultural attributes and norms of their colonizer by trying to fit into the colonizer’s conceptions of Other-ness. Colonized peoples are unable to resist colonial rule without conceiving of liberation in terms of the boundaries of the colonizer: “in ‘normalizing’ the colonial state or subject, the dream of post-Enlightenment civility alienates its own language of liberty and produces another knowledge of its norms” (Bhabha 2012, p. 123).

A discussion of the traumatic cultural relationship between the colonizer and colonized can be found in Fanon (1961): “[t]he sweeping, leveling nature of colonial domination [of colonization] was quick to dislocate in spectacular fashion the cultural life of a conquered people...the new legal system imposed by the occupying power, the marginalization of the indigenous population and their customs by colonial society, expropriation, and the systematic enslavement of men and women, all contributed to this cultural obliteration” (p. 170). wa Thiong’o (1992) examines the role of language as a means of establishing colonial dominance, giving examples of the British colonial regime’s imposition of the English language within Kenyan schools in the mid-20th century. The use of native Kenyan languages was punished in schools through physical and social punishment while English was promoted as “the measure of intelligence and ability in the arts, the sciences, and all the other branches of learning” (wa Thiong’o 1992, p. 12). While the primary purpose of the colonial project was to extract economic profit from the colony, wa Thiong’o writes that “its most important area of domination was the mental universe of the colonized, the control, through culture, of how people perceived themselves and their relationship to the world...[T]he destruction or deliberate undervaluing of a people’s culture...was crucial to the [colonizer’s] domination of the mental universe of the colonized” (p. 16). Cultural disruption is a primary means through which the process of wealth and resource extraction is regulated, and one of the most marked channels through which that cultural disruption operates is through the construction and exclusion of linguistic identities.

There has been little work on the integration of Postcolonialism into economic thought. Zein-Elabdin (2009) proposes that institutional and cultural economics likely serve as the best link between Postcolonialism in Economics by articulating how hegemonic cultural transmission by colonizers interplays with and distorts the norms and institutions of colonized peoples. Charusheela (2004) similarly notes that subfields like Institutionalism are likely to serve as a bridge for considering Postcolonialism in economics, adding that bringing together postcolonial and economic theory would allow for analyses of class structure and “economic domination” that were not previously thought up of in both fields.
2.3. POSTcolonialISM AND CULTURE

A proper analysis of Colonialism and its lasting effects is wholly incomplete without a through examination of the social and cultural processes underlying both the justification and execution of the colonial project. While reliance on culture as the object of study is arguably one of the defining properties of Postcolonialism, only in the past two decades have culture and institutions begun making a resurgence in Economics and little to nothing has been done to integrate notions of the culture and social fabric of the colonized into economic studies of Colonialism at either a theoretical or empirical level. Simultaneously, interpreting both the present and persistent effects of colonial rule necessitates consideration of the colonizer’s active manipulation of the culture and identity of colonized peoples; Colonialism inherently operates through the cultural field in its desire to reap profit and “spread civilization” across the colonies. These ideas form the basis of justifying the inclusion of “social fabric” in the context of repeated games within an economic model of Colonialism. I turn to this representation of social norms in the next section.
3. A Model of Social Fabric Distortion

This section presents a model of “social fabric” within a society that derives from primitive notions of social norms as cooperative strategies within repeated games.

Let the population of a to-be-colonized society $S$ be represented by a unit interval continuum $[0, 1]$. Moreover, let each member of this society $S$ have a disposition $\theta$ towards cooperation with local social norms. This $\theta$ is precisely the discount factor of that member of the population, which drives cooperation in the context of repeated games. $\theta$ has a cumulative density function $D$ with support on $[0, 1]$ such that:

- $D(0) = 0$ and $D(1) = 1$;
- $D$ is continuously differentiable with probability density function $d$;
- $\int_{x_1}^{x_2} d(x)dx > 0$ for any $0 \leq x_1 < x_2 \leq 1$.

A population member with a higher value of $\theta$ represents a member of the population who views local social norms as more important and is thereby more willing to cooperate with those local customs and traditions. There is no assumption of symmetry or uniformity on $D$. A society may, in principle, have a large amount of its population value local social norms and have a cluster of higher $\theta$ values near the right end-point at 1. On the other hand, if most of a society does not value its social norms, $\theta$ may be more concentrated towards lower values at 0.

I define the local society $S$ to have a level of social fabric $s$ signalled by the share of the population $[0, 1]$ that follows the local social norms of that society. Suppose that the people of this local population can choose between two actions: $L$, cooperate based on local social norms and receive a continuous flow of income $f(\theta)$, or $A$, deviate from those norms (or cooperate based on “alternative” principles) and receive a one-time payoff of $\tau$. The payouts from $L$ and $A$ for a member of the local society with a cooperation parameter of $\theta$ are:

$$v(L, \theta) = \sum_{t=0}^{\infty} f(\theta)\theta^t = \frac{f(\theta)}{1 - \theta} \quad \text{and} \quad v(A, \theta) = \tau + \sum_{t=1}^{\infty} 0 = \tau$$

$f$ is a continuous function $f : [0, 1] \mapsto [0, +\infty)$ such that $f(0) \geq 0$, $f(\theta) > 0$ for $\theta > 0$, and $f(\cdot)$ is weakly increasing. The weakly increasing property reflects that individuals may receive some additional sort of utility from cooperating dependent on their discount factor. In principle, this payout could be constant for all values of $\theta$, but it is at least weakly higher for population members with higher values of $\theta$.

This structure provides a powerful and intuitive interpretation for a population member’s willingness to cooperate based on local social norms. Each period, an individual with a cooperative tendency (or discount factor) $\theta$ receives a payout of $f(\theta)$ from cooperation, leading to a lifetime present discounted value of $\frac{f(\theta)}{1 - \theta}$. Choosing to “cheat” on said cooperation leads to a one-time payoff of $\tau$. 

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3.1 Deriving the Cost Function

For any value of $\bar{c}$, a member of the local population will switch from local social norms $L$ to alien social norms $A$ if and only if

$$\frac{f(\theta)}{1-\theta} \leq \bar{c}$$

**Proposition 1:** For every $\bar{\theta} \in [0,1)$, there exists a unique $\bar{c} \geq 0$ such that $\frac{f(\theta)}{1-\theta} = \bar{c}$. Consequently, for $\theta > \bar{\theta}$, $\frac{f(\theta)}{1-\theta} > \bar{c}$ and for $\theta < \bar{\theta}$, $\frac{f(\theta)}{1-\theta} < \bar{c}$. In turn, exactly $1-\bar{c} = D(\bar{\theta})$ of the population will weakly prefer alien norms so that $\bar{c}$ will prefer local norms.

**Proof.** See Appendix. \hfill \square

Since $\lim_{\theta \to 1} \frac{f(\theta)}{1-\theta} = +\infty$, it is impossible for a member of the population with $\theta = 1$ to prefer $A$ to $L$ unless $\bar{c} = +\infty$. By incurring a cost $\bar{c}$, an outsider (i.e. a colonizer) is able to set the social fabric to $\bar{c}$, but can never set social fabric to 0.

The correspondence between cost and social fabric naturally gives rise to a cost function $c(1-x) : [0,1] \mapsto [0,\infty)$ such that for a given level of social fabric $1-x$, a cost $c(1-x)$ is necessarily incurred to set the social fabric to that level*. The choice of the argument as $1-x$ rather than $x$ is such that when $x=0$, the level of social fabric is at $1-x=1$ so that the colonizer is not changing the social fabric; as $x$ increases, the costs represent larger and larger changes to the social fabric away from 1.

Note that if $f(0) = 0$, $c(1-0) = c(1) = 0$, since $\frac{f(0)}{1-0} = f(0) = 0$, so a member of the population with $\theta = 0$ will be indifferent between $L$ and $A$ when $\bar{c} = 0$.

Throughout this paper, I will also define $c(\cdot)$ to be a function $c(s) : (0,1] \mapsto [0, +\infty)$, where $s = 1-x$ is the level of social fabric. The actual function $c(s)$ and $c(1-x)$ are identical, they simply utilize different arguments.

*The domain is $[0,1)$ rather than $[0,1]$ because the social fabric can never be set precisely to 0 for any finite cost $\bar{c}$
3.2 Behavior of the Cost Function \(c(\cdot)\)

As a CDF, \(D\) is necessarily weakly increasing. If this assumption is strengthened to say that \(D\) is strictly increasing, this means that \(D\) is invertible. Then, it makes sense to invert \(\bar{s} = D(\bar{\theta})\) to read \(D^{-1}(\bar{s}) = \bar{\theta}\), meaning the cost function can explicitly be written to solve:

\[
c(1 - x) = \frac{f(\theta)}{1 - \theta} = \frac{f(D^{-1}(x))}{1 - D^{-1}(x)}
\]

Since \(D\) is strictly increasing, this also means that \(D^{-1}\) will be strictly increasing. Such an explicit form such eases the process of proving differentiability and concavity results about \(c\). For simplicity, let \(g(x) = D^{-1}(x)\).

**Proposition 2**: \(\lim_{x \to 1} c(1 - x) = +\infty\).

**Proof.** See Appendix.

This shows that the cost of setting social fabric closer to 0 approaches \(+\infty\), and is equivalent to \(\lim_{s \to 0} c(s) = +\infty\).

**Proposition 3**: \(c(1 - x)\) is increasing in \(x\) at \(x = 0\) and is strictly increasing for \(x \in (0, 1)\). Moreover, \(\lim_{x \to 1}(c(1 - x))' = +\infty\)

**Proof.** See Appendix.

Since \(c(1 - x)\) is strictly monotone increasing, setting social fabric to lower levels necessarily incurs larger costs. Equivalently, \(c(s)\) is decreasing at 1 and strictly decreasing at \(s < 1\). Moreover, the marginal cost of distorting social fabric at a higher level approaches infinity.

On the other hand, the (nasty) second derivative is given by:

\[
c''(1 - x) = \frac{1}{1 - g(x)} \left( g'(x)^2 f''(g(x)) + g''(x) f'(g(x)) \right)
\]

\[+ \frac{1}{(1 - g(x))^2} \left( 2g'(x)^2 f'(g(x)) + f(g(x)) g''(x) \right)
\]

\[+ \frac{1}{(1 - g(x))^3} \left( 2f(g(x)) g'(x)^2 \right)
\]

The convexity of the cost function depends on the convexity of the distribution itself as well as that of \(f\), but as \(x\) nears 1, the function becomes “approximately convex.”

**Proposition 4**: There exists \(x' \in (0, 1)\) such that for all \(x > x'\), \(c(1 - x)\) is strictly convex.

**Proof.** See Appendix.
3.2. BEHAVIOR OF THE COST FUNCTION $C(\cdot)$

In sum, a strictly increasing distribution $D$ of $\theta$ gives rise to a cost function $c(\cdot)$ for the colonizer such that:

- $c(s) : (0, 1] \mapsto [0, +\infty)$ gives the cost of setting social fabric to $s$;
- $c(s) = \frac{f(D^{-1}(1-s))}{1-D^{-1}(1-s)}$;
- $c(0) = 0$ if $f(0) = 0$;
- $\lim_{s \to 0} c(s) = +\infty$;
- $c'(s) \leq 0$ for all $s$ (this holds strictly for $s < 1$);
- $c''(s) > 0$ for all $s$ in a neighborhood of 0.

Figures 1a, 1b, and 1c below shows examples of the cost function with $f(\theta) = \theta$ derived from the uniform distribution on $[0, 1]$ ($D(x) = x$), the arcsin distribution ($D(x) = \frac{2}{\pi} \arcsin(\sqrt{x})$), and the Kumaraswamay distribution (with $a = 1$ and $b = 2$).
3.3 Duality: Deriving $D$ from the Cost Function

Subsection 3.2 gives a method for deriving the colonizer’s cost function from the distribution $D$ of $\theta$ within the population, as well as the intrinsic value $f$ of $\theta$ placed by locals on cooperation. In practice, it is very possible that the colonizer’s cost function may be “well known”; the colonizer knows what policies it will implement and the specific goals of subjugation that those policies are meant to achieve. However, the prior distribution $D$ of $\theta$ in the population may not be known and, even if it is known, a colonizer may not be able to observe $f(\cdot)$. Nevertheless, some knowledge about the shape of the cost function and $f(\cdot)$ can be used to back out information about the original distribution.

Recall that the cost function $c(\cdot)$ is defined to satisfy

$$c(1 - x) = \frac{f(D^{-1}(x))}{1 - D^{-1}(x)}$$

for $x \in [0, 1)$. First, since $D^{-1}(0) = 0$, $c(1) = f(0)$, which is the value that a population member with $\theta = 0$ places on cooperation. A very sensible assumption on $c(\cdot)$ may be that $c(1) = 0$, i.e. that there is 0 cost associated with perturbing social fabric.

Suppose now more broadly that $f(\cdot)$ is known and is simply equal to the identity, $f(\theta) = \theta$. Then the CDF $D$ can be explicitly solved for:

$$c(1 - x) = \frac{f(D^{-1}(x))}{1 - D^{-1}(x)} = \frac{D^{-1}(x)}{1 - D^{-1}(x)}$$

$$D^{-1}(x) = \frac{c(1 - x)}{1 + c(1 - x)}$$
3.3. DUALITY: DERIVING $D$ FROM THE COST FUNCTION

$$D(x) = \left( \frac{c(1-x)}{1+c(1-x)} \right)^{-1}$$

If $c(1-x)$ is differentiable on $[0, +\infty)$, $c'(1-x) > 0$ for all $x > 0$, $\lim_{x \to 1} c(1-x) = +\infty$, and $c'(1) \geq 0$, then:

- $D(0) = 0$ and $D(1) = 1$;
- $D$ is differentiable on $[0, 1)$ with continuous probability density function $d(x)$;
- and $d(x) > 0$ for every $x \in (0, 1)$ and $d(0), d(1) \geq 0$ (the CDF is strictly increasing on its interior).

In sum, while both the value of cooperation $f(\cdot)$ and the distribution $D$ may be unobservable, it is possible to place assumptions on $c(\cdot)$ that give way to reasonable properties of both $f(\cdot)$ and $D$.

Regardless of its derivation from a prior distribution or a cost function, this characterization of social fabric determination gives rise to two sub-populations within the population of a colonized society: a fraction $s$ of the population playing $L$, that is, following local social norms, and a fraction $1-s$ playing $A$ that deviates or follows alien norms due to the actions of the colonizer.
4. The Colonization Game

This section utilizes the primitives of social fabric from the previous section to build a simple model of colonization centered around two ideas: distortion of social fabric and extraction of resources. After setting up the initial conditions of the game, I solve for sub-game perfect Nash equilibria, derive properties about the solutions to the game, discuss comparative statics to the solutions, and end by computing a solution to a very basic iteration of the model. Suppose there are two main players: $C$, the colonizer, and $S$, the local society under threat of colonization, above. Let $N$ be the notation for the player “nature” to formalize notions of uncertainty. Throughout the model, I assume that $C$ and $S$ are risk-neutral in regards to uncertainty.

4.1 The Local Society

The locals’ payoff is governed by the amount of resources they can derive benefit from, denoted $y$, as well as their social fabric $s$, which is precisely the level of social fabric as determined in the previous section. In particular, $s = 1$ corresponds to an intact, cooperative society based on local norms and $s = 0$ to a chaotic, uncooperative society. Then, the payoff of the local society is given by the function $u(y, s), u : \mathbb{R} \times [0, 1] \mapsto \mathbb{R}$, where

- $u(y, \cdot)$ is strictly increasing in $s$ for $y > 0$;
- $u(\cdot, s)$ is strictly increasing in $y$ for $s > 0$;
- $u(y, 1) = y$
- $u(y, s) > 0$ for all $s > 0$ and $y > 0$;
- $u$ is $C^2$;
- $\lim_{y \to \infty} u(y, s) = +\infty$ for all $s$;
- and $u(0, s) = 0$ for all $s$.

The interpretation of $u(\cdot, \cdot)$ regarding social fabric is that at higher levels of social fabric, the members of the local society have no problems generating cooperation and following similar customs and traditions and are able to fully enjoy whatever level of resources they are endowed with. However, at lower levels of social fabric, there is an imbalance in cooperative incentives that manifests itself in lack of ability to cooperate based on local norms. Consequently, the society has a harder time sharing its resources. In practice, depending on the nature in which $s$ is distorted, this may also manifest itself in additional racist, classist, or social attitudes within the society that did not exist previously in the precolonial period.

It is very possible that $u(\cdot, \cdot)$ is somehow linked to $f(\cdot)$. I make no assumption on whether this may or may not hold.
4.1. THE LOCAL SOCIETY

Suppose that the local society possesses some resource endowment $\bar{y}$. While a very narrow interpretation of $\bar{y}$ may consist of just raw materials, I take this measure of “resources” to be very general, including particularly the value of labor that a given society possesses, which a colonizer can utilize through forced labor and enslavement. Within the model, the local society can take two actions in the presence of colonization. They can take action $W$, work and receive utility from whatever resources they possess. The full level of resources may potentially be extracted at a rate $t \in [0,1]$, meaning the locals only possess resources $(1-t)\bar{y}$ so that their total payoff is $u((1-t)\bar{y}, s)$. The other action is to rebel against potential colonization, denoted $R$. Their set of possible actions is hence $\{W, R\}$.

In the event of a successful rebellion, $s$ is reset to 1 and with certainty the local society receives payout $u(\bar{y}, 1) = \bar{y}$; that is, any external social stimuli generated by the arrival of the colonizers are erased. If rebellion fails, they receive payoff $-M$, for $M \geq \bar{y}$. The process of rebellion is governed by uncertainty, and the probability of successful rebellion is directly dependent on the level of social fabric. Let this probability be given by a function $p(s)$, where $p : [0,1] \mapsto [0,1]$, such that

- $p(\cdot)$ is strictly increasing in $s$;
- $p$ is continuously differentiable;
- and $\frac{M}{\bar{y} + M} \in p\left((0,1)\right)$, that is, there exists $s^*$ such that $p(s^*) = \frac{M}{\bar{y} + M}$, $p(s) < \frac{M}{\bar{y} + M}$ for all $s < s^*$, and $p(s) > \frac{M}{\bar{y} + M}$ for all $s > s^*$.

These assumptions say that when a society is more intact and $s$ is closer to 1, it is easier to coordinate rebellion. When social fabric is less intact, it may be harder to coordinate rebellion and, moreover, some deviant locals may ally themselves with a colonizer. The final assumption guarantees that when faced with the lottery of rebellion, there is a threshold of social fabric at which the expected value of rebellion is 0; below that threshold the expected value of rebellion is negative and above it is positive. In turn, the expected payoffs of the locals $S$ from each action are given as below:

$$\pi^W_S = u((1-t)\bar{y}, s)$$

$$E\pi^R_S = p(s)\bar{y} - (1-p(s))M$$

In the event the locals work, their payoff is strictly decreasing in $t$ and strictly increasing in $s$. In the event of rebellion, their expected payoff is strictly increasing in $s$, since $p(s)$ is strictly increasing in $s$.

One property about the shape of $u$ in relation to $p(\cdot)$ that arises on certain occasions is that:

$$u(\bar{y}, s) \geq p(s)\bar{y} - (1-p(s))M$$

(4.1)

That is, for any level of social fabric, working with no extraction is weakly preferred to risking rebellion at that specific level of social fabric. Note that this holds strictly at $s^*$ since $u(\bar{y}, s^*) > 0 = p(s^*)\bar{y} - (1-p(s))M$, and holds weakly at $s = 1$. 


4.2 The Colonizer

The other player in the model is the colonizer $C$. Suppose that the colonizer is able to extract from the locals by imposing a rate of extraction $t \in [0, 1]$ on the locals’ resources $\overline{y}$ so the payoff the colonizer gains from extraction will be $t\overline{y}$. In particular, since social fabric does not actually affect the level of resources, $s$ does not directly enter into the colonizer’s payoffs in regards to resource taxation/extraction.

The next piece of the colonizer’s payoff comes from suppressing the level of social fabric $s$ of the local population. The cost of suppressing social fabric is governed by the cost function $c(s)$ introduced above. I directly make a set of reasonable assumptions on $c(\cdot)$, thereby describing the distribution function of $\theta$ in terms of the cost function:

- $c(1) = 0$;
- $\lim_{s \to 0} c(s) = +\infty$;
- and $c'(1) \leq 0$ with $c'(s) < 0$ for all $s < 1$.

One example of a function that satisfies the above criteria is $c(s) = \frac{1}{s} + s - 2$ or $c(1 - x) = \frac{1}{1-x} - x - 1$, which gives rise to a CDF as pictured in Figure 3 below.

![Figure 3. CDF Derived from $c(s) = \frac{1}{s} + s - 2$](image)

More generally, such a cost function can describe a large class of CDFs, including the Kumaraswamay Distribution with $a < b$ and a variant of the Logit-normal distribution on $(0, 1)$ extended to $[0, 1]$ with $D(0) = 0$, $D(1) = 1$, and $\sigma < 1$. Since the probability of successful rebellion is dependent on $s$ through the function $p(s)$, the colonizer is able to suppress the threat of potential rebellion by exerting a cost to suppress social fabric.

The colonizer makes two moves: first it proposes a rate of extraction $t \in [0, 1]$ on $S$’s
resources $\bar{y}$; second, it sets the level of local social fabric $s$, thereby incurring the corresponding cost $c(s)$. If the local society decides to work, the payoff for the colonizer is given by

$$\pi^W_C = t\bar{y} - c(s)$$

In this event, the colonizer’s payoff is strictly increasing in extraction $t$ and decreasing in $s$. If the locals decide to rebel, the expected payoff of the colonizer is given by

$$E\pi^R_C = (1 - p(s))\bar{y} - p(s)M - c(s)$$

That is, if rebellion succeeds with probability $p(s)$, the colonizer “loses” and receives payoff $-M$; if rebellion fails with complementary probability, the colonizer captures all the resources and receives $\bar{y}$. In either case, the colonizer will have already chosen a level $s$ of social fabric distortion and incur the cost $c(s)$. Since $-p(s)$ is decreasing in $s$ and $-c(s)$ is increasing in $s$, there is ambiguity as to whether the expected payoff from rebellion is increasing or decreasing with respect to changes in $s$.

Note that the colonizer can pick $(t, s) = (0, 1)$, which does not distort social fabric and incurs cost $c(1) = 0$, thus yielding a payoff from extraction of $0 \cdot \bar{y} - c(1) = 0$. In this case, the locals prefer working to rebellion as well, since

$$\pi^W_S = (1 - t)y(s) = (1 - 0)y(1) = \bar{y} \geq p(s)\bar{y} - (1 - p(s))M = E\pi^R_S$$

Hence, it is possible for the colonizer to receive a payout 0 in the model, meaning that the colonizer can finish the game with non-negative payoffs and therefore finds entry into the game weakly profitable.

### 4.3 Design of Game

The basic design of the game is as follows. First, the colonizer makes a choice $(t, s) \in [0, 1] \times (0, 1]$ of extraction of resources and social fabric. Then, observing these proposed choices, the locals decide whether to work or rebel. If the locals decide to work by playing $W$, the game ends with the colonizer and local society respectively receiving payoffs:

$$\pi^W_S = u((1 - t)\bar{y}, s) \text{ and } \pi^W_C = t\bar{y} - c(s)$$

If the locals pick action $R$ and rebel, the player nature $N$ moves. With probability $p(s)$, rebellion succeeds and the game ends with payoffs:

$$\pi^{R,\text{succeed}}_S = \bar{y} \text{ and } \pi^{R,\text{succeed}}_C = -M - c(s)$$

If rebellion fails, with probability $1 - p(s)$, the payoffs are respectively

$$\pi^{R,\text{fail}}_S = -M \text{ and } \pi^{R,\text{fail}}_C = \bar{y} - c(s)$$

This is illustrated in the extensive-form game tree in Figure 4, where the top payoffs are those of the colonizer and the bottom those of the local society.
4.4 Solving for Sub-game Perfection

In this section, I describe a series of sub-game perfect Nash equilibria to the colonization game.

4.4.1 Finding the Optimal Rate of Extraction

Fix $\bar{y}$ and $M \in \mathbb{R}_+$. Recall that the respective expected payoffs for $S$ from working and rebelling are given by

$$E\pi^W_S = (1-t)\bar{y}(s)$$
$$E\pi^R_S = p(s)\bar{y} - (1-p(s))M$$

For a given $t \in [0,1]$ and $s \in (0,1]$, working is weakly preferred to rebellion if and only if

$$u((1-t)\bar{y}, s) \geq p(s)\bar{y} - (1-p(s))M$$

In particular, for a given value of $s = \bar{s}$, the locals are indifferent between work and rebellion if and only if

$$u((1-t)\bar{y}, \bar{s}) = p(\bar{s})\bar{y} - (1-p(\bar{s}))M$$
4.4. SOLVING FOR SUB-GAME PERFECTION

Proposition 5: For every \( s \in [s^*, 1] \), where \( s^* = \frac{M}{b + M} \) there exists a unique \( t \in (-\infty, 1) \) such that the locals are indifferent between rebellion and working. This generates a function \( t(s) : [s^*, 1] \mapsto (-\infty, 1) \) which gives the rate of extraction that makes the locals indifferent between rebellion and working.

Proof. See Appendix.

Since the local’s payoff is strictly decreasing in the rate of extraction \( t \), if the colonizer sets an extraction rate \( t > t(s) \) at a given level of social fabric, the locals will strictly prefer rebellion over work; if the colonizer sets \( t < t(s) \), the local society will strictly prefer work over rebellion. Since the colonizer’s payoff is strictly increasing in \( t \), they will set \( t \) as high as possible to extract maximum possible resources from the locals. If they desire a situation with no rebellion, the colonizer will always try to set \( t = t(s) \). In this case, for a level of social fabric, they will set a rate of extraction \( T(s) \) as follows:

\[
T(s) = \begin{cases} 
0 & t(s) < 0 \\
t(s) & t(s) \in [0, 1] \\
1 & t(s) > 1
\end{cases}
\]

Proposition 5 gives a further definition of \( T(s) \) in equation (4.2):

\[
T(s) = \begin{cases} 
\max\{0, t(s)\} & s \geq s^* \\
1 & s < s^*
\end{cases}
\]

(4.2)

where as before \( s^* \) solves \( p(s) = \frac{M}{b + M} \).

It follows that for \( s \in [s^*, 1] \), setting the extraction rate and social fabric to \((t(s), s)\) results in a local society that is indifferent between working and rebellion. However, if \( t(s) < 0 \), the colonizer is forced to set an extraction rate equal to 0, and the locals prefer rebellion. Any extraction rate in \([0, 1]\) will result in a local society that prefers working over rebellion. In turn, given that the colonizer would like the locals to work instead of rebel, \( T(s) \) gives the optimal rate of extraction for a given level of social fabric \( s \), allowing the colonizer to extract as much of the locals’ resources as possible without encountering a credible threat of resistance.

A graph of \( t(s) \) and \( T(s) \) is shown in Figure 5 below. \( t(s) \) is shown in a dashed line at the bottom to illustrate a situation where \( t(s) \) goes below 0, thereby binding \( T(s) \) at 0.
Figure 5. The Extraction Function $T(s)$

Behavior of $T(s)$ along $[s^*, 1]$

On the domain of $(s^*, 1]$, consider when $T(s) = t(s)$. $t'(s)$ is determined by solving $F_s(s, t(s)) = 0$:

$$F_s(s, t(s)) = (\partial u/\partial y)(-\overline{y})t'(s) + \partial u/\partial s - p'(s)(\overline{y} + M) = 0$$

$$t'(s) = \frac{\partial u/\partial s - p'(s)(\overline{y} + M)}{\overline{y}\partial u/\partial y} \quad (4.3)$$

The sign of $t'(s)$ is ambiguous. If $\partial u/\partial s < p'(s)(\overline{y} + M)$ for some $s$, then $t'(s) < 0$ and the rate of extraction decreases as the intactness of social fabric increases. On the other hand, if $\partial u/\partial s > p'(s)(\overline{y} + M)$, $t'(s) > 0$ and the rate of extraction increases if the intactness of social fabric increases. Since $p'(s) > 0$, $\overline{y} + M > 0$, and $\partial u/\partial y > 0$, it follows that $t'(s) < 0$ in equation (5) so that as the intactness of social fabric increases, the rate of extraction decreases.

However, assuming that $\partial u/\partial s$ is bounded, if $M$ is sufficiently large, it follows that $t'(s) < 0$ for all $s$. That is, distortion of social fabric and rates of resource/output extraction are positively correlated.

**Proposition 6:** A population that experiences no distortion of social fabric will only be indifferent between working and rebellion if the extraction rate is strictly less than 1.

*Proof*. See Appendix. \qed

Consequently, it also follows that $T(s)$ is continuous at $s^*$. $T(s) = \max\{0, t(s)\}$ is continuous on $[s^*, 1]$ as the maximum of two continuous functions so that $T(s)$ is continuous on $[0, 1]$ itself.
4.4.2 The Colonizer’s Preference for Extraction

Since the colonizer is always playing an optimal extraction rate by choosing $T(s)$ for a given $s$, they next evaluate for which (if any) values of $s$ the colonizer will prefer a non-rebellion situation. The colonizer then compares

$$\pi^W_C = T(s)\bar{y} - c(s)$$ and $$E\pi^R_C = (1 - p(s))\bar{y} - p(s)M - c(s)$$

**Proposition 7** The Colonizer always weakly prefers a local society that is working to one that rebels.

*Proof. See Appendix.* \(\square\)

Finally, since the colonizer will no matter what desire a working equilibrium, the colonizer chooses $s$ to maximize

$$T(s)\bar{y} - c(s)$$

Note that for $s < 1$, the colonizer can set $(t, s) = (0, 1) = 0$, which yields a higher payoff than and hence dominates picking $T(s) = 0$ for any $s < 1$. In turn, it is sufficient to look at $t(s)$ on $[s^*, 1]$ only when $T(s) = t(s)$.

**Proposition 8**: There are three possible types of solutions that maximize $T(s)\bar{y} - c(s) = 0$: set $s = 1$, set $s = s^*$, or set $s = s' \in (s^*, 1)$. These result in extraction rates of $t(1) = (1 - p(1)) + (1 - p(1))\frac{M}{\bar{y}}$, $t(s^*) = 1$, and $t(s')$, respectively.

*Proof. See Appendix.* \(\square\)

4.5 Primary Predictions of the Model

In general, since the colonizer will always prefer a rebellion where locals work, the only sub-game perfect Nash equilibria are those where the locals will in fact work. Based on the proposition above, there are three main types of equilibria:

- The colonizer sets social fabric $s = 1$ and sets the extraction rate to $(1 - p(1)) + (1 - p(1))\frac{M}{\bar{y}}$. Minimal extraction and resource extraction follows in the stead of no social fabric distortion. The locals work. If $p(1) = 1$, this equilibrium is a “no colonization” equilibrium ($t = 0$ and $s = 1$).

- The colonizer sets social fabric to $s' \in (s^*, 1)$ and a tax rate $t = t(s') \in (0, 1]$. Partial taxation or extraction is accompanied by some non-trivial degree of social fabric distortion. The locals work.

- The colonizer sets social fabric $s = s^*$ and fully extraction with rate $t = 1$. Full extraction of resources accompanies a heavy erasure of social fabric. The locals work.
These equilibria possess a set of properties that positively correlate the extraction rate directly to distortion of social fabric: as extraction increases, the level of social fabric falls.

**Proposition 9** Ceteris paribus, in the set of sub-game perfect Nash equilibria where the locals work, the optimal choice of extraction rate is strictly decreasing in the optimal choice of social fabric. That is, in the data, we should observe that rates of extraction and social fabric levels are negatively correlated: for any two datapoints $(t, s)$ and $(t', s')$, if $s' > s$, then $t' < t$.

*Proof.* See Appendix. □

This result forms a core finding of this paper: Historically, the more colonizers extract from a local population, the more it is necessary for them to distort social fabric. In practice, it is possible that fundamental differences in the distribution of $\theta$ (and hence the cost function), the shape of the rebellion probability function, the endowment of a region with resources $\bar{y}$ for extraction, and the potential punishment for rebellion $M$ will cause variation in optimal solutions; these last two properties are discussed in the next section. However, controlling for these factors, the pattern we should observe is one of negative correlation between economic extraction and social fabric levels (or a positive correlation between economic extraction and social fabric distortion). The purpose of the case studies in the next chapter is to take these results and discuss historical examples which fit the predictions of this colonizer model.

### 4.6 Establishing Comparative Statics

This section provides comparative statics for the equilibria outlined above in regards to how the colonizer’s choices of $s$ social fabric and $t$ extraction change with exogenous changes in the parameters $\bar{y}$, the resource allocation of the local society, and $M$, the punishment for the colonizer or local society for losing a rebellion. Throughout, I use super/submodularity to refer to the single variable “increasing differences” iteration of comparative statics.

**Comparative Statics on $\bar{y}$**

It is difficult to establish concrete comparative statics results regarding the optimal choices of $s$ and $t$ without specifying additional assumptions on the functional forms of the probability function $p(\cdot)$ and payout function for the locals $u(\cdot, \cdot)$. In particular, recall that $t(s)$ solves the following problem on $[s^*, 1]$:

$$u((1 - t(s))\bar{y}, s) = p(s)\bar{y} - (1 - p(s))M$$

Suppose $\bar{y}$ rises to $\bar{y}'$. First, $s^*$ falls to $s^{**} = \frac{M}{\bar{y}' + M}$, so there are no problems with looking at behavior on $[s^*, 1]$. Fix $t(s) = t$. Then, keeping $s$ fixed, both $p(s)\bar{y}' - (1 - p(s))M > p(s)\bar{y} - (1 - p(s))M$ and $u((1 - t)\bar{y}', s) > u((1 - t)\bar{y}, s)$. If, at $y = ((1 - t)\bar{y}, s)$, it occurs that

$$\frac{\partial}{\partial y} \left( u((1 - t)\bar{y}, s) \right) = \frac{\partial u}{\partial y}(1 - t) > p(s) = \frac{\partial}{\partial y} \left( p(s)\bar{y} \right)$$
then the marginal increase in the payout from working is greater than the marginal increase from rebelling. In turn, to compensate for this discrepancy, the colonizer may raise the extraction rate $t$ to $t'$ to extract slightly more output from the locals. Conversely, if the marginal increase in the payout from working is less than the increase from rebellion, the extraction rate may be slightly lowered to prevent a rebellion from occurring. The ambiguity in the signs of these countervailing effects generates uncertainty about how these changes in exogenous parameters affect the optimal solution for the colonizer. Nevertheless, there are a few observations that can be made about the behavior of $t(s, \bar{y})$.

Suppose we are at a point where $T(s) = t(s)$. Recalling equation (4.3), the derivative of $t(s)$ with respect to $s$, the derivative of $t(s)\bar{y}$ with respect to $s$ is:

$$
\frac{\partial (t(s, \bar{y})\bar{y})}{\partial s} = t_{s\bar{y}} = \frac{\partial u/\partial s - p'(s)(\bar{y} + M)}{\bar{y} \partial u/\partial y} = \frac{\partial u/\partial s - p'(s)(\bar{y} + M)}{\partial u/\partial y}
$$

The derivative of this expression with respect to $\bar{y}$ gives $t_{s\bar{y}}$:

$$
\frac{\partial^2 (t(s, \bar{y})\bar{y})}{\partial s^2} = \left(\frac{\partial u}{\partial s} (1 - t(s)) - p'(s) \frac{\partial u}{\partial \bar{y}}\right) \frac{\partial^2 u}{\partial \bar{y}^2} (1 - t(s))
$$

**Proposition 10:** There exists $\delta > 0$ such that for $s = s^* = \frac{M}{\bar{y} + L}$, $t(s)\bar{y}$ is submodular in $(s, \bar{y})$ for all $s \in (s^*, s^* + \delta)$.

**Proof.** See Appendix. \qed

If the optimizer of $t(s)\bar{y} - c(s)$ is located at or slightly above $s^*$, this shows by Topkis’ Monotonicity Theorem that for incremental changes in $\bar{y}$, the optimal level of social fabric for the colonizer will decrease, that is, the level of social fabric distortion increases. The practical interpretation of this is that in societies that experience a high rate of extraction (where $t(s)$ is close to 1 and $s$ close to $s^*$), a slightly higher level of resources held by that region results in further distortion of local social fabric.

By placing additional structure on the shape of $u(\cdot, \cdot)$, it is possible to achieve more MCS results with $\bar{y}$.

- A reasonable assumption may be that the extraction function is decreasing in $s$ (higher rates of social fabric distortion enable further extraction), i.e. $t_s < 0$, which is true if and only if $\partial u/\partial s - p'(s)(\bar{y} + M) \leq 0$. Note that since $t(s^*) = 1$ and $t(1) < 1$, this is true at least one point on $(s^*, 1)$.

- Another assumption may be that $\frac{\partial u}{\partial s\partial \bar{y}} < 0$; this says that the marginal benefit from resources is greater at lower social fabric than higher social fabric, when a society may be more “relatively intact.”

- Finally, a third assumption may be that $u(y, s)$ is convex in $y$ so that $\frac{\partial^2 u}{\partial y^2} \geq 0$.

**Proposition 11:** Suppose that $\partial u/\partial s - p'(s)(\bar{y} + M) \leq 0$, $\frac{\partial u}{\partial s\partial \bar{y}} < 0$, and $\frac{\partial^2 u}{\partial y^2} \geq 0$. Then $t(s, \bar{y})\bar{y}$ is submodular in $(s, \bar{y})$ on $(s^*, 1]$. 
Proof. See Appendix.

It follows that \( \frac{\partial^2 t(s, y)}{\partial s^2} \geq 0 \) and \( t(s, y)y \) is submodular in \((s, y)\); moreover, \( t(s, y)y - c(s) \) is supermodular in \((s, y)\) as well. In turn, by Topkis’ Monotonicity Theorem, if a solution \( s' \) exists on \((s^*, 1]\) with resource allocation \( y \), when the allocation rises to \( y' > y \), the maximizing solution falls weakly to \( s'' \leq s' \). In other words, a rise in the resource allocation at an interior solution may result in more damaging of social fabric, although the effect on the value of extraction itself may be more ambiguous.

Nevertheless, while the assumption of \( u(\cdot, \cdot) \)'s convexity in \( y \) may be sensible, it is possible to also think that \( \frac{\partial u}{\partial \alpha(y)} \) is greater than 0 rather than less than 0, i.e. that gains from provision of resources are higher at higher levels of social fabric when those resources are more easily shared through cooperation and social norms than at lower levels of social fabric. Therefore, the primary power of comparative statics with \( y \) is to establish that higher levels of resources in colonies that face high extraction lead to higher levels of social fabric distortion, as shown in Proposition 10.

**Comparative Statics with \( M \)**

In the event of facing a working populace, the colonizer maximizes \( \pi_C^W(s) = T(s)y - c(s) \). Since \( M \) enters into \( T(s) \), this function can be rewritten as \( \pi_C^W(s, M) = T(s, M)y - c(s) \). Note that if \( M \) increases, keeping social fabric and extraction fixed, both the colonizer and the locals will still prefer working over rebellion if they did earlier, since the punishment from risking rebellion increases and the expected payoff from risking rebellion decreases.

**Proposition 12:** \( T(s, M) \) is increasing in \( M \).

Proof. See Appendix.

Hence, keeping social fabric fixed, the rate of extraction is weakly increasing in the punishment from rebellion. That is, the extraction function “shifts up” as \( M \) increases.

**Proposition 13:** \( T(s, M) \) is submodular in \((s, M)\) for \( s \in (0, s^*) \) and \((s^{**}, 1)\).

Proof. See Appendix.

Submodularity of \( T \) in \((s, M)\) on the select intervals shows that that \( T(s, M)y - c(s) \) is also submodular in \((s, M)\). By Topkis’ Monotonicity Theorem, the maximizer in \( s \) of \( T(s, M)y - c(s) \) weakly falls as \( M \) increases. In other words, as the punishment from loss of rebellion increases, the optimal level of social fabric \( s \) weakly decreases (or the distortion of that social fabric increases), and the rate of social fabric distortion does not fall. Simultaneously, the rate of extraction does not decrease.

The failure to establish submodularity on \([s^*, s^{**}]\) results from its dependence on the monotonicity of \( t(\cdot, M) \); if \( t(\cdot, M) \) is monotone decreasing in \( s \) on the select interval, then submodularity may be established. While higher rates of extraction are now feasible, there is ambiguity as to whether the colonizer will choose to capitalize on that ability to extract
more output by increasing or decreasing social fabric. In practice, when $M$ rises to $M'$, an optimizing solution on $(s^*, s^{**})$ would never be observed, since the optimal extraction rate would be equal to 1 on this interval; therefore, a choice of $s^{**}$ would dominate any other choice in $(s^*, s^{**})$.

\section*{4.7 A Simple Version of the Model}

The purpose of this section is to give an example of computing solutions to the colonizer game based on a basic set of assumptions about functional forms. Suppose the following assumptions are satisfied:

- $M = \overline{y}$: the “loss” of rebellion is the same in magnitude as the “gain”;
- $u(y, s) = sy$: the local society’s payoff is linear in social fabric and resource endowment and $u((1 - t)\overline{y}, s) = (1 - t)s\overline{y}$;
- $p(s) = s$: social fabric is explicitly the probability of successful rebellion;
- and $c(s) = \frac{s}{s} + s\overline{y} - 2\overline{y}$.

I first solve for $t(s)$, which is given by:

$$\left(1 - t(s)\right)s\overline{y} = s\overline{y} - (1 - s)\overline{y} = (2s - 1)\overline{y}$$

$$1 - t(s) = \frac{2s - 1}{s}$$

$$t(s) = 1 - \frac{1}{s} = \frac{1 - s}{s}$$

Since $p(s) = s$, $s^*$ solves

$$p(s^*) = s^* = \frac{M}{\overline{y} + M} = \frac{\overline{y}}{\overline{y} + \overline{y}} = \frac{1}{2}$$

so that $s^*$ is 0. Hence, $T(s)$ is written as

$$T(s) = \begin{cases} \frac{1 - s}{s} & s \in \left[\frac{1}{2}, 1\right] \\ 1 & s \in (0, \frac{1}{2}) \end{cases}$$

$c'(s)$ is given by:

$$-\frac{\overline{y}}{s^2} + \overline{y}$$

On the other hand, on $[s^*, 1] = [\frac{1}{2}, 1]$, $t'(s)\overline{y}$ is written as

$$t'(s)\overline{y} = -\frac{\overline{y}}{s^2}$$

Since $c'(s) > t'(s)\overline{y}$ for all $s \in [s^*, 1]$, it follows that the colonizer will set social fabric to $s^* = \frac{1}{2}$, yielding an extraction rate of $T(s^*) = 1$ and a payoff for the colonizer of

$$T(s^*)\overline{y} - \frac{\overline{y}}{2} - \frac{\overline{y}}{2} + 2\overline{y} = \overline{y} - \frac{\overline{y}}{2} = \frac{\overline{y}}{2}$$

Consequently, the colonized society will have receive a payout of 0 and are extracted fully, have a social fabric parameter of $\frac{1}{2}$, and will not have any strong incentive to deviate and attempt rebellion.
5. Case Studies

The studies presented in this section are meant to describe a relationship between the model presented above and the lived histories of Colonialism within the context of social fabric and extraction. The structure of these studies utilize a series of colony-level histories that describe how colonizers worked to disrupt local societies as a means of either directly extracting resources from colonies through repression of resistance or by easing the process of administrative rule. For a given colony, I begin by describing the means by which the colonizer established itself in a region and began to exercise power over that region. I then provide details regarding the nature and breadth of colonial economies as well as the precise mechanisms through which colonizers distorted social fabric. Two common themes in these studies include a “non-locality” of resource extraction — extracted output is either exported to markets abroad or used for colonizers’ benefit in administration rather than redistributed to locals — and the use of categorization, stratification, and even violence that have been used to establish societal boundaries and change the colonized’s conception of self. In the first two cases of British India and Nigeria, the case studies resemble “interior” solutions to the model above, where partial but not complete taxation accompanies partial distortion of social fabric. In the latter two cases, Algeria and Congo, the case studies more closely resemble extreme equilibria where heavy erasure of social fabric accompanies total extraction of resources.

These histories are not meant to be exhaustive, but they clearly represent the simultaneity of social fabric distortion and resource extraction I have demonstrated in the model above.

5.1 South Asia

While the origins of British rule in South Asia date back to the days of the East India Company in the 17th century, I begin my study of British India after the establishment of the British Raj in 1858, marking the formal takeover of India by the Crown. Bose and Jalal (2011) write that “[i]t is in the period from 1858 to 1914 that Britain is generally seen to have been able to extract solid strategic and economic advantages from its prize colonial possession” (p. 78). South Asia is a complex space, exhibiting massive heterogeneity along geographic, ethnic, religious, and linguistic lines; the nature of British rule in ruling (and in some cases creating) these separate spaces of South Asia is simultaneously heterogenous. Hence, this case study does not seek to describe every minute detail of British rule in every region of India, but rather provides broad examples of economic extraction and social fabric distortion from this time. British colonial rule in India was marked by the creation and division of societies, peoples, and classes in “images” conceived by the British amidst an elaborate administrative and economic structure built to accelerate the export of raw materials from India. Hence, a complex network of social fabric distortion in British South Asia accompanied a substantial extraction of resources from the colony. The case of South Asia most accurately represents an “interior solution” to the model presented above: substantial (though not complete) extraction of resources is coupled with a substantial re-figuring of
social spaces, i.e. the distortion of social fabric.

1858 saw the British government’s repression of the “Sepoy Mutiny” of 1857, which sought to overthrow the rule of the British East India Company and re-instate the Mughal emperor in Dehli. Consequently, the British government dissolved the East India Company, formed the “British Raj,” and began the process of stabilizing its foothold in the subcontinent through military, administrative, and economic maneuvers (Bose and Jalal 2011, p. 78). A Crown-appointed Viceroy (or Governor-General) and Secretary of State replaced the East India Company’s executives, establishing a Colonial capital first in Calcutta (until 1911) and then Dehli. Territorially, the British had formal hold over almost all of modern day India, Pakistan, and Bangladesh, with concessions for princely states such as Hyderabad. While these states were headed by local sovereigns, both subjects and rulers were often compelled to pay political and financial tribute to the British, putting a question mark on whether these units were truly “autonomous.”

The organization of India into British territory and princely states was part of a broader “attempted monopolization of regulatory powers by an increasingly centralized [British] apparatus, the development of an elaborate, hierarchical bureaucracy that surveyed, mapped, and measured both land and people, the deepening and widening of the administrative and military reach of the state, and a determined reinvestment in epistemic modalities of rule” (Goswami 2004, p. 31). The new British administration sought to authenticate and augment its rule precisely through the quantification, segmentation, and creation of knowledge that would allow it to rule the peoples of India. Intervention in sociocultural spaces served to “transform the geographical space of colonial India into a commodified, ‘second-order’ space embedded within rather than merely tied to the broader imperial economy through external relations” (p. 45). British reconceptualization and reorganization of India were closely tied to integrating the colony into the larger British economic system. But before turning to the intercession of Britain into the social space of India, I will discuss the extractive nature of the colonial economy.

5.1.1 The Colonial Economy

While the East India Company was initially formed to establish a network of trade with India and China, by the time of the British Raj, the British economy in India was built mostly around the export of cash crops and raw materials like cotton, jute, rice, oil seeds, and tea (Metcalf and Metcalf 2006, p. 97, p. 125). During the colonial period, agricultural cultivation one way or another served as the main economic space in which most Indians operated; well into the early 20th century, about 70% of Indians were dependent on agricultural business, whether through cultivation or labor (p. 125).

Throughout the late 19th and early 20th century, the British Empire essentially lived off of the Indian economy’s exports to fuel its expenses, including a host of infrastructural and administrative expenses at home and in India, financing of wars, pensions for British armed forces and civil servants, and the purchase of military equipment (Bose and Jalal 2011, p. 80). Up until World War I, Britain utilized an export surplus with India (about 60 million
pounds) to finance nearly a third of its deficits with the US and Europe (about 110 million pounds in total); “monetary surpluses generated by colonial India became central for the survival of Britain’s imperial economy in an era of intensified imperial rivalry and economic competition” (Goswami 2004, p. 68). Heavy flows of raw materials from India into Britain were counterbalanced by the export of manufactured commodities, the infamous “council bill” system that caused massive depreciations in the Indian rupee relative to the pound sterling, and a variety of pound-based “home charges,” including payments for supposed “services,” shipping, interest on railways, and other questionable administrative expenses that the British levied on Indians (Metcalfe and Metcalf 2006, p. 125). Notably, India was not permitted to institute any protective tariffs on the import of British goods, placing it at the mercy of the Crown’s system. Such a maneuver was very deliberate: British officials claimed that “any ‘encouragement of industrial enterprises’ within colonial India would entail the ‘colony gaining at our expense’ and the dismantling of the very “edifice” of Britain’s industrial supremacy” (Goswami 2004, p. 69). India was not perceived at any point as an independent set of polities but rather as an instrumental piece of the British economy. John Stuart Mills famously argued that British colonies such as India were “hardly to be looked upon as countries, carrying an exchange of commodities with other countries, but more properly, as outlying agricultural or manufacturing estates belonging to a larger community” (p. 44), that “community” being Britain.

The British’s reliance on the raw material “export economy” and policy of manufactured good imports sought not only to fuel Britain’s surplus with India but also to disrupt local economies: “the colonial state was coming under increasing pressure from the metropolis to institute fiscal policies designed to maintain India as the most important outlet for British manufactured goods” (Bose and Jalal 2011, p. 82). Although manufactured goods like textiles were at one point a critical piece of the Indian economy, colonial rule saw the regression of these industries back into the realm of cultivation and material exports: “[t]he long-established export of Indian textiles was converted into that of raw cotton, while cheaper mill-made piece-goods imported from Britain flooded the Indian market” (Kosambi 1995, p. 209). In fact, during a recession in 1879, when the value of British textile exports to India dropped from 85 million to 60 million pounds, “the British textile lobby...forced the government to remove the Indian cotton import duties, which had been imposed for purely fiscal reasons and not as a protective tariff” (Rothermund 2002, p. 37). The colonial Indian economy was deliberately designed to run through the English. Simultaneously, conventionally thriving industries like handicrafts experienced declines as Indians were forced to turn towards agriculture to engage in the reality of the British economic system.

As Britain guided the Indian commerce towards agriculture, the colonial administration began controlling the rising economy of agricultural plots. From 1868-1878 in Punjab, land used for cultivation rose from 20 to 23 million ares, and from 1870-1891 the per-acre price of land increased sixfold (Grewal 1995, p. 293). Rapid increases in the value of land and investment prospects greatly advantaged those local Indians who possessed capital, leading to an increase in the number of moneylenders, as well as large zamindars (landowners) who were often able to obtain patronage from British rulers, who they erroneously viewed as “natural leaders” of agricultural societies. A series of land reforms by the colonial adminis-
5.1. SOUTH ASIA

tation sought to further limit the economic mobility of Indian farmers to ensure the growth of material exports and hence sustain the British presence in India. For example, the Punjab Land Alienation Act of 1900 limited the transfer of agricultural land to certain subsets of civilians, attempting to keep land in the hands of agriculturalist classes rather than risk land falling into the hands of those who would not utilize it for cultivation (p. 296). “These measures were taken because the development of colonial India as a vast market for British goods could only rest on the expansion of broadly based purchasing power of India’s predominantly agrarian populace. The cultivation of new cash crops, such as cotton and jute, could also be promoted by lightening the revenue and rent burden” (Bose and Jalal 2011, p. 81).

Naturally, profit opportunities for the British came at a dire price for small farmers in Punjab, who had composed the majority of the agricultural class for decades prior. Pressured by further restrictions on economic mobility through British law, the growing power of large, British-backed landlords, and chronic indebtedness to moneylenders, Punjabi peasants often found themselves working as tenants on their own land, with land alienation accelerating through the turn of the 20th century (Grewal 1995, p. 295; Metcalf and Metcalf 2006, p. 133-134). On the Eastern end of the colony, the Bengal Rent Act of 1859 and Tenancy Act of 1885 granted absolute rights to zamindars over tenants in the wake of a series of peasant rebellions. Land reform acts like these in turn allowed Britain to tighten its grasp over local economies, to create richer classes of landowners obedient to British commands (with a larger class of subservient tenants), and facilitated the flow of materials out of the colony by limiting activities (rebellious or otherwise) that would threaten that flow.

Taxation trends in British India date back to the days of the East India Company in the late 18th century, and involved the construction of specific categories that more closely fit British notions of the relationship between landlord and tenant. For example, the salient 1793 Permanent Settlement of Bengal ruled that “the zamindar, who used to be only a tax collector and who now became a landlord in the British sense of the term, would keep only 10 per cent of what he collected from the peasants, who were now called tenants and who paid rent rather than revenue to the landlord” (Rothermund 2002, p. 20). The remaining 90% of the revenues went directly to the East India Company. The 1793 act formed the basis for which the Company and subsequently the British Raj would set up tax systems throughout India and, in fact, served as an initial model for British revenue collection throughout the entire empire. In other cases, revenue was collected through village councils (a mahalwari system) or directly from peasants (a ryotwari system). During company rule (and even afterwards), ryotwari taxes in Maharashtra averaged near 50%; a letter to British Politician Charles William Wynne in 1826 reads: “[h]alf the gross produce of the soil is demanded by Government, and this, which is nearly the average rate wherever there is not a Permanent Settlement, is sadly too much to leave an adequate provision for the present” (Dutt 1902, p. 369).

However, tax systems like the zamindari suffered from issues where revenue amounts were set every few decades; rising inflation through the end of the 19th century hence diminished the real value of income from taxation, even while taxes were collected in pounds. In the
early 1870s, taxation revenue constituting of 9% of national income, fell to 6% by 1900 and then slowly recovered until the Second World War (Dharma 1998, p. 207). While nearly half of total colonial tax revenue came from agricultural land in 1900, it gradually fell to 10% by 1947 (p. 208). In other systems such as the ryotwari, however, the British were able to exert direct control over individual peasants and hence more frequently adjust tax rates to match economic fluctuations (Banerjee and Iyer 2005, p. 1197).

Infrastructural projects in the British Raj, particularly the construction of railway systems beginning in the mid-19th century, have commonly been cited as providing unequivocal benefits to Indians. In reality, railways served as the primary vehicle of resource extraction and colonial administrative mobility in the British Raj. Foremost, railways were meant to speed up the flow of goods between agricultural centers and port cities for export to Britain and the foreign world. British railway economist Hyde Clark noted that “[t]he real operation...was to make the Hindoos form the railways, and enable us to reap a larger portion of the profits” (Goswami 2004, p. 48). Not only did railroads serve to accelerate British exports out of the colony, they more directly connected Indian farms to the global economy and, hence, made the prices at which Indian farmers sold their goods much more sensitive to the volatile business cycles of the world economy. One source from Punjab writes that “the price of wheat in Punjab came to depend on its price in Liverpool” (Grewal 1994, p. 294). Railways also allowed British troops to quickly travel throughout the colony to suppress uprisings whenever they occurred, tightening British administrative control over the region. Moreover, “[s]ince most of the [railway] equipment was imported from Britain, the building of the railways did not stimulate the growth of other ancillary industries” (Bose and Jalal 2011, p. 81-82). The introduction of infrastructural technology was more broadly “constructed and construed as magical technological and engineering feat that would domesticate, discipline, and modernize a barbarous population, tame its prejudices, and elicit its loyalty” (p. 47).

In brief, the economy of the British Raj was centered around extraction of raw materials from the colony which financed a large portion of the British Empire’s expenses. Colonizers utilized economic, administrative, and infrastructural means to limit the economic mobility of Indians insofar as it threatened the livelihood of the export business.

5.1.2 Social Fabric: Creations and Separation of Space

A common thread that runs through nearly all manifestations of social fabric distortion of South Asia is the creation of linguistic, class, ethnic, and religious boundaries through administrative process of quantification and categorization. Distortion of social fabric worked to fulfill a British desire for social fragmentation and organize the colony “in their terms,” easing the process of administration and in turn the project of extraction.

As colonial administrators who were unfamiliar with local norms and systems of thought, the British sought to re-conceptualize the social space of society into a clean image that they could easily understand, where each member could be classified as belonging to a certain religion, ethnicity, and language. In many cases, the British believed that locals should be governed by their local religious laws and customs; Muslims should be ruled by Muslim courts
and Hindus by Hindu Courts, disregarding the religious fluidity of shared cultural spaces. However, a pseudo-scientific process of classification ensued that sought to “translate” local norms into (often fallacious) concepts that were understandable by the British resulted in the creation of utterly false narratives about the social norms of local society (Cohn 1999, p. 27). These norms were in turn “translated” back into local norms through the instatement of policies that encoded these false beliefs. The injection of these new colonial norms and structures in turn mutated the ability of Indians to participate as members of the colonial society: “[o]pportunities for Indians to participate in the governing structure of empire were strongly shaped by the theories that had emerged after the 1857 revolt of an unchanging social order comprised of a mosaic of separate communities, whose ‘natural leaders’ spoke for them.” (Metcalf and Metcalf 2006, p. 133). In the eyes of the British, Indians were composed of distinct (not fluid) categories that had “natural leaders” and “natural followers.” Notions of natural leaders, for example, can be seen in the economic context of appointing zamindars as “natural rulers” and land tenants as “natural subjects” of those rulers, simply because the British believed that society was organized in such a manner.

Although precolonial India was, in a geographic sense, composed of dozens of different polities that did not broadly associate with each other, British rule marked the unification of the subcontinent into a singular mass. One of the most powerful tools for social stratification was the Census. Decennial Censuses of India, beginning in 1872, sought to quantitatively describe trends of ethnicity, religion, caste, language and, in the process, defined these various facets as strict categories rather than as fluid objects (Metcalf and Metcalf 2006, p. 112). More importantly, the British formally used these categorizations as a means of defining a “majority” and “minority,” creating a dynamic where members of “majorities” and “minorities” would begin to conceive of themselves and demand rights in terms of these categories, often in areas that had previously had no geographic connection. Census-based stratification “helped create supra-local caste and religious categories to whom the colonial state could distribute differential patronage” (Bose and Jalal 2011, p. 84). One of the most important of these colonial constructions was “the political category of ‘Indian Muslim’. Whatever the internal differences among India’s Muslims, this encouraged them to lay emphasis on their religious identity in putting forward political claims” (p. 87). Categorization resulting from the census both resulted in and was accompanied by “an array of pseudo-scientific ‘racial’ differences” (Metcalf and Metcalf 2006, p. 112) conceived of by the British. For example, nomadic peoples were labelled as “criminal tribes”; groups like Bengalis were classified as a “feminine” race that was “feeble and spineless”; Punjabis and Pathans were seen as masculine “martial races” (p. 112). These categories manifested themselves in policies carried out by the colonial state. For example, the colonial army mainly recruited from “Sikhs, Gurkhas, Punjabi Muslims and Pathans” (Bose and Jalal 2011, p. 78) as opposed to the “non-martial” Tamils and Bengalis.

Perhaps the most effective manner in which the British stratified South Asian societies was through classification, administration, and education of language. While British colonizers often believed in notions of linguistic hierarchies (e.g. a “mother tongue” or a “primary” or “secondary language”), many precolonial South Asian spaces were in reality much more fluid in regards to language. For example, one account from near Hyderabad comments on
the multitude of languages spoken through various spaces in the same locale: Hindustani in some spaces, Marathi in others, Persian in yet other places. Languages in this historical context are not markers of identity but rather “tools that are used by people, in some cases by members of particular castes or communities, in other cases by the whole population... no more or less linked to identity than any other practice or custom” (Mitchell 2009, p. 54). Languages like Persian may be used in the court; Hindustani in the marketplace; Punjabi in the domestic sphere. Men may utilize some languages more than women depending on the everyday contexts which they are presented with. In one sense, language in precolonial South Asia can in and of itself be viewed as a social norm or tradition, as a form of mutually-agreed upon communication in a specific context and space. In turn, the desire of a colonizing power to regulate those forms of communication, suggesting that one form of language is a “primary language” for one race or religion, creates division in social fabric that distorted incentives to cooperate on norms of language use. In the same way as the minority-majority paradigm, introducing a conception that one language should be a “language of Hindus” or a “language of Muslims” created an internal division that perpetuated itself in the ways that populations conceived of and, hence, behaved amongst themselves.

How did the Census specifically work to distort this notion of a fluid linguistic space? The 1871 Madras Census presents one example through its listing of the number of people speaking one of six languages, yet without explicitly asking a question in the Census survey about what languages were spoken in a specific area. “[T]hese figures were arrived at not by counting actual numbers of people claiming to speak each language, but by calculating the population living within certain pre-determined linguistic boundaries” (Mitchell 2009, p. 56). Hence, linguistic identity, at a Census level, was defined solely in terms of the geographic space an individual occupied. The 1881 Census took a more reductive approach by specifically asking for a “Mother Tongue” — survey responders, and subsequent British administrative reports on a region, were hence deliberately forced to identify with a single language and therefore a single identity (p. 59).

Stratification on the basis of language resulted in a variety of linguistic divides and nationalism as a means of identity formation. The British firmly believed that, since language encoded vital information about the custom and society of a people, mastery of language implied a mastery of control over a society (Cohn 1999, p. 43). “[L]anguage as identity became an appendage to the communitarian discourses of the early twentieth century. In the process of controverting the identity of language to fit regionally specific configurations of education and employment, the colonial state and an alert segment of Indian society, had created a definite niche for the politics of language” (Jalal 2002, p. 137). As British rule created new boundaries of singular identity in terms of language, in the South, Telugu shifted from a language of oral and written communication, music, literary worth, and accounting to “a new personified object of adoration, pride, and devotion, as a specific subject of study, pedagogy, and attention in its own right, and as a marker of identity” (Mitchell 2009, p. 69). The late 19th century saw “a flood of subsequent works—histories, biographies, anthologies, encyclopedias, and compendia—that were explicitly organized and written in relation to the Telugu language” (p. 74). On the other hand, British schooling systems in Punjab sought to suppress commonly-spoken tongues such as Punjabi in favor of vernaculars like Urdu as
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a means of attempting to integrate its agricultural economy into a broader ecosystem of information transmission in the colonial subcontinent. “[A] consensus had emerged within the Punjab administration in favor of making Urdu the official language... Urdu may not have been the lingua franca for the whole of India yet it could become one through official patronage, enabling the colonial state to better administer its possessions” (Jalal 2002, p. 108). That is, Urdu was “chosen” by the British as a language of instruction because of its convenience and its ability to connect economically important areas to broader British systems of information and educational transmission. The suppression of widely spoken tongues in favor of an administrative vernacular is hence seen as another site of social fabric distortion.

The infamous Hindi-Urdu divide sits at the center of colonially-triggered linguistic stratification. As early as 1800, the British formed beliefs that “Muslims” and “Hindus” should have separate tongues although, particularly in Northern India, both spoke some dialect of a vernacular named Hindavi. The process of casting a new language called Hindi as a “language of Hindus” was initially fostered by an erroneous British belief that Hindi was an ancient language of Hindus derived from Sanskrit; the British were even as fallacious as to believe that Sanskrit was “invented by the Brahmans to be a mysterious repository for their religion and philosophy” (Cohn 1999, p. 25), and hence possessed some special significance for Hindus as a “race.” A meticulous compilation of grammars books, histories, and dictionaries which sought to “organize” language and purge “foreign” (i.e. non-Sanskritic) words from Hindavi resulted in the instruction of Hindus in a new “Hindi” language throughout colonial school systems (Dalmia 1997, pp. 148-149). The British hence set into motion a process by which Hindus began to conceive of themselves as fundamentally constituting a separate nation (in the sense of Benedict Anderson’s imagined community) with their own “national” language, and by the mid 19th centuries, the subcontinent saw the beginnings of a Hindu nationalism which sought to describe Hindu as a fundamentally separate from Muslim (p. 156). Although the creation of “Urdu” as a dialect of Hindavi for Muslims had arguably started earlier, a similar set of events resulted in the teaching of “Urdu” in a Persio-Arabic script to Muslims in colonial schools, thereby establishing “Urdu” as the “language of the Muslims,” a divide that was further exacerbated as a response to “Hindi” as the “language of Hindus” (p. 218-219). Consequently, Hindu and Muslim nationalisms formed one of the primary divisions of social fabric in Northern India, spiraling and gaining traction through the Partition of the subcontinent in 1947. A British policy of categorization through both linguistic and administrative means generated large cleavages in the Indian society along religious lines which formed arguably the primary means of self-identification (religion) throughout the late 19th and 20th centuries.

There are many other sites of social fabric distortion in colonial South Asia, such as the redefining of Islamic sharia and Hindu shastras in ways that fit British conceptions of the rigidity (rather than fluidity) of religious law and social norms (Jalal 2002, p. 140)*, or the role of the colonial government in re-conceptualizing notions of “caste” in the context of traditionalism/modernity (Metcalf and Metcalf 2006, p. 112). A more concrete example that illustrates social fabric as representing “social norms” in a very clear context of cooperation

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*This is similar to a policy I will examine in the case study of Algeria.
and punishment can be seen with the extension of British economic protection to North Indian taluqdar who aided in repressing the 1857 rebellion (Bose and Jalal 2011, p. 83) or the forceful confiscation Gujrati land in the wake of anti-taxation protests in 1918 (Dharma 1998, p. 209).

By defining categories of what it meant to be “Muslim” or “Hindu” or “Telugu-speaking” in Colonial South Asia, the British Raj sought to organize its colony into separate spaces that were easily understandable and, hence, easier to control. The purpose of social stratification and organization in the colonial context was also largely a process of injecting “British norms” into South Asia, in the sense that colonizers defined their own societies in terms of religion, ethnicity, and mother tongue, and hence sought to restructure the societies they controlled in ways that could be divided along their own predefined lines. Through these methods, the British were better able to determine the sorts of information that South Asians had access to and thereby reduce threats of resistance to their rule.

5.2 British Nigeria

The case study of Nigeria illustrates another “interior solution” of the model, where partial extraction of resources and taxation of production accompanies a non-absolute distortion of social fabric. British extraction of resources from Nigeria worked largely through the spread of taxation and the introduction of a Pound-based cash economy that dictated forms of production, capital formation, and wage labor in the colony. Social fabric distortion occurred through such means as the provincial “reorganization” of local peoples in polities in terms of British conceptions, restructuring of traditional administrative and punishment mechanisms, shifts in traditional gender and social roles revolving around changes in economic production, propaganda campaigns, and the introduction of technology and media that served to dictate a dynamic of power and modernization between colonizer and colonized.

5.2.1 British Dominance

Nigeria’s colonial history began in 1851 with Britain’s annexation of Lagos, initiating a series of events that would result in formal English rule of Nigeria lasting from 1900 until 1960. Spheres of influence in Nigeria established by British companies in the latter half of the 19th century culminated in the British being awarded “rights to Nigeria” at the Berlin Conference of 1884-1885. The British’s interest in Nigeria lay in the potential to profit of its trade in natural resources, generally believing that this goal could be best achieved “through increased British influence in the local affairs of indigenous communities” (Falola and Heaton 2008, p. 86).

Beginning in 1886, governance and conquest of Nigeria beyond Lagos was led by the Royal Niger Company, which received a charter from the British Government to “govern, extend the territories under its control, and administer justice in ways that it defined” (Falola 2009, p. 6). The Company was quick to construct, through a combination of military force and treaties, a monopolistic structure that gave itself sole rights over trade in palm oil and kernels
5.2. BRITISH NIGERIA

on the Niger River (Hermann 2011, p. 406), forcing many Africans who “depended on Niger trade for their livelihood” (Isichei 1983, p. 363) to either submit to this economic imposition or be decimated in resistance. As a means of extending its domain and protecting commercial interest in raw materials, the Company set up its own constabulary (a private army and navy) to enforce economic hegemony over the region (Otu 1999, p. 294), composed of local Nigerian mercenaries led by white officers. The Company’s armies subsequently embarked on dozens of military expeditions into the late 19th century, utilizing European military technology to force the surrender of kingdoms, emirates, and other realms throughout the region (Falola 2009, p. 6).

Company forces attacking one polity often found allies in other nearby communities, usually the weaker enemies of the polity being attacked. For example, the Company overthrew Itsekeri chief Nana with the help of his trading rivals (Isichei 1983, p. 373). There was hence an incentive for locals to cooperate with outside colonizers instead of their (rival) neighbors. The formation of such alliances was deliberately and carefully planned on part of the Company: “[t]he British collected knowledge about peoples and places before they launched their attacks” (Falola 2009, p. 17). Knowledge and exploitation of preexisting rifts was instrumental in helping subdue local societies and easing the process of establishing foreign rule. The Company’s manipulation of (or use of force against) locals formally “ensured that the RNC was the only authority legally permitted to negotiate terms of trade on the Niger, with the result that the company could then set those terms heavily in its favor,” which included “high tariffs on imports and exports, which had to be paid upon entering or exiting the Niger” (Falola and Heaton 2008, p. 100).

After a series of administrative maneuvers, the British government took control over Nigeria from the Royal Nigeria Company in 1900, converting Company properties into the Northern and Southern Nigeria Protectorates (in addition to Lagos, which the Crown already controlled) (p. 103) and amalgamated the Protectorates in 1914, by which time the British had gained almost full control of what is now modern Nigeria (p. 117). Particularly in the Hausa-Fulani dominated North, the British ruled indirectly over Nigeria through local kings and chiefs rather than through direct administration as a means to “to respect traditional political institutions and promote continuity between indigenous and colonial regimes” (Falola and Heaton, p. 110) (Larkin 2008, p. 22). After capturing villages as part of conquests, the British would appoint warrant chiefs as local enactors of white rule; sometimes these individuals were respected elders, while others “were mere upstarts and nonentities” (Falola 2009, p. 80). Nigerians saw these often arbitrarily chosen rulers as “symbols of oppression and exploitation” (p. 81) who abused power and seldom kept the people’s interests in mind. Local rulers acted as mouthpieces for British officers, with failure to enact colonial directives resulting in “ousting” by the regime, replacing resistant chiefs with “malleable replacements” (Falola and Heaton 2008, p. 111). In fact, “[i]n large areas of central and south-eastern Nigeria no traditional rulers existed and, therefore, had to be invented” (Isichei 1983, p. 382). Nevertheless, as the decades of colonial rule went on, the “powers of the chiefs and religious leaders eroded as British colonial domination and political aggrandizement became more entrenched” (Otu 1999, p. 294). The establishment of British administrative rule, bringing with it the extension of British demands and norms from the provincial down to the village
level, marked an initial stage of social fabric distortion in Nigeria.

In 1909, the British government passed the Collective Punishment Ordinance, which “empowered colonial officers to punish a whole group, village, or whole town for the transgressions of a member (Falola 2009, p. 26), thereby using violence as explicit punishment for refusing to cooperate with the colonizer’s wishes. While official policies maintained that colonial officers should not resort to violence unless as a last resort, colonial authorities in reality were “obsessed with upholding their prestige and authority” (p. 27) and would resort to whatever means possible to uphold that prestige. Some officers even subdued dozens upon dozens of villages to “produce unquestioned respect for the white man” (p. 27). Consequently, Nigerians regarded soldiers and political agents as “overbearing leaders who would use command and violence to achieve their objectives” (p. 53) rather than beneficent actors, creating a lasting tension between colonial administrators and Nigerians.

5.2.2 Taxation, the Cash Economy, and Wage Labor

Britain primarily derived profit from Nigeria through repressive taxation and high import/export tariffs. Amidst the backdrop of mandatory cash crop and mineral production, taxation served as a primary channel for British rule to not only extract profits but also assert authority over locals. As a means of more directly controlling local economies, the British introduced a cash system where taxes were collected solely in British currency, forcing many Nigerians into Pound-based wage labor and disrupting centuries of pre-developed methods of capital accumulation, trading, and production methods (Falola and Heaton 2008, p. 111). Tax sums were often calculated based on a geographic resource endowment, meaning that all individuals had to pay the same tax, regardless of income or class (Falola 2009, p. 81). Taxation was even seen by the British as “a moral benefit to the people [that] stimulat[ed] industry and production” (Hermann 2011, p. 395).

Taxation in terms of British currency was seen as the most efficient form of collecting tribute since the British government could dictate taxes in terms of wage labor and payment systems it had set up through its cash economy in Nigeria, sacrificing the livelihood of Nigerians as a result. For instance, men on the Jos Plateau were forced to work as tin miners for subsistence wages, and would often end up selling food supplies and other essentials to generate enough cash (in Pounds) to give to their colonizers as tax (Isichei 1983, p. 387). Beyond tin, conscription into mining jobs was common throughout much of Northern Nigeria (Falola and Heaton 2008, p. 123). Reliance of both the tax system and the colonial economy on the British pound was seen “as part of the larger project of social and economic control” (Hermann 2011, p. 394) in Nigeria.

Taxation was gradually instituted from region-to-region across Nigeria, with the gradual extension of taxation policies to new provinces often met with violent resistance. The cause for resistance was simply that next-to-nothing was being given in return to Nigerians (Isichei 1983, p. 388). That is, taxation existed as a siphon on resources with minimal infrastruc-
tural development. Despite intermittent peasant uprisings against taxation running from the early 1900s through the inter-War period, most substantial resistance was crushed by the British; for example, an uprising against forced labor in Udi resulted in villages being razed to the ground and the mandatory unpaid conscription of two thousand workers to take part in railway construction (Isichei 1983, p. 397). Projects like the railroad simultaneously operated on a broader level of social disruption. They destroyed local forests and fields and destroyed villages, whether by directly constructing rail-lines through communities or utilizing them as sources of labor (Larkin 2008, p. 39). The destruction of local societies and sites was simultaneous with the development of colonial infrastructure that sought to augment extraction.

Labor systems instituted by the British consisted of both forced and unforced labor, such as the case of railways; however, while the use of forced labor was common in the 1920s, it mostly subsided by 1945 (Isichei 1983, p. 388-389). While some colonial officials are credited with establishing infrastructure by building roads and railroads throughout Nigeria, this infrastructure was largely built at the human cost of forced and underpaid workers and was mean to augment systems of economic extraction (Falola 2009, p. 28). Policies of forced labor and conscription, a British cash economy, and taxation in the form of cash all contributed to an economy of extraction where Nigerians were forced to work for the demands of the colonizer (Falola and Heaton 2008, p. 123-124). Even as Western-educated Nigerians found work in the colonial civil service, they were often relegated to menial tasks deep within the British bureaucracy (p. 137).

While Nigeria did not find its resources completely exhausted and its locals were not always forced to work as literal slaves by the British, there was nevertheless a high degree of dominance imposed by the colonial government on local economies through the imposition of tariffs, taxation, and a cash economy. Hence, Nigeria as a colony experienced heavy, but not complete, extraction and taxation. Naturally, the model of this paper would predict that this high rate of taxation would be accompanied by a substantial disruption (but not utter decimation) of local social fabric. The goal of the next two sub-sections is to illustrate both formal and informal channels through which the process of economic extraction authenticated itself through both official administrative channels and more subtle sociocultural structures.

5.2.3 Norm Formation, Administration, and Punishment

The use of taxation as a means to benefit (through patronage) colonially-appointed rulers, limit social mobility by placing a larger tax burden on poorer Nigerians, and force Nigerians into the British cash economy was seen by Nigerians as a deliberate attempt to restructure society for British gain and, indeed, the British were “trying to restructure indigenous politics, impose new ideas on native administration, [and] introduce native courts with judges whose power was new and authoritarian” (Falola and Heaton 2008, p. 106). The creation of these economic systems drew male labor away from households and village communities,
meaning that women often stepped in to complete household chores which men had previously undertaken. In turn, the colonial economic structure “affected gender and generational relations as traditional economic roles became blurred and were refashioned to meet the needs of increased cash cropping, decreased food production, and expansion in the import-export market.” (p. 132). British economic policy was directly responsible for the development of new norm structures, speaking to the implicit simultaneity in norm distortion and extraction.

Collective social punishment also transformed with the advent of a colonial prison system. In the precolonial world, imprisonment for crime was unheard of, and communities resorted to other means such as execution or flogging as punishment (Otú 1999, p. 294). Consequently, the arrival of colonizers marked the entrances of British-style written laws, policing systems, and prisons, simultaneously discouraging old institutional norms and replacing them with alien European notions. This presents a direct upheaval of local social norms, following the interpretation that colonizers acted to directly replace traditional methods of punishment with new ones.

As a means of normalizing economic policies, the government launched propaganda campaigns where agents of the colonial government went across Nigeria hailing the benefits of taxation as a means to fund public projects, although in practice the development of these projects was painfully slow. While the propaganda was mostly ineffective, it did plant an idea in the minds of Western-educated Nigerians that taxation was the primary means of “developing” or “modernizing” local societies (Falola and Heaton 2008, p. 105). But, more broadly, the goal of the British colonial project was “to raise Africans to the educational, political, and social plane of the “modern” world - to make backwards people modern” (Larkin 2008, p. 23). Taxation and profit from Nigeria hence had to be framed in terms of “progress,” of the imposition of modern (Western) ideals that acted to legitimize rule. This generated a tension within imperial rule: while the purpose of policies like indirect rule was to establish rule while respecting local norms, the broader social goals of the colonial project were to refigure local societies in terms of British conceptions.

As colonial rule spread throughout the early 20th century, the British were largely concerned with making assumptions about the structure of Nigerian society and utilizing those assumptions to rule the colony. For example, the Yoruba people were governed separately between Northern and Southern Nigeria despite existing as a contiguous people (Isichei 1983, p. 390) because the North and South were “natural divisions” in the eyes of the British. Simultaneously, the British viewed Islam as “more advanced than traditional religion” (p. 392) and hence that the larger Muslim presence in the North made those Nigerians more “civilized.” The British also arbitrarily believed that smaller units of political organization (which had formed the basis of much of precolonial Nigeria) were less efficient than larger units (which characterized most of Western European society). Most importantly, they gave credence to a view that Nigerians could not grasp basic Western ideals, reflected by the labelling of western-educated Nigerians (who spoke English and wore suits) as inherently stupid and disrespectful (p. 391-392). The division of Nigerians into arbitrary categorizations based on religious and cultural characteristics (Ijo, Igbo, Muslim, Christian) informed British rule of the region, and by repeatedly making administrative decisions in the context of
these fallacious frameworks, the British “did much to ensure that they viewed themselves in the same way” (p. 392). Administrative division had a direct effect on how peoples thought of themselves and their neighbors years later. For example, by treating the “Tiv” people as “a corporate body with homogenous interests” (p. 392), the British generated previously nonexistent race consciousnesses that affected how local populations viewed themselves and their interactions with others into the post-Independence era.

The establishment of “native courts” by British administrators in 1900 was yet another attempt to establish British administration in terms of both English and Nigerian institutions, and like other such ventures, failed in extending substantial agency to Nigerian norms. Organizationally speaking, the native court system functioned like a British court, with a native council serving as a “court of appeal” and a district commissioner as a judge. Despite the use of Nigerian figures in administrative roles (who, based on the evidence above, were likely handpicked by the British), all the laws of the court were English, with almost none based on precolonial laws, norms, and customs. In fact, “[d]uring the last year that these courts functioned, they handled fewer than a dozen cases, not one of which was instigated by natives themselves” (Otú 1999, p. 300).

The replacement of chiefs with British-appointed rulers, the direct administrative grouping of different kingdoms with their previous rivals, and the replacement of local systems of governance (such as the complex courts of the Oyo) with new “native courts” represented ways in which the British subdued local societies and reconfigured them in terms which they could more easily rule. Britain disrupted local societies through novel forms of punishment and administration that disposed of the traditional in order to tighten their economic foothold on Nigeria.

### 5.2.4 Missionaries, Infrastructure, and the Media

Prior even to Company Rule, Christian Missionaries were proponents of colonization, arguing for introduction of “Christian Civilization” into Nigeria (Falola and Eaton 2008, p. 86), i.e. the imposition of Western European conceptions of behavior into a “backwards” locale. Prior to the late 1800s, missionary culture generated a tension of competing ideas; local leaders often welcomed missionaries as an attempt to gain favor with the British, while evangelicals sought to change indigenous culture, which they viewed as inherently uncivilized and backwards (p. 89). While capture of Nigeria from the early stages was figured in terms of establishing Western norms, this was simultaneously met by local resistance to the imposition of these norms. However, as the colonial administration subdued local societies and re-formed them to meet their ends of profit and taxation, this tension slowly disappeared. Decades later, missionaries and their schools had a permanent effect on Nigerians’ perceptions of themselves, mostly in Southern Nigeria, with a growing middle class of Westernized, European-educated individuals believing strongly in the “civilizing mission” of colonizers, adapting Christian social norms and owning a “heightened material and social position to the ‘civilizing’ influence of Christianity and mission education” (p. 128-129). Despite Nigerians’ successful resistance to Christian influence in the precolonial period, missionary practices were able to reform Nigerians’ self-conceptions once the colonial state established
hegemony over the colony. Many Nigerians’ views of their place within Nigeria changed as a consequence, particularly in the South. Yet, the failure of similar policies to gain traction in the North generated a dichotomy of a more “traditional” North and a “modern” South, aligning closely with the definition of social fabric as generating heterogeneous behaviors and norms within different subsets of the population.

The tail end of colonial rule, beginning in the 1930s, involved the introduction of infrastructural technologies that acted as testaments to a superior conception of colonial rule. In the process, these projects worked into the subconsciousness of the ruled and began to construct the ideal notion of a modern colonial subject, a Nigerian that was “[t]echnologically adept, forward thinking, mutable” (Larkin 2008, p. 21). Modern infrastructures — steel railways, roads, telegraphs — were “sublime” in the eyes of Nigerians, strange fantastic objects that existed beyond the limits of imagination. The colonized Nigerians would for some time remain in awe at the technological might of the colonizers, yet could suspend their awe and be taught how to interact with modern technology by following the guidance of the colonial state. In British eyes, Nigerian society was “mutable,” and could be transformed from a “backwards” society into a “modern one” by being exposed to the might and power of European technology (p. 43). The construction of “sublime” infrastructure within the colony generated a dynamic that characterized the local Nigerian as “backwards but able to be civilized,” with the colonizer providing a path towards achieving that “civilization.”

The advent of radio during the same period continued this power dynamic between the “sublime” technology of the colonizer and the backwards colonized. Radio was a wholly public experience; while many Nigerians owned wireless sets in their homes, the British set up loudspeakers in open urban spaces, thereby determining in what spaces and even at what times of day the spread of information was and was not appropriate (p. 71). In one sense, this was an extension of British “indirect rule” to the everyday. On a surface level, radio served to move “ideas and propaganda around a series of circuits aimed at constituting differing levels of political identity” (Larkin 2008, p. 52). More specifically, radio possessed a dual significance: it acted as both a source of information and a form of media that dictated conceptions about what Nigerians should be. Content production was almost entirely British; bar a small subset of local programming, Nigerians listened to English broadcasts prepared abroad by the BBC. News and information consumed by Nigerians was hence almost always an extension of the British mouthpiece. However, the linguistic dynamics of radio also served to create a “hierarchy of ignorance” (p. 53), an implicit class structure based around the intelligibility of information. Most broadcasts were in English, intelligible to an upper-middle class and elite of Nigerians who could understand English. Nigerian broadcasts were usually in one of three vernaculars (Yoruba, Hausa, Igbo), meaning many Nigerians who predominantly communicated in a provincial or local language were not prioritized in linguistic spaces, and others could not understand these forms of communication. Coupled with the public space in which radio operated, the creation of content in English first and then Nigerian vernaculars created a notion that Nigerians as a whole could only come into the modern day if they spoke one of these lingua francae (p. 53). The modern Nigerian conformed to “English” or “vernacular” identity, and there was no space for non-vernaculars and the alternative forms of communication, culture, and norm that accompanied them.
Nigerian society experienced countless sites of social fabric distortion. Some were administrative, structural, and directly affected the ability to employ local social norms. Others worked by officially and unofficially dividing and grouping Nigerians in terms of arbitrary categorization, in turn altering Nigerians perceptions of who they were and what their place was within society. These processes worked simultaneously to both authenticate and augment colonial hegemony over the colony. Yet, while societies throughout Nigeria were profoundly changed, they were not erased.

5.3 Colonial Algeria

Colonial Algeria has one of the longest and harshest experiences with Colonialism, lasting from 1830 through the end of the Algerian War of Independence in 1962. In the context of my model, Algeria’s history of colonization represents a nearly complete extraction of resources coupled with a heavy degree of social fabric distortion, carried out through the reappropriation of local norm-generating social structures and authenticated by the violence of the French state.

5.3.1 Blood and Conquest

Algeria’s history of Colonialism is different from other episodes discussed in this paper largely because of its conception as a space of French settlement and advancement. For centuries, a fertility myth was propagated among the French that Algeria was a land capable of sustaining bountiful harvests ripe for agricultural cultivation (Sessions 2015, p. 208). Malthusian-esque fears about the ability of the French race to sustain itself beginning in the early 19th century culminated in a desire to establish a colonial state in Algeria that would allow Frenchmen to settle there, contribute to the growth of the French race, and cultivate the resources necessary to support the growth of that race (McDougall 2017, p. 90) (Sessions 2015, p. 319). The cultural dimension of this desire to capture Algeria stemmed from a belief in the “civilizing mission” of French conquest originating in Napoleonic Egypt (p. 6), and was accompanied by a belief that the Ottoman Rulers of the land were simply deficient in cultivating the “rich” land of Algeria (p. 183).

The conquest of Algeria began in 1830, when the French razed Algiers to the ground; the city lost at least 30,000 native inhabitants, who were either killed or exiled (Bennooune 1988, p. 36). One French witness described that “all the houses that were not occupied by the officers were practically demolished, [and] the doors and beams were taken to be used for fires” (p. 36). After securing Algiers, the French quickly captured a string of urban centers, depopulating and destroying Media, Bijiya, Constantine, and Mascara (p. 37-38) by 1843, swathes of “harried and homeless” flowing into the Algerian countryside (McDougall 2017, p. 70). Consequently, urban Algerians’ “unprotected houses, shops and country estates were summarily occupied by others or sold off at ridiculously low prices” (Ruedy 1992, p. 52), easing the process with which the colonial conquerors took control of Algerian properties for their own ends.
Between 1840 and 1847, the French military took control of agricultural plains throughout rural Algeria, employing a scorched earth strategy to “subjugate the peasantry and expropriate its plots of land” (Bennoune 1988, p. 40), in the process chopping down orchards, tearing down villages, and burning thousands of Algerians alive. The destruction of these local communities was largely used to ease the process of grabbing land; “[t]he physical violence and usurpation of property with which the [colonial] era began continued for many years, gradually giving ways to institutionalized forms of violence and usurpation” (Ruedy 1992, p. 50). Violent methods used to repress and extract from Algerians were utilized again and again as threats for failure to cooperate or submit to the French.

Repeated military expeditions towards the South over the next decade resulted in French control of most of modern Algeria by 1848, where many towns were “besieged and sacked, and thousands of their residents butchered.” (Sessions 2015, p. 312). Numerous historical records of Algeria’s conquest at the hands of the French have been characterized as genocide (p. 180). Even afterwards, between 1866 and 1872 Algeria lost over 640,000 inhabitants (who were either killed or fled from the country) (Bennoune 1988, p. 39). From 1830 until 1875, somewhere between 650,000 and 825,000 Algerians died in military resistance (organized or otherwise) to French conquerors (McDougall 2017, p. 80), ending with the repression of the Mokrani Revolt of 1871 (Bennoune 1988, p. 46).

5.3.2 Land, Labor, and Taxation

The demise of urban economies through the depopulation of cities like Algiers forced most surviving urban to flee into the rural areas; the Algerians that remained were left as beggars (Bennoune 1988, p. 36). The destruction of thriving small commodity markets inhabited by craftsmen and artisans, the imposition of a French currency system, inflation due to the onset of the conquest, confiscation of property, destruction of homes, cemeteries, and other local fixtures to widen roads to widen roads, increases in rents, and the removal of the rich urban Muslim class from the city center had devastating consequences for indigenous merchants who attempted to sustain their business in the face of the French conquest (Bennoune 1988, p. 36, p. 52) (McDougall 2017, p. 55). Consequently, many Algerians were forced to abandon their roles as producers and work as wage laborers in docks and other hard labor work. French documents from the 1850s suggest that Algerians laborers were paid less than a quarter of what French laborers were paid (Bennoune 1988, p. 57), and a substantial gap between Algerian and European wages remained through the interwar period (McDougall 2017, p. 100). An 1849 ordinance mandated that Algerians would have to provide forced labor for roads and colonization centers without compensation (Bennoune 1988, p. 56). Paradoxically, as French settlers expropriated lands from rural Algerians, indigenous migration to urban centers increased, resulting in an increase in the population employed in wage labor (p. 68).

Nevertheless, prior to the colonial period only about 10% of Algerians lived in urban centers (Bennoune 1988, p. 27). Since a primary goal of French conquest was to establish hold over rural regions for the purposes of settlement (Sessions 2015, p. 232), Europeans slowly
began moving to the newly claimed territories, numbering 10,000 in 1834, 40,000 by 1842, and nearly 250,000 by 1872 (McDougall 2017, p. 89). Thousands of French settlers saw their ability to support the goals of the French republic “only by the complete subordination of Algerian territory and its resources including, crucially, its inhabitants’ cheaply exploitable labour” (p. 87-88). Agricultural cultivation by settlers largely consisted of fruits, vegetables, cereal, wine, and livestock, which was mostly exported to Europe along with iron ore, phosphates, minerals, and natural gas (p. 71). Nevertheless, efforts by settlers to “fertilize” the soil of Algeria were underwhelming, and agricultural output was not nearly as high as expected: “those who envisioned a North African landscape emptied of its native inhabitants and filled with French farmers found the slow realization of this vision to be an ongoing source of anxiety” (Sessions 2015, p. 289). The earlier portion of the 20th century was particularly characterized by falls in production of livestock, olive oil, and cereal, with some sluggish growth in fruit and vegetables from 1930s onwards (Bennoune 1988, p. 64).

Throughout the 1830 and 1840s, French colonial officials began the process of distributing land to willing French immigrants and settlers (or colons), regulating the market via price controls and ensuring that only those who would be willing to till and the land would partake in these transactions (Sessions 2015, p. 246). The colonial state took up the process of arbitrarily taking native land into its possessions via “sequestration, confiscation, expropriation, cantonment, and the application of various property bills devised to establish ‘incommutable individual property’ to transform the soil into a commodity” (Bennoune 1988, p. 43). This included French claims to “vacant properties,” which usually became “vacant” when locals fled from the French army, as well as “thousands of hectares of ‘empty’ land, much of which had in fact been communal grazing land of the nomadic or village communities” (Ruedy 1992, p. 70). While over 400,000 hectares were allocated to settlers between 1841 and 1851, large corporations began taking over these properties over the next few years for the purposes of agricultural production (p. 43); between 1830 and 1934, over 1.5 million hectares were taken by the colonial state and given to settlers (Bennoune 1988, p. 48).

While the 1863 Senatus-Consulte was meant to recognize indigenous proprietors’ rights to land, these rights were only extended to property that had not already been colonized (McDougall 2017, p. 96-97). “Local” Islamic law was used selectively to justify land transfer to settlers use (Bennoune 1988, p. 47). Processes like cantonment occurred because the French believed “that most nomads controlled more territory than they really needed” (Ruedy 1992, p. 71), meaning the colonizers could justify confiscation of large portions of their land, relegating small plots in return. Later, the 1873 Warnier Law “destructur[ed]...the traditional Algerian land tenure system” by placing all land transactions between Europeans and Muslims under formal French Law (Bennoune 1988, p. 46), with an 1887 land law giving “Europeans the means to force the sale of undivided Algerian property” (McDougall 2017, p. 97-98). Deliberate “disintegration of the social organization of the peasantry was to induce the colonized peasant to ‘detach himself from the native collectivity that can [thenceforth] do nothing for him’ so that in the long run he will be forced by economic necessity to ‘put himself under European tutelage’ in the form of wage labour” (p. 44). By 1954, the colon population had reached over one million, “acquired a total monopoly of political and economic power...and possessed nearly 3 million hectares of the richest cultivable land in the
country” (Ruedy 1992, p. 68-69). In establishing a grip on the Algerian population, colonizers were able to gain the best land in all of Algeria, relegating inferior land to whichever locals remained.

Consequently, “Algerian rural society crumbled under the massive land sequestrations that resulted from the Imperial reforms, leaving...tribes with few defenses against the disease and famine that followed in their wake. It is estimated that 20 to 25 percent of the 4.2 million Muslim Algerians died in the mid-1860s as a direct result of the land transfers of the previous decade” (Sessions 2015, p. 319). Despite claiming to represent Algerian interests, the process of land law formation simply established French dominance over the colonized. By 1930, 70% of Algerian landowners possessed less than 10 hectares a land, while the average landowner only possessed 4 hectares of land, leading to widespread malnutrition (Bennoune 1988, p. 60). This generated two social classes within the colony: a wealthy French settler class and a poor Algerian class. As late as 1954, despite consisting of only 10% of the total population, French settlers accounted for 47% of national income. The process of settler colonization “accelerated the disarticulation of the native economy and the progressive impoverishment of Algerian society” (Ruedy 1992, p. 81).

On top of French dispossession of Algerian land, Algerians were consistently forced to pay for “services” of the colonial state that they received no benefit from. In 1849, the state declared that “all natives are subject to special taxes, except those employed as share-croppers on the European estates, inhabiting a house, and working under the supervision of a European landowner or his manager” (p. 56). Through 1911, locals ended up paying for over 46% of the costs of roads and railroads to benefit settler trade and facilitate military and administrative over locals (p. 50-51), and in 1909 were paying “nearly half of all taxes in the colony, contributing about one-third of the central budget, two-thirds of the department budgets, and half of the communal budgets” (Ruedy 1992, p. 91). Throughout the 1920s and 1930s, 75% of indirect taxes collected were paid by Algerians, and one jurist even concluded that “while Algerians owned 38 percent of the land capital goods of the colony, they paid 71.19 percent of its direct taxes” (p. 91). Taxation extended to punishment for attempting to organize resistance to colonial power. In the wake of the 1871 rebellion, a 68 million franc levy was imposed on the local Algerian peasantry for “war compensation” (Bennoune 1988, p. 58), on top of the confiscation of thousands of hectares of land, even though many of the “punished” peasantry had not taken part in the rebellion (Ruedy 1992, p. 79).

5.3.3 Laws and Norms in the Colonial State

The way in which French colonial rule distorted social fabric to further repress Algerians and extract economic profit can best be described through segregation of populations within Algeria and appropriation of local social norms and customs.

French administration of Algeria was not unique in that it followed a process of “divide and conquer” common throughout the colonial era, segregating populations in ways which made them easier to organize and manipulate. A prime example of this can be seen in the segregation of local Arab and Berber (specifically Kabyle) communities, where perceptions
of “cultural differences” between the two in the early 19th century led to the propagation of a myth that the “Kabyle, attached to his ancestral soil, was industrious, practical, curious, democratic, expansive, and far less religious than the Arab, who was soft, lazy slow-witted, introspective, and given to dreaming and fanaticism” (Ruedy 1992, p. 91). In turn, the French gave priority in setting up schooling systems in Kabyle-dominated regions, propagated the study of Berber dialects in schools, encouraged leaders to give speeches in French, attempted Christian evangelization, set up periodic village meetings, and even lowered taxes (p. 91-92). However, these policies did little to inherently “preserve” Kabyle cultural identity — for example, the number of Berber speakers actually decreased — and in fact did nothing more than to generate formal societal cleavages through the (fallaciously-based) privileging of one ethnic group.

Demarcation of local societies among religious lines (Jew vs. Muslim) was also common, to the extent that the Algerian Muslim “was above all a legal, rather than a religious category” (Shepard 2008, p. 12). The repression of Muslim practices, outlets for worship, and norm governance observed by the majority of Algerians constituted a large portion of social fabric distortion. Muslims “did not forgive the closing of mosques and zawiyas, the confiscation of hubus, the desecration of cemeteries, the harassment of Islamic education, or the periodic interference with the canonical duty of pilgrimage” (Ruedy 1992, p. 100). This process was informed by a notion of “assimilation-ism,” that the role of colonial rule was to civilize other societies and bring rationality to them. “[T]he state and its local agents would break down what they described as local traditions and structures that promoted superstition and ignorance...French institutions would offer them access to a legal system, training, and education premised in universal principles and rationality. Irrationality and religious fanaticism, Muslim in particular, would crumble” (Shepard 2008, p. 22). While this colonial project was racially and culturally motivated in flavor, there was an administrative aspect to this ideology as well. “Islam had played an important role in mobilization against European colonial rule in nearly all Muslim countries, and it stood to reason that to encourage Islam, in any of its aspects, was to lend sport, sooner or later, to resistance to European rule” (Christelow 1985, p. 6). Therefore, the repression of Islamic practices was seen by the French state as a necessary step in reducing the probability of successful resistance to their regime and ability to utilize Algeria as a space for taxation and extraction.

Administrative law within Algeria was governed by a dual system of governance: one set of laws for “locals,” a separate one for “Frenchmen” (Shepard 2008, p. 24-25), which, at an ideological level, was part of a process in which the colonial state would “decide” which of its subjects had the “capacity for rational decision making.” (p. 21). While the nationality of all men within Algeria was declared by the state to be “French,” citizenship status was confined to settlers, and could only be extended to indigenous Algerians who met certain prongs, notably abandoning their right to be judged in under the “indigenous” (usually Islamic) law court (p. 27). The ability to enjoy the benefits of full French citizenship could only be enjoyed by abandoning local norms and traditions an in particular giving up the ability to be formally governed by those traditions. In fact, following “local norms” was systematically punished; the creation of a “native penal code” in 1881 “instituted exorbitant penalties for thirty-three infractions limited to natives” (p. 31), many of which remained in place through
the 1940s. These sorts of policies even extended as far as public education, where native Arabic instruction was forbidden in primary schools (French was taught instead) until the interwar period (Bennoune 1985, p. 68).

To maintain tighter control over “local” norms, the French state committed itself to the reformation of Islamic law court system in terms of French understanding. This reconfiguration allowed a conception of “Islamic justice” solely in terms of the colonizer’s ideals, allowing the colonizer to dole out religious justice and reducing the threat of Islamic resistance to local rule. The institutionalization of Islam within the French court system simultaneously transferred religious power from rural Marabouts (oftentimes wandering Sufi saints who preached resistance to the colonial regime) to the urban ulema (religious bureaucracy) (Christelow 1985, pp. 17-18). Simultaneously, this project of streamlining the religious court system was concerned with generating a streamlined bureaucracy that was easy for the French to understand and, hence, control. The qadi, a judge in the Islamic court, was deliberately transformed into a salaried government official, with the colonizer’s imposition of “the rational of Roman law tradition” (Christelow 1995, p. 9) combined with the judge’s traditional training in the conventional principles of Islamic justice.

The first prominent instance of French intercession in the world of Islamic law courts came in 1854, with a decree “granting autonomy to the Muslims in civil affairs, and the effort to improve the Muslim judicial system through a rationalization of organization and procedures” (Christelow 1985, p. 140). This simply acted as a formalization of the division of law codes between “Muslims” and “Frenchmen,” and marked out a goal of attempting to “modernize” (i.e. Westernize) the conduct of Islamic law proceedings. The education of qadis in Islamic judicial practices commonly accord in the madrassa, or religious school, which became, in the eyes of the French administration, a primary site through which their goal of reforming the Muslim legal system could be accomplished. In regards to reforming the madrassa system, one French official remarked: “Let us try... to create qadis who at the same time know the religious books well, and know the elements of our principles, of our social, industrial, and civilizing sciences” (p. 146).

A decree in 1866 marked the institutionalization of qadis within the French legal system in the context of the madrassa, characterized by the institution of a mandatory exam to be passed by all prospective qadis and mandatory education in such academic subjects as history and geography. As a result, “Muslim magistrates would [now] have to know about such vital topics as Roman ruins” (p. 186). French orientalists took over the construction of curricula in the madrassa and the practice of Islamic law, determining the procedures with which cases were considered and generating a hierarchy of appeal among different levels of the court, thereby upending centuries of discourse in the philosophy of Islamic law and replacing it with strict Western notions of judicial process in a historically flexible legal space (p. 262). “Any religious office in which one exercised spiritual authority, whether it was expressed in legal judgements, or scholarly discourse, or public preaching, eventually came under the direct control of the French” (p. 22). The qadi transformed from an arbiter of Islamic justice to a salaried bureaucrat, a servant of the colonial state (p. 245). Consequently, as the role of the qadi morphed away from constituting an important part of
everyday Islamic discourse rooted in tradition, most judges now “seemed intent primarily on pursuing individual interests, rather than formulating a common and coherent response to new problems” (p. 84). Muslim courts were hence not destroyed by the French but integrated and warped into the colonial structure; the social norms governing the behavior of Algerians were not destroyed, but rather “distorted.”

In sum, the French colonial government made substantial attempts to re-figure the everyday religious and social spaces of Algerians as a part of establishing its hegemony and repressing locals so as to authenticate the process of colonial extraction.

### 5.4 The Congo Free State and Belgian Congo

Situated in the center of the African continent, Congo (now the Democratic Republic of Congo) illustrates perhaps the most devastating episode of Colonialism in this paper, with the ruthless extraction of the region’s resources by Belgian colonizers in the late 1800s and 1900s accompanying brutal attempts to repress local societies. Within the context of my model, Congo represents an example of an equilibrium where nearly total taxation/extraction of resources accompanies maximal attempts to erase social fabric. This erasure of social fabric was initially achieved through the imposition of brutal violence on local Congolese, generating a system of essential slavery lasting for decades, which evolved into a less overtly violent but equally disruptive administrative rule from the 1910s through 1960.

#### 5.4.1 The Congo Free State

The colonization of the Congo can be broken into two main periods: The Congo Free State (1885-1908) and Belgian Congo (1908-1960). Prior to this period, the region was ruled by a series of kingdoms and other polities. After the arrival of Portuguese explorers near the end of the 15th century, the Kuba Kingdom at the region’s Western end served as a source of slaves for the booming Trans-Atlantic Slave Trade (Hochschild 1999, p. 10). Nevertheless, no attempts were made to travel beyond the coast and up the Congo River until the 1800s, when a series of English explorers attempted to penetrate the center of the continent. This piqued the interest of Belgium’s King Leopold II, who saw this undiscovered region as a massive source of profit for his burgeoning kingdom. Leopold initially concealed these economic desires under a veil of “moral uplift,” scientific advancement, philanthropy, and calls to end Arab slave trade in the region (p. 42), consequently organizing a conference to send “scientists, linguists, and artisans who would teach practical skills to the natives” (p. 45) of this as-of-yet uncharted land. By the Berlin Conference of 1884-5, Leopold had succeeded in securing “rights” to a Congo Free State (Gondola 2002, p. 57), including domain over some 15 million local Congolese with allowance for other European powers to utilize trade routes and send Christian missionaries throughout the region.

In 1885, Leopold declared all the “vacant land” of the Congo as the sole property of Belgium, formally giving his forces free domain to loot and steal locals’ lands and crops (Hochschild 1999, p. 117) in the wake of traumatic violence inflicted by explorers like Henry Stanley.
within the previous decade, which had succeeded in instilling fear of Europeans into local Congolese. By the early 1890s, Leopold had given an explicit agenda to his Belgian forces to “seize all the ivory” of the Congo for the purposes of profit (Gondola 2002, p. 64). This desire for sheer extraction can be seen within the model of this paper as a desire to set \( t \) close to 1, distorting local social fabric as much as necessary to achieve this total extraction. The seizure of ivory from the locals was accompanied by the deliberate suppression of any benefit for local populations based around a “myth of the lazy native,” that the Congolese did not deserve to profit from their resources because they were inherently backwards. Leopold is even quoted as saying that “[i]n dealing with a race composed of cannibals for thousands of years it is necessary to use methods which will best shake their idleness and make them realize the sanctity of work” (Hochschild 1999, p. 118).

As a consequence of this decree, “Congo state officials and their African auxiliaries swept through the country on ivory raids, shooting elephants, buying tusks from villagers for a pittance, or simply confiscating them. Congo peoples... were forbidden to sell or deliver ivory to anyone other than an agent of Leopold” (p. 118). Ivory was sold abroad by European agents for massive profit, while local Congolese received paltry cloth and beads in return; law prevented Africans from receiving European currency as a means of sustaining European economic hegemony. The Belgian obsession with ivory can best be seen through data on ivory exports from the Congo: while 5,824 kilograms of ivory were exported in 1888 from the colony, 118,739 kilograms were being exported by 1892 (Gondola 2002, p. 70). These episodes, as well as other manifestations of violence throughout the Congo, took place under the careful watch of the Force Publique, a military force employed by the Belgians to aid in the extraction of resources and the enforcement of laws that facilitated that extraction. While most commanding members of the Force Publique were white Belgians, and while many were often mercenaries from British West African colonies, most of the subaltern military force was composed of forcefully conscripted Congolese (Hochschild 1999, p. 127).

In an age before the establishment of railroads and road travel, another primary site of extraction in the Congo Free State was the use of local laborers as “porters” to carry ivory, military equipment, and other goods and resources to and from regions of the Congo that were not near the coast or river. While some of the tens of thousands porters were paid measly salaries, many simply received food sufficient to sustain them and most were conscripts (p. 119), amounting to slavery in nearly every sense but nominal (Gondola 2002, p. 65). Hunger-stricken porters were asked to do strenuous tasks ranging from transporting machine guns to disassembling and transporting steamboats over long marches. Even children were enslaved in these services; at times, witnesses observed “seven- to nine-year-olds each carrying a load of twenty-two pounds” (Hochschild 1999, p. 119). The far-reaching hand of the Belgian regime coupled with the mandatory conscription of Congolese into porterage or labor represented an extraction of resources that extended beyond purely physical by simultaneously sucking dry much of the Congolese labor force. While the building of Leopold’s railroad near the turn of the century reduced demand for porters, approximately 1800 Congolese died in the constructions of these tracks, those who survived were paid meagre wages, and new modes of transport eased the ability of the Belgian regime to extract more resources from newly accessible rural areas of the Congo (Gondola 2002, p. 65; Hochschild 1999, p.
Perhaps the largest site of extraction within the Congo Free State comes in the form of rubber, spurred on by a sudden increase in demand for use in tires, clothing, wiring insulation, and other daily use. Nearly half of the Congo was covered in rubber vines, providing a source of profit for the Belgians even more lucrative than ivory, and by the early 1890s rubber exports had far outstripped those of ivory (Hochschild 1999, p. 159). While 74,000 kilograms of the substance were exported in 1888, by 1905 nearly 5 million kilograms were finding their way into world markets from Belgian Congo, with Leopold’s regime reaping the profits (Gondola 2002, p. 70). The state resorted to higher and more complex forms of societal violence to extract rubber from the Congo. One officer would land his troops near a village whose labor was to be used for extracting rubber, loot all the food, seize the villagers’ women, and then sell back the women once a set quota of rubber was collected by the villagers men; this process would be repeated from village to village (p. 161). The physical act of collecting rubber was simultaneously painful; the most efficient means to collect the raw substance was to smear it on one’s bare body, wait for it to harden, and then forcefully peel it off. This process took place under the watch of the Force Publique and garrisons employed by private European companies working in the region (p. 163). Failure to meet rubber quotas resulted in public lashing or execution (Likaka 2009, p. 35), while the cutting off of right hands and ears was also common (Hochschild 1999, p. 165-166).

The Free Congo State represents a high degree of resource extraction in concordance with the aforementioned model. It is in a sense difficult to capture the precise manner in which Belgian rule in the Free Congo State tangibly “distorted” social fabric since the violence of colonization went beyond distortion and erased swathes of local society. Therefore, deviation from local norms to the “colonizer’s norms” can largely be articulated in terms of threats of violence rather than patronage or financial rewards. The incentive to shift to the norms of the colonizer should better be thought of as a threat to comply with the colonizer’s wishes, with failure to comply resulting in brutality (such as the cutting off of hands) or death.

This can clearly be seen in the case of rubber extraction, where locals’ women were stolen and only given back after a quota’s worth of rubber was brought. Here, colonial violence operates both physically and transactionally, forcing locals to take actions dictated by the colonizer and provide them with resources, or face the deaths of their loved ones. Similarly, the conscription of Congolese into the Force Publique displays a forceful conversion of locals into enactors of colonial violence. Many Congolese simply had no choice but to join these military ventures, or essentially face slavery in rubber, ivory, infrastructure building, or porterage jobs. The “norm” of the colonizer was to obey the colonizer; the punishment for failing to follow that norm was usually death.

Distortion of social fabric operated beyond threats of death and punishment for conscripted and enslaved Congolese. Forced male labor resulted impacted smaller village societies as bodies were drawn away from local communities, resulting in drops in food production that were exacerbated by the high mortality rates of these workers, who could not return home to provide for their families (Likaka 2009, p. 34-35). “Orphaned” children (whose par-
ents and extended family were usually killed by Force Publique soldiers) were placed in Leopold’s “children’s colonies” run by Catholic missionaries, with most male children becoming members of the colonial military force once they came of age (Hochschild 1999, p. 134). Colonization encompassed all facets of both life and death.

The violence of the Congo Free State also figured itself into the manner in which Congolese viewed and submitted to outside colonizers; that is, the violence inflicted by the colonizer substantially suppressed locals’ ability to resist colonial rule. While the effects of violence and forced labor have been examined above, this can also be seen in terms of the terminology that locals used to refer to Colonialism. Locals often “named” figures, events, and objects associated with colonizers, thereby conveying information about their personal experience colonial conditions. “Naming” hence acts as a sort of testimony to everyday experiences and social perceptions of colonization. For example, certain colonial officials were often referred to as Bula Matari (“break rocks!”), initially derived from the explosion of dynamite in road construction, as a means to represent the disruption of Colonialism in village spaces (Likaka 2009, p. 56). Cibalabala (wildcat) represented the assault on local cultural practices by Catholic missionaries (p. 63). Terminology surrounding the rubber trade and its accompanying social disruption was captured through words derived from bunduki (gun) and buluki (witchcraft) (p. 66). In a broader sense, the synonymity of Colonialism with violence as expressed in new words and phrases can be thought of as an indicator of measuring just how deeply Colonialism wormed its way into traditional Congolese spaces, that is, how information about Colonialism’s effect on local societies and social fabric was encoded in linguistic practices. “[A]ccusation of colonial violence and assault of Colonialism on the village world were laments of suffering and expressions of discontent and anger” (p. 93).

5.4.2 Belgian Congo

Leopold’s control of the Congo was motivated sheerly by a pursuit of resources and profit and utilized violent rule as a means to pursue said resources (Gondola 2002, p. 61). While outrages from international politics resulted in a takeover of Congo by the Belgian state itself (from King Leopold) in 1908, extraction of resources and distortion of social fabric continued to a large degree. The purpose of the colonial enterprise was still to “generate profit for the metropolis” (p. 78). While reports of abuses surrounding rubber extraction subsided, largely in part due to the creation of the cultivated rubber industry and the end of official policies such as hand-severing, the “new” Belgian colonizer simply switched to policies of heavy taxation and rubber cultivation (Hochschild 1999, p. 278; Likaka 2009, p. 35). Military occupations remained a key feature of colonial rule through the 1930s as a means of keeping populations repressed after attempts at rebellion, such as at Pende in 1931 (Marchal 2009, p. 274). Extraction of resources and wealth still occurred, simply in a less explicitly violent manner under a guise of formal administration.

Forced labor (and accompanying punishment like lashes) remained, with quotas dictating the length of time for which Congolese could work in forced labor (Marchal 2009, p. 279). Between 1921 and 1931, more Congolese workers died during the renovation of Leopold’s railway than in its original construction (p. 279). Meanwhile, an estimated five thousand
workers died in “the copper mines and smelters of Katanga... between 1911 and 1918” (p. 279). Death still surrounded the daily lives of Congolese even after the end of Leopold’s rule. Mandatory cash-crop production established itself as another growing development at the beginning of colonial rule. Farmers who had previously cultivated food and other crops for use by locals were now forced to produce cash crops (e.g. cotton, coffee, potatoes, and cultivated rubber) for export by the colonizer. In the case of cotton cultivation, this administrative process resulted in a social gap between chiefs (landlords) and cotton producers that “was a conscious and controlled process that primarily benefitted the state” (Likaka 1997, p. 95) through state-dictated resource allocations and heavy taxation of locals, resulting in heavy intra-household and intra-community inequality (Likaka 2009, p. 36). Even supposed “collaborations” between private companies and locals placed the burden of labor on the Congolese: “[f]or Africans, this collaboration... entailed creating the plantations and ensuring that they were harvested; for Europeans, it amounted to providing selected seed and to taking delivery of the harvested crop” (Marchal 2017, p. 286).

Belgian Congo represented a shift towards structural distortion of social fabric in regards to ways communities were organized and educated, as Belgium, following in the stead of its fellow European colonizers in other regions, believed in a civilizing mission to “liberate” Africans from their previous customs and traditions. Administration of smaller rural regions was based on the misconceptions that the Congolese consisted of perpetually warring independent tribes, ignoring precolonial Congo’s composition of larger polities with extensive domains (p. 78). The creation of chefferies (chiefdoms) was meant to create smaller units of political organization based on this assumption of “small tribal communities” that disposed of preexisting social and political structures that acted as modes of local cooperation. This process including the replacement of local chiefs with those who would follow the orders of colonizers, who were often rewarded by the colonial system and allowed greater control of localized regions by the colonial apparatus (p. 79-80). This administrative structure can again be seen in the model as organizationally “dividing and conquering” local Congolese societies, increasing submission to the colonizer and reducing local cooperative incentives by both making it harder to cooperate horizontally (between now divided chefferies) and vertically (replacing chiefs with those who followed the colonizer’s dictates). Moreover, the process of resource extraction was closely linked to this social partitioning. The colonial government apportioned land into “blocks” “to be placed in joint ownership [between private and local ownership],” including a clause which stated that “chefferies would grant the company, up until 1936, rights over fruits present and future from palms growing within this same block” (Marchal 2017, p. 104). That is, division of local societies into smaller pieces in a sense eased the ability of outside parties to extract from locals, essentially placing a monopoly on the ability of local Congolese to utilize resources and preventing them from making any substantial profits. In extreme capacities, colonial administrators and private companies even sought to build “model villages” or “relocate” entire villages within close vicinities of factories (p. 67) as a means of easing profit gains for the colonizers.

Social fabric distortion also worked through Catholic missionaries, who worked to dismantle local Congolese traditions (categorized as “backwards” and “savage”) and replace them with “clean” and “Christian” norms. The missions “involved the establishment of economic,
social, and political conditions which prepared the colony for profitable utilization” (Fabian 1983, p. 169). In fact, before departing for Congo, missionaries were given guidebooks that “instructed them to work closely with the church to ‘civilize’ the local population” (Gondola 2002, p. 82). In turn, Belgian civil servants were to aid Christian missionaries in this project as part of larger ideology to convert local Congolese to follow Western European norms and traditions.

Missionaries rejected any norms that were distinctly Congolese and non-European. Breastfeeding via long intervals between birth, abortive practices, division of household labor, any expression of indigenous cultural or social symbols, gender ideologies, and practices regarding social or biological production deemed generally “repulsive” were banned, disrupting the transmission of norms rather than allowing for their reproduction (p. 50). Schools opened by missionaries were built with a mission to form a “lower middle class with limited political awareness that would staunchly support the colonial state” (Gondola 2002, p. 82). The purpose of mission education “was not just to convey certain skills and kinds of knowledge; it had to form and transform the whole person in all respects, religious as well as secular” (Fabian 1983, p. 177). The goal of missionary education was then social, dictating the type of knowledge that a colonized subject should possess and utilize in their day to day lives and interactions.

By the 1920s, Belgian administrators created native courts that assisted Catholic missionaries in acting as colonial officials by providing formal channels for campaigns to end these “repulsive” and “superstitious” practices. This assault on social practices acted not only to actively suppress tradition but also threatened mechanisms of their “social and cultural reproduction” (Likaka 2009, p. 45), doling out punishment for refusing to follow the dictated colonial/Catholic norms. While the the purpose of these courts was to regulate intra-village conflict and daily life between the Congolese, there was still some presence of local, precolonial social norms; “families, kinships groups, and closed associations [worked to] maintain or restore social harmony” by sometimes regulating the same domestic conflicts as native courts (p. 48). Indeed, the model of this paper predicts that it is impossible for colonizers to wipe clean local social fabric, meaning it is natural to observe the salience of precolonial social norms even in extreme contexts.

In sum, the Free Congo State from the 1880s through 1908 represents the extreme prediction of my model, that a high erasure of social fabric accompanies total extraction of resources from a colonized region. King Leopold’s reign authenticated this extraction of resources by directly imposing violence on the Congolese, distorting their social fabric by forcing them to submit to the will of his colonial administration. While the use of violence as a tool was slightly less common once the Belgian state took over from 1908-1960, the high extraction of resources simply evolved to a more institutional level, as did the distortion of local social fabric through the governance of every day social life.
6. Conclusions

In this paper, I have provided an economic framework that links colonial resource extraction with its social effects. While by no means exhaustive, the game I present in this paper encodes two very important notions: Colonizers can directly extract resources from colonized populations and, by incurring a cost, can also distort “social fabric” to suppress the threat of local resistance against colonization. The colonizer first chooses a rate of resource extraction $t \in [0, 1]$ on a level of local resources $\bar{y}$ and then a level of social fabric $s \in (0, 1]$. A social fabric value of 1 represents an intact society, while social fabric closer to 0 represents an increasingly chaotic, noncooperative, and suppressed population. When choosing a level of social fabric $s$, the colonizer incurs a cost of $c(s) \geq 0$. This reflects that there are administrative or military costs associated with distorting social fabric. As $s$ approaches 0, $c(s)$ approaches infinity, meaning that it is increasingly difficult to set social fabric equal to 0.

After observing the rate of resource extraction and the level of their social fabric, the colonized local society then decides whether to rebel against colonial rule or to accept their fate. In the case of rebellion, the probability of successful rebellion is strictly increasing in the level of social fabric; if the colonizer sets social fabric to lower levels (i.e. distorts social fabric more), the probability of successful rebellion is lower. Hence, to reduce the threat of successful rebellion, the colonizer has a tangible incentive to distort social fabric. In the event that rebellion is successful, locals are able to enjoy the entirety of their resources $\bar{y}$ without any level of extraction or taxation. In the event that rebellion fails, however, locals receive some negative payoff $-M$. From the colonizer’s end, successful rebellion results in a payoff of $-M$ and failed rebellion in the payoff $\bar{y}$. Whoever wins the rebellion is able to enjoy the entirety of resources, while the other payer is duly punished.

In the event of working, locals receive a payout (or utility) $u(t\bar{y}, s)$ for a rate of extraction $t$ and social fabric $s$. $u(\cdot, \cdot)$ is strictly increasing in both arguments and $u(y, 1) = y$ for all $y$. Hence, social fabric acts as a sort of “scalar” for local payoffs; higher levels of social fabric allow a society to enjoy its resources more than lower values.

This game generates three types of Nash equilibria. In the first, a colonizer does not distort social fabric and is able to extract from the local population just enough to keep them indifferent between rebellion and work in a risk-neutral framework. In turn, the locals work. Assuming that the probability of successful rebellion is equal to 1 when $s = 1$, this leads to a rate of extraction of 0. Hence, this equilibrium corresponds to a situation of “no colonization”: there is no resource extraction and no social fabric distortion. Since this equilibrium involves “no colonization,” we would not expect to observe such a situation if we notice a system of colonizaton in place.

In the second equilibrium, a rate of extraction between 0 and 1 accompanies social fabric distortion: the rate of extraction $t$ is set strictly greater than 0 and the level of social fabric strictly less than 1. In the third Nash equilibrium, a total extraction of resources also accompanies social fabric distortion: $t$ is set to 1 and $s < 1$. In both cases, the locals work,
but are precisely indifferent between working and rebelling. If there are multiple equilibria, the set of optimal solutions for the colonizer involve higher rates of extraction occurring with strictly lower levels of social fabric (or higher rates of social fabric distortion). This in turn establishes a simultaneity of social fabric and extraction. Observed resource extraction does not occur without distortion of social fabric, and social distortions never occur without nontrivial extraction. In certain reasonable cases of these equilibria, monotone comparative statics establish that both slight increases in the level of resources held by a colony and the punishment from failing to win a rebellion result in increases in social fabric distortion.

What exactly is “social fabric,” and what is the economic basis for the notion of “social fabric” I present? I define a level of social fabric $s \in [0, 1]$ to be the share of the local population that cooperates with a local social norm. I define a social (or cultural) norm as a unique Nash equilibrium strategy that generates cooperation in a repeated game and is derivative of some past historical evolution of norms within a given society or culture. I model the local population as a unit interval in $[0, 1]$ and endow each member of that population with a disposition towards cooperation of $\theta \in [0, 1]$ which is distributed via a continuous and differentiable CDF $D$. $\theta$ is the discount factor of a given member of a population, which comes into play during infinitely repeated games. Based on this parameter, each member of the population chooses to “cooperate” or “not cooperate” with a local norm. Cooperating based on social norms leads to a payout of $f(\theta)$ each period for an infinite sequence of periods, leading to a lifetime payoff of $\frac{f(\theta)}{1-\theta}$. Failure to cooperate with these norms results in an instantaneous payoff of $\overline{c}$ for some $\overline{c}$ given exogenously, and 0 in all periods afterwards. In the absence of colonization, $\overline{c} = 0$ so that all members of the population cooperate with the local norm. However, if colonization occurs and the colonizer incurs a cost of social fabric $c(s)$, $\overline{c} = c(s) \geq 0$. By setting $\overline{c}$ high enough, the colonizer can get a fraction $s$ of the population to abandon local norms in favor of some instantaneous reward from the colonizer depending on the shape of the CDF of $D$. Hence, the shape of the colonizer’s cost function $c(\cdot)$ is fundamentally linked to the distribution of the parameter $\theta$ within the local population.

The direct interpretation of $\overline{c}$ is that it is the utility gained from deviating from a local norm. However, it is much more useful to look at the relative gain from following a local norm versus deviating from that norm, which is equal to $\frac{f(\theta)}{1-\theta} - \overline{c}$. Now, as $\overline{c}$ grows, for a given $\theta$, there is a lower incentive to cooperate with the local norms. This may not be because there is an actual reward for refusing to cooperate with a norm (in the sense of a bribe from the colonizer) but that there is an active punishment for cooperating with local norms. Resistance to colonial rule may be punished via threats of violence, or local social or cultural practices may be actively criminalized.

Why are the “social” or “cultural” effects of colonial policies particularly important? The massive work in Postcolonialism through fields like anthropology, history, and critical theory has tasked itself with looking at the effects of both formal and informal colonial policies on the colonial and postcolonial populations. This extends beyond a simple “institutional” characterization of Colonialism and moves to study the everyday livelihoods of colonial populations, analyzing the ways in which they engage with and conceive themselves in relation
to colonial powers and their own populations. In the cases of Western European colonization of Africa and Asia which I study in this paper, Colonialism was motivated not only by a desire to extract profit but also to “civilize the savages” (non-Western populations) which occurred amidst an obsessive backdrop of othering, racial hierarchy, and a desire to document, organize, and reproduce organized forms of knowledge. Colonialism operated through physical and psychological violence, geographic and identity-based separation, institutional and informal policymaking. Insofar as the geographic regions of this paper are concerned, there are almost no instances where these formative racial and philosophical principles did not guide the project of Colonialism. The way in which European colonization busied itself with resource extraction from local populations cannot be separated from the persistent social disruption it inflicted upon those same populations.

Empirical testing of the hypothesis presented in my model is thorny, prominently because there is no way to historically “measure” social fabric in the way in which I have defined it. Moreover, when I discuss the “resources” which a colony possesses and a colonizer can extract, I take this to encompass not only physical resource but also the value of labor and land which locals can provide to a colony. Hence, I rely on a series of colonial historical case studies from South Asia, Nigeria, Algeria, and the Congo to describe the relationship between resource extraction and social fabric distortion in the context of my model. The cases of South Asia and Nigeria more closely represent “interior solutions” to my model, where processes of division, segmentation, and identity formation along linguistic, ethnic, racial, and religious lines accompanied administrative structures that facilitated the flow of materials out of the colony. Algeria arguably exhibits a greater degree of extraction, partially because it was conceptualized as a space for the expansion of the French Race, while the Congo is infamous as the site of literal enslavement, societal erasure, and the siphoning of raw material. Although it is impossible to qualitatively label social fabric distortion in one colony as “worse” than another, resource extraction in Algeria and Congo were more largely centered around the use of violence by colonial authorities, which may illustrate that there was a more active threat seen if individuals cooperated with local social customs and traditions and resisted (or did not follow the boundaries dictated by) colonizers.

The first contribution of this paper is to develop some sort of economic “theory” or “model” of Colonialism. A proper theory behind economic phenomena is necessary to perform serious structural, empirical investigations of these phenomena. While the model I present in this paper is very simple, it is simultaneously effective, and should be seen as the starting point for a swathe of future literature on economic theories of Colonialism. Such theories, I argue, should not simply involve notions of “extraction” in an institutional sense (providing continuity with the current literature on inclusive/extractive institutions) but also model the interplay between Colonialism and social behavior.

The second contribution of this paper is to turn discussion of the effects of colonies on current economic growth increasingly towards the role of social norms and structures. The social divisions and trauma caused by the colonial project have path-dependently endured into the present day. Manipulation of populations and social fabrics (as collections of social norms) has forever changed how postcolonial populations have conceived of themselves in
relation to their own populations, their ex-colonizers, and the rest of the world. There is no reason to believe that identity formation exists in a vacuum and disappeared immediately after colonizers abandoned their colonies; rather, the social traits and divides populations took on as a result of the colonial period have persisted. Said (1994) writes that the intertwined projects of Imperialism and Colonialism most paradoxically allowed “people to believe that they were only, mainly, exclusively, white, or Black, or Western, or Oriental...No one can deny the persisting continuities of long traditions, sustained habitations, national languages, and cultural geographies” (p. 336).

While this paper has not explicitly examined the postcolonial period, it serves to lay the groundwork for future economic studies of Colonialism by stressing the key role of social norms and social fabric in serving as a backbone of colonizers’ capacity to assert dominance and thereby ease their process of profit extraction. In turn, these factors are instrumental in looking at persistent colonial effects on modern-day economies. For the time being, literature in the field of Economics has largely confined itself to a narrow study of the path dependent effect of “formal” colonial institutions on modern economic growth. While formal institutions are key for looking at incentives for investment and notions of economic mobility within markets, the marked and persistent social and cultural effects of historical events have shown themselves to be equally as important. Hence, the development of theories of social fabric and Colonialism are necessary to look at the postcolonial persistence of these effects and, in turn, provide new empirical and theoretical frameworks for examining central questions within Economics.
7. Works Cited


of France. Cornell University Press.


8. Appendix

**Proposition 1:** For every $\bar{\theta} \in [0, 1)$, there exists a unique $\bar{c} \geq 0$ such that $\frac{f(\theta)}{1 - \theta} = \bar{c}$. Consequently, for $\theta > \bar{\theta}$, $\frac{f(\theta)}{1 - \theta} > \bar{c}$ and for $\theta < \bar{\theta}$, $\frac{f(\theta)}{1 - \theta} < \bar{c}$. In turn, exactly $1 - \bar{s} = D(\bar{\theta})$ of the population will weakly prefer alien norms so that $\bar{s}$ will prefer local norms.

**Proof.** Let $\bar{c} = \frac{f(\bar{\theta})}{1 - \bar{\theta}} \geq 0$, which gives the necessary $\bar{c}$ since $\bar{\theta} < 1$. To see that $\bar{c}$ is unique, note that since $f(\theta)$ is weakly increasing, $\frac{f(\theta)}{1 - \theta}$ is strictly increasing in $\theta$, meaning that for $\theta > \bar{\theta}$, $\frac{f(\theta)}{1 - \theta} > \bar{c}$. Similarly, for $\theta < \bar{\theta}$, $\frac{f(\theta)}{1 - \theta} < \bar{c}$. Since $\theta \sim D$, $1 - \bar{s} = D(\bar{\theta})$ of the population will prefer $A$ to $L$, meaning the rest of the population will prefer $L$ to $A$. \qed

**Proposition 2:** $\lim_{x \to 1} c(1 - x) = +\infty$.

**Proof.** Since $D(1) = 1$, $g(1) = D^{-1}(1) = 1$, $1 - g(x) \to 0$ as $x \to 1$, and $f(g(1)) \in (0, +\infty)$, it follows that

$$\lim_{x \to 1} c(1 - x) = \lim_{x \to 1} \frac{f(g(x))}{1 - g(x)} = +\infty$$

thereby giving the result. \qed

**Proposition 3:** $c(1 - x)$ is increasing in $x$ at $x = 0$ and is strictly increasing for $x \in (0, 1)$. Moreover, $\lim_{x \to 1} c(1 - x)' = +\infty$

**Proof.** The derivative of $c(1 - x)$ is given by:

$$-c'(1 - x) = \frac{g'(x)(f(g(x)) + (1 - g(x))f'(g(x)))}{(1 - g(x))^2}$$

At $x = 0$, $f'(g(x)) \geq 0$, $f(g(x)) \geq 0$, and $g'(x) > 0$ while $g(x) = 0$ so that this expression is weakly greater than 0. Since $f(g(x)) > 0$ for $x > 0$, this expression is strictly greater than 0 for $x > 0$ so that $-c'(1 - x) > 0$. Finally, since the numerator is bounded and $g(1) = 1$, $\frac{1}{1 - g(x)} \to +\infty$ as $x \to 1$ so that $-c'(1 - x)$ also goes to $+\infty$ as $x$ goes to 1. \qed

**Proposition 4:** There exists $x' \in (0, 1)$ such that for all $x > x'$, $c(1 - x)$ is strictly convex.

**Proof.** The second derivative of $c(1 - x)$ is

$$c''(1 - x) = \frac{1}{1 - g(x)} \left(g'(x)^2 f''(g(x)) + g''(x) f'(g(x))\right)$$

$$+ \frac{1}{(1 - g(x))^2} \left(2g'(x)^2 f'(g(x)) + f(g(x))g''(x)\right)$$

$$+ \frac{1}{(1 - g(x))^3} \left(2f(g(x))g'(x)^2\right)$$

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First, note that for all \(x \in (0, 1)\), \(g(x), g''(x), f'(x), \text{ and } f''(x)\) are all bounded and, therefore bounded below; any product of these elements is also bounded below. Hence, for all \(x > 0\), there exist \(A_1, A_2 \geq 0\) such that

\[
\frac{1}{1 - g(x)} \left( g'(x)^2 f''(g(x)) + g''(x) f'(g(x)) \right) \geq -A_1 \frac{1}{1 - g(x)}
\]

\[
\frac{1}{(1 - g(x))^2} \left( 2g'(x)^2 f'(g(x)) + f(g(x)) g''(x) \right) \geq -A_2 \frac{1}{(1 - g(x))^2}
\]

Moreover, \(2f(g(x)) g'(x)^2 > 0\) for \(x \geq 0\) so that there exists \(A_3 > 0\) such that:

\[
\frac{1}{(1 - g(x))^3} \left( 2f(g(x)) g'(x)^2 \right) \geq A_3 \frac{1}{(1 - g(x))^3}
\]

Hence:

\[
c''(1 - x) \geq A_3 \frac{1}{(1 - g(x))^3} - A_2 \frac{1}{(1 - g(x))^2} - A_1 \frac{1}{1 - g(x)}
\]

\[
= \frac{A_3 - A_2(1 - g(x)) - A_1(1 - g(x))^2}{(1 - g(x))^3}
\]

As \(x \to 1\), the numerator goes to \(A_3 > 0\), while the denominator goes to 0, meaning that \(c''(1 - x)\) itself goes to \(+\infty\). Consequently, there exists some \(L > 0\) and \(x' \in (0, 1)\) such that for all \(x > x'\) \(c''(1 - x) \geq L > 0\). Hence, for all \(x \in (x', 1)\), \(c''(1 - x) > 0\).

**Proposition 5:** For every \(s \in [s^*, 1]\), where \(s^* = \frac{M}{\overline{y} + M}\) there exists a unique \(t \in [0, 1]\) such that the locals are indifferent between rebellion and working. This generates a function \(t(s) : [s^*, 1] \mapsto [0, 1]\) which gives the rate of extraction that makes the locals indifferent between rebellion and working.

**Proof.** The locals are indifferent between working and rebellion if and only if the following function \(F(s, t) = 0\):

\[
F(s, t) = u((1 - t)\overline{y}, s) - \left( p(s)\overline{y} - (1 - p(s))M \right)
\]

Since \(u(\cdot, \cdot)\) is bounded below by 0, \(F(s, t)\) has a solution if and only if

\[
p(s)\overline{y} - (1 - p(s))M \geq 0
\]

\[
p(s)(\overline{y} + M) \geq M
\]

\[
p(s) \geq \frac{M}{\overline{y} + M} = s^*
\]

Note that \(p(s) > \frac{M}{\overline{y} + M}\) for all \(s \in (s^*, 1)\). Hence, for such a solution to exist, it must be that \(s \geq s^* > 0\). First, suppose that equation (4.1) holds. Since \(u(\cdot, s)\) is not bounded above and \(u(\cdot, \cdot)\) is continuous, by the Intermediate Value Theorem there exists 0 < \(y' < \infty\) such that

\[
u(y', s) = p(s)\overline{y} - (1 - p(s))M
\]
Since $u$ is strictly monotone increasing in $\overline{y}$ for $s > 0$, $y'$ is unique. Moreover, it follows that $y' \in [0, \overline{y}]$ so that there exists a unique $t' \in [-\infty, 1]$ such that $y' = (1 - t')\overline{y}$; this gives a solution to $F(s, t) = 0$. More formally, the Jacobian of $F$ is given by

$$D_F = \begin{pmatrix} \partial F/\partial s & \partial F/\partial y \end{pmatrix} = \begin{pmatrix} \partial u/\partial s - p'(s)(\overline{y} + M) & -\overline{y}\partial u/\partial y \end{pmatrix}$$

where $\partial u/\partial y$ recalls the definition of $u$ as $u(y, s)$. In particular, since $\partial u/\partial y < 0$ for all $s \in [s^*, 1]$, by the Implicit Function Theorem, there exists a function $t(s) : [s^*, 1] \mapsto \mathbb{R}$ such that

$$u((1 - t(s))\overline{y}, s) - \left( p(s)\overline{y} - (1 - p(s))M \right) = 0$$

Note that $t(s^*) = 1$, since

$$u((1 - 1)\overline{y}, s^*) = u(0, s^*) = p(s^*)\overline{y} + (1 - p(s^*))M = 0$$

On the other hand, $t(1) = (1 - p(1)) + (1 - p(1))\frac{M}{\overline{y}}$, since

$$u\left( \left( (1 - p(1)) + (1 - p(1))\frac{M}{\overline{y}} \right)\overline{y}, 1 \right) = p(1)\overline{y} + (1 - p(1))M$$

Note that $t(\cdot)$ will map into $[0, 1]$ if equation (4.1) holds, i.e. $u(\overline{y}, s) \geq p(s)\overline{y} + (1 - p(s))M$ and $u(0, s) = 0 < p(s)\overline{y} + (1 - p(s))M$. Otherwise, it is possible that $t(s) < 0$, that is, the colonizer gives the locals “additional compensation” for social fabric distortion. In practice, this never happens, since rates of extraction can never be negative, but when solving for a closed form solution for $t(s)$ in practice, such an occasion may rise.

Therefore, for every $s \in [s^*, 1]$, $t(s)$ gives the rate of extraction by the colonizer such that the locals are indifferent between rebellion and work which, technically speaking, can also include “negative” rates of extraction.

**Proposition 6:** A population that experiences no distortion of social fabric will only be indifferent between working and rebellion if the extraction rate is strictly less than 1.

**Proof.** Note that $t(1)$ is defined by:

$$u((1 - t(1))\overline{y}, 1) = (1 - t(1))\overline{y} = p(1)\overline{y} - (1 - p(1))M$$

$$1 - t(1) = p(1) - (1 - p(1))\frac{M}{\overline{y}}$$

$$t(1) = (1 - p(1)) + (1 - p(1))\frac{M}{\overline{y}} \geq 0$$

Moreover, since $p(1) > p(s^*) = \frac{M}{\overline{y} + M}$

$$t(1) = (1 - p(1)) + (1 - p(1))\frac{M}{\overline{y}} < (1 - p(s^*)) + (1 - p(s^*))\frac{M}{\overline{y}}$$
\[
= \left(1 - \frac{M}{\gamma + M}\right) + \left(1 - \frac{M}{\gamma + M}\right) \frac{M}{\gamma} = \frac{\gamma}{\gamma + M} + \frac{M}{\gamma + M} \frac{M}{\gamma} = \frac{\gamma + M}{\gamma + M} = 1
\]
so that a population that experiences no distortion of social fabric will only be indifferent between rebellion and work if the extraction rate is strictly less than 1. On the other hand, \( t(s^*) \) is defined by:
\[
u((1 - t(s^*))\gamma, s^*) = p(s^*)\gamma - (1 - p(s^*))M = 0
\]
Since \( s^* > 0 \), this is true if and only if \((1 - t(s^*))\gamma = 0\), meaning that \( t(s^*) = 1 \).

**Proposition 7** The Colonizer always weakly prefers a local society that is working to one that rebels.

**Proof.** First, consider \( s \in (0, s^*] \). Then a working populace is preferred to a rebellious one by the colonizer when:
\[
\pi_C^w = T(s)\gamma - c(s) = \gamma - c(s) \geq (1 - p(s))\gamma - p(s)M - c(s) = E\pi_C^r
\]
In this case, the working situation is preferred, since \( \gamma \geq (1 - p(s))\gamma - p(s)M \) for all \( s \).

Now, suppose \( s \in [s^*, 1] \) and that the extraction rate \( T(s) \) is equal to \( t(s) \geq 0 \). Then, the colonizer compares:
\[
t(s)\gamma - c(s) \text{ and } (1 - p(s))\gamma - p(s)M - c(s)
\]
Working is preferred by the colonizer if and only if
\[
t(s)\gamma \geq (1 - p(s))\gamma - p(s)M = \gamma - p(s)(\gamma + M)
\]
\( t(s) \) is defined as in equation (3) to yield
\[
u((1 - t(s))\gamma, s) = p(s)\gamma - (1 - p(s))M = p(s)(\gamma + M) - M
\]
\[
p(s)(\gamma + M) = M + u((1 - t(s))\gamma, s) \geq M
\]
But since \( M \geq \gamma \geq (1 - T(s))\gamma \) for all \( s \in [s^*, 1] \), it follows that
\[
p(s)(\gamma + M) \geq (1 - t(s))\gamma
\]
\[
t(s)\gamma \geq \gamma - p(s)\gamma - p(s)M = (1 - p(s))\gamma - p(s)M
\]
which gives the result that the colonizer weakly prefers the locals to work than to rebel.

Finally, suppose \( t(s) < 0 \) so that \( T(s) = 0 \). Then, the colonizer compares
\[
T(s)\gamma - c(s) = -c(s) \text{ and } (1 - p(s))\gamma - p(s)M - c(s)
\]
Note that a working equilibrium is weakly preferred when:
\[
0 \geq (1 - p(s))\gamma - p(s)M
\]
Since \( s > s^* \) and \( p(\cdot) \) is strictly increasing, \( p(s) > \frac{M}{\gamma + M} \). Then, it follows that
\[
(1 - p(s))\gamma - p(s)M = \gamma - p(s)(\gamma + M) < \gamma - \frac{M}{\gamma + M}(\gamma + M) = \gamma - M \leq 0
\]
which gives the result that a working equilibrium is still strictly preferred.
**Proposition 8:** There are three possible solutions that maximize $T(s)\bar{y} - c(s) = 0$: set $s = 1$, set $s = s^*$, or set $s = s' \in (s^*, 1)$. These result in extraction rates of $t(1) = 1 - p(1)) + (1 - p(1))\frac{M}{\bar{y}}$, $t(s^*) = 1$, and $t(s')$, respectively.

**Proof.** First, consider $s \in (0, s^*]$. Here, the expected payoff from the working society is

$$\bar{y} - c(s)$$

which is increasing in $s$ and is hence maximized at $s = s^*$. Now, consider the domain $[s^*, 1]$. The colonizer maximizes the expected payoff in the case of working as:

$$t(s)\bar{y} - c(s)$$

The FOC is given by:

$$t'(s)\bar{y} - c'(s) = 0$$

Using equation (4.3), this is equivalent to

$$\bar{y} \left( \frac{\partial u/\partial s - p'(s)(\bar{y} + M)}{\bar{y}\partial u/\partial y} \right) = c'(s)$$

$$\frac{\partial u/\partial s - p'(s)(\bar{y} + M)}{\partial u/\partial y} = c'(s)$$

If $\frac{\partial u/\partial s - p'(s)(\bar{y} + M)}{\partial u/\partial y} > c'(s)$ for all $s \in [s^*, 1]$, then the optimal choice of $s$ is $s = 1$. Consequently, the colonizer chooses an extraction rate $t(1) = (1 - p(1)) + (1 - p(1))\frac{M}{\bar{y}}$.

If $\frac{\partial u/\partial s - p'(s)(\bar{y} + M)}{\partial u/\partial y} < c'(s)$ for all $s \in [s^*, 1]$, then the optimal choice of $s$ is $s = s^*$. Otherwise, the following set $S'$ is nonempty:

$$S' = \{s \in [s^*, 1] : \frac{\partial u/\partial s - p'(s)(\bar{y} + M)}{\partial u/\partial y} = c'(s)\}$$

The colonizer then chooses $s$ such that

$$\arg \max_{s' \in S' \cup \{s^*\}} t(s)\bar{y} - c(s)$$

which also accounts for the fact that the $t(s)\bar{y} - c(s)$ is maximized on $(0, s^*]$ and $s = s^*$. Let $s'$ be a maximizer of this equation; then the colonizer will choose a rate of extraction $t(s') \in [0, 1]$.

Note that if the optimal $s$ is less than 1, then the rate of extraction is necessarily greater than 0; if it were equal to 0, the colonizer would have payoff $0\bar{y} - c(s) < 0$; the colonizer could do better by extracting at a rate 0 and setting social fabric to 1, thereby receiving payout 0. Hence, in the case of an interior solution for $s \in (s^*, 1)$, the corresponding $t$ is strictly greater than 0. \qed
Proposition 9 In the set of sub-game perfect Nash equilibria where the locals work, the optimal choice of extraction is strictly decreasing in the optimal choice of social fabric. That is, in the data, we should observe that rates of extraction and social fabric distortion are positively correlated.

Proof. Suppose there were two observed equilibria, one where the the extraction rate and social fabric were at \((t, s)\) and another where the extraction rate and social fabric were at \((t', s')\), where \(s' > s\) but \(t' \geq t\). Suppose that the locals prefer to work in either case. In the first case, the payoff for the colonizer is \(t\overline{y} - c(s)\), while in the second the payoff is \(t'\overline{y} - c(s')\). But since \(c(s)\) is strictly decreasing, \(c(s') < c(s)\), and since \(t' \geq t\), it follows that \(t\overline{y} - c(s) < t'\overline{y} - c(s')\). That is, since the locals will work in either case, \((t', s')\) strictly dominates \((t, s)\). This contradicts that \((t', s')\) and \((t, s)\) are both potentially optimal choices for the colonizer.

\(\square\)

Proposition 10: There exists \(\delta > 0\) such that for \(s = s^* = \frac{M}{\overline{y} + L}\), \(t(s)\overline{y}\) is submodular in \((s, \overline{y})\) for all \(s \in (s^*, s^* + \delta)\).

Proof. To see this, note that at \(s = s^*\), \(t(s) = 1\) so that \((1 - t(s)) = 0\). Hence, the cross partial of \(t(s, \overline{y})\) is equal to

\[-p'(s) \frac{\partial u}{\partial \overline{y}} < 0\]

since \(\frac{\partial u}{\partial \overline{y}} < 0\) and \(p'(s) > 0\). Since this inequality is strict, there exists \(\delta > 0\) such that for all \(s \in (s^* - \delta, s^* + \delta)\), \(t_s \overline{y} < 0\) as well. To account for the potential non-differentiability of \(T(s)\) at \(s = s^*\) (where \(T(s)\) switches from \(t(s)\) to 1), I constrain the interval to its right handed portion \((s^*, s^* + \delta)\).

\(\square\)

Proposition 11: Suppose that \(\partial u/\partial s - p'(s)(\overline{y} + M) \leq 0\), \(u(y, s)\) is submodular in \((s, y)\), and \(\frac{\partial^2 u}{\partial y^2} \geq 0\). Then \(t(s, \overline{y})\overline{y}\) is submodular in \((s, \overline{y})\) on \(s^*, 1\).

Proof. To capture how changes in \(t\) may depend on the exogenous parameter \(\overline{y}\), I write \(t(s)\) as \(t(s, \overline{y})\). Recalling equation (3), the derivative of \(t(s)\) with respect to \(s\), the derivative of \(t(s, \overline{y})\) with respect to \(s\) is:

\[\frac{\partial(t(s, \overline{y}))}{\partial s} = t_s \overline{y} = \frac{\partial u/\partial s - p'(s)(\overline{y} + M)}{\overline{y}} = \frac{\partial u/\partial s - p'(s)(\overline{y} + M)}{\partial u/\partial y}\]

evaluated at \(y = (1 - t(s))\overline{y}\). The derivative of this expression with respect to \(\overline{y}\) gives \(t_s \overline{y}\):

\[\frac{\partial^2(t(s, \overline{y}))}{\partial s^2} = \left(\frac{\partial u}{\partial s}(1 - t(s)) - p'(s)\right)\frac{\partial u}{\partial \overline{y}} - \left(\frac{\partial u/\partial s - p'(s)(\overline{y} + M)}{\partial u/\partial y}\right)\frac{\partial^2 u}{\partial y^2}(1 - t(s))\]

Since \(t(s)\) is assumed to be decreasing in \(s\) so that \(\partial u/\partial s - p'(s)(\overline{y} + M) \leq 0\) and \(\frac{\partial^2 u}{\partial y^2} \geq 0\), \(\partial u/\partial s - p'(s)(\overline{y} + M)\left(\frac{\partial u}{\partial s}(1 - t(s)) - p'(s)\right)\frac{\partial u}{\partial \overline{y}} \leq 0\). On the other hand, since \(u(y, s)\) is submodular in \((y, s)\), and \(u(y, s)\) is convex in \(y\) so that \(\frac{\partial^2 u}{\partial y^2} \geq 0\), \(\left(\frac{\partial u}{\partial s}(1 - t(s)) - p'(s)\right)\frac{\partial u}{\partial \overline{y}} \leq 0\). Hence, the entire numerator of \(\frac{\partial^2(t(s, \overline{y}))}{\partial s^2}\) is \(\leq 0\) so that the function itself is \(\leq 0\), meaning, by definition that it is submodular in \((s, \overline{y})\).

\(\square\)
Proposition 12: $T(s, M)$ is increasing in $M$.

Proof. Let $M' > M$ and fix $s \in [0, 1]$. Note that, $s^* = \frac{M}{\eta + M}$ rises to $s^{**} = \frac{M'}{\eta + M'} < 1$. Suppose $s < s^* < s^{**}$. Then $T(s) = 1$, which is not sensitive to changes in $M$.

If $s \in (s^*, s^{**})$, since $s > s^*$, $T(s, M) = t(s, M) \leq 1$; but since $s < s^{**}$, $T(s, M') = 1 \geq t(s, M)$.

Finally, if $s > s^{**}$, $T(s, M) = t(s, M)$, which solves;

$$u((1 - t(s, M))\eta, s) = p(s)\eta - (1 - p(s))M > p(s)\eta - (1 - p(s))M'$$

$$= u((1 - t(s, M'))\eta, s) > 0$$

since $s^* > s^{**}$. Since $u(\cdot, \cdot)$ is bounded below by 0 and strictly increasing in its first argument, it follows that $(1 - t(s, M'))\eta < (1 - t(s, M))\eta$, or equivalently, that $t(s, M') > t(s, M)$.

Proposition 13: $T(s, M)$ is submodular in $(s, M)$ for $s \in (0, s^*)$ and $(s^{**}, 1)$.

Proof. Let $M' > M$. As above, note that, fixing $\eta$, $s^* = \frac{M}{\eta + M}$ rises to $s^{**} = \frac{M'}{\eta + M'} < 1$. First, consider the case where $s \leq s^* < s^{**}$. In this case, $T(s, M) = 1$; $T_{sM} = 0 \leq 0$.

Next, suppose $s > s^{**}$. $T_s(s, M)$ is given by:

$$T_s(s, M) = t_s(s, M) = \frac{\partial u/\partial s - p'(s)(\eta + M)}{\eta \partial u/\partial \eta}$$

Consequently, $T_{sM}(s, M)$ is given by:

$$T_{sM}(s, M) = t_{sM}(s, M) = -\frac{p'(s)}{\eta \partial u/\partial \eta} < 0$$

which gives submodularity over this domain.

\qed