Constructing Capital in the Twentieth Century: The Price of Prisons and the Lasting Effects of Incarceration*

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February 27, 2020

Abstract

Institutions of justice, like prisons, can be used to serve economic and other extra-judicial interests, with lasting deleterious effects. We study the effects on incarceration when prisoners are used primarily as a source of labor using evidence from British colonial Nigeria. We digitized forty-two years of archival records on prisons from 1920 to 1938 and 1971 to 1995 and examine the impacts of labor demand shocks on the use of prison labor. We find that prison labor made up a significant share of colonial public works expenditure and infrastructure construction, and that positive economic shocks increased incarceration rates. This result is reversed in the postcolonial period, where prison labor is not a notable feature of the labor market. We document a significant reduction in contemporary trust in legal institutions in areas with high historic exposure to colonial imprisonment. The resulting reduction in trust is specific to legal institutions today.

JEL classification: H5, J47, O10, O43, N37

Keywords: Prison, Incarceration, Colonial, Taxation, Forced Labor, Public Works, Trust, State Legitimacy

*Thanks to Liz Ananat, Sandy Black, Suresh Naidu, David Weiman, Alan Dye, Marlous van Waijenburg, Michiel de Haas, Denis Cogneau, Elise Huillery, Rajiv Sethi, James Fenske, Ewout Frankema, Florence Bernault, Naomi Lamoreaux, Gerald Jaynes, Tim Guinnane, Anja Benshaul-Tolonen, Robynn Cox and participants at the Yale Economic History seminar, the Columbia University Women in Economics seminar, the Social Science History Association, the Liberal Arts Colleges Economic History workshop, African Economic History Network, African Studies Association and the American Economic Association ASSA conferences for useful comments and suggestions. Thanks to Monique Harmon, Bennie Chen, Yubang Weng, Anamaria Lopez, Robrenisha Williams, Chloe Dennison, Serena Lewis and others for excellent research assistance. All errors are our own.

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1 Introduction

> *"The Prison at Port Harcourt has been considerably developed and at the close of the year there were 829 prisoners in custody and these are employed by the Eastern Railway. The Engineer in charge at Port Harcourt is highly pleased with the way the prisoners are worked; they have given no trouble and have been of great assistance in developing that station. It was my intention to have 1,000 prisoners stationed there before the close of the year, but this was impossible as two prisons...which should have supplied the drafts to make up the number, had an outbreak of chicken-pox..."*
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> - E. Jackson, Acting Inspector of Prisons, *Lagos, 23rd April, 1915*

Prisons are an important arm of state control and state capacity, and the functioning of prisons affects how people, both within and outside a country, view a particular state[1]. There has been renewed debate on the economics of prisons, particularly around the use of prison labor, in the last few years, partly due to the trends of rising incarceration rates around the world, with the current prison population estimated at around 11 million people globally (Jacobson, Heard, and Fair, 2017).

The United States has been a particularly heated center of this discussion, since it holds the title of the country with the highest rate of incarceration in the world, with 0.7% of the US population incarcerated as of 2019, and the US having over 20% of the world's prison population with just 5% of global overall population[2]. The US also uses prison labor, with prisoners in one government-run Federal Prison Industries program earning over $500 million producing consumer goods like mattresses, body armor and road signs at significantly

[1]Hence the famous Nelson Mandela quote 'no one truly knows a nation until one has been inside its jails. A nation should not be judged by how it treats its highest citizens, but its lowest ones.' Source: World Prison Brief.

[2]Source: World Prison Brief.

below market wages (Economist, 2017). While there is heated philosophical debate about the use of prison labor, there is very little quantitative research on the economics of prison labor, examining what happens when the state highlights the use of prison labor as a prime objective of prisons. What are the effects on incarceration when prisoners are viewed and used as a store of labor to serve economic interests? And how does this affect citizens' views of state legitimacy, when an arm of state justice is used to serve economic interests?

We answer these questions in this paper using evidence from colonial Nigeria over 1920 to 1938, where prison labor was a feature of state administration and the labor market. We examine how incarceration responds to economic shocks when prison labor is an important part of state finance, by first estimating the share of prison labor in colonial public finance. Next, we exploit shocks to economic productivity through rainfall and agricultural commodity prices, to examine the impacts of economic shocks, that increase the demand for labor, on incarceration rates, when convict labor is used intensively by the state and makes up a significant share of colonial public finance. Finally, to understand the effects on state legitimacy when prisons, an arm of state justice, is used to serve economic interests through prison labor, we study the long-term effects of exposure to colonial imprisonment centered around prison labor on contemporary views of state legitimacy through reported trust in legal institutions. We conduct a number of falsification tests, using post-colonial imprisonment as an outcome, to understand the effects of economic shocks on incarceration rates, under a regime where prison labor is not a major feature of the labor market or state policy. We use different datasets and digitized forty-two years of archival records on prisons from 1920 to 1938 and 1971 to 1995. We assembled data on prisoners, wages, prices and colonial public finance from colonial and post-colonial archives, combined with representative surveys of our trust and views of state legitimacy outcomes, and geocoded climate information from high resolution NASA data to test our hypotheses.

Colonial Nigeria presents an excellent region to study these questions, with generalizable implications, for a number of reasons. First, colonial Nigeria had relatively high incarceration rates. As of 1940, the British colonial government in Nigeria was incarcerating more people (.3-.4% in 1940) than countries in Europe over a similar period (.06% in 1950)[3]. In fact, colonial Nigeria was incarcerating about the same fraction of people as the notoriously racially unequal US prison system was incarcerating its Black population over the same time period, and at a higher rate than the overall US incarceration average of less than .2%[4]. To put these figures in context with contemporary data, Figure 1 shows the top 40 of 222 countries/jurisdictions by incarceration rate in the world currently. If we place colonial Nigerian incarceration rates in 1940 on the chart, it would have ranked at number 15 of 222 in the world today right between Seychelles and Panama, as shown in the figure. Nigeria incarcerates a much lower percentage of people today, ranking at around 211 of 222 by World Prison Brief estimates. Secondly, a primary motive for incarceration in colonial Nigeria was explicitly the use of prison labor, which enables us to cleanly study the effects on incarceration when prisoners are viewed and used as a store of labor to serve economic interests. Relatedly, the change in the view and approach to incarceration away from prison labor in the post-colonial period, allows us to study the effects on incarceration when prison labor is not a feature of the labor market. Finally, detailed data on attitudes towards state institutions, allow us to explore the effects on citizens' views of state legitimacy long after the action of using state justice and prisons to serve economic interests has occurred.

This paper presents three main results addressing the questions raised in the opening paragraph. First, we estimate the share of prison labor in colonial public finance to assess the importance of convict labor to colonial public works like roads and infrastructure construction like the railroad. These projects were essential in meeting the revenue imperative of the

[3]Source: Author estimates from archival data and World Prison Brief

[4]Colonial Nigeria at a rate of between .2-.4% on average compared to the US Black incarceration rate of around .4% over the same period. Source: (Muller, 2012).

colonial regime, maximizing revenues from the export of agricultural products and mineral resources while minimizing the costs of administration, including costs associated with hiring free market labor. We find that prison labor made up a significant share of colonial public works expenditure, with the share of prison labor in colonial public works expenditure being between 40% and 140% over 1920 to 1938.

Second, we examine the impacts of economic shocks on colonial incarceration rates and the use of prison labor using rainfall and agricultural commodity export prices. We find that positive shocks to agricultural productivity increase incarceration rates and the use of prison labor over the colonial period. This is because labor shortages, combined with state mandated ceilings on wages increase the use of coercion as outlined in Acemoglu and Wolitzky (2011). Colonial officials push forward the timing of construction on infrastructure like the railroad, but facing severe labor shortages due to the increased relative value of African laborer/farmer outside options, changed the prosecutions of certain crimes to better utilize forced prison labor. This effect is reversed in the post-colonial period where prison labor is not a feature of the labor market and negative shocks increase incarceration rates.

Third, we find a strong negative association between long-term exposure to high historic levels of colonial imprisonment and lower trust in legal institutions today. Legal institutions like modern-day courts, police and tax administration systems are largely colonial products, and historic exposure to systems prioritizing economic interests over 'justice' as an aim of prison/legal systems lower people's view of state legitimacy and trust in legal institutions. This negative association is however not present for interpersonal trust demonstrating that the effects work through state institutions. Conversely, the effect does not hold for exposure to post-colonial incarceration again highlighting the importance coercion through the colonial prison system.

We add to several distinct literatures. First, we add to the literature on the economics

of forced labor and coercive labor contracts (Acemoglu and Wolitzky, 2011; Bobonis and Morrow, 2014; Dell, 2010; Gregory and Lazarev, 2013; Juif and Frankema, 2018; Lowes and Montero, 2016; Naidu and Yuchtman, 2013; van Waijenburg, 2018; Saleh, 2019). Previous work has examined the impacts of economic shocks on coercive contract enforcement (Naidu and Yuchtman, 2013), and estimated the share of forced labor in colonial public finance (van Waijenburg, 2018), but there is very little evidence on the economics of prison labor, with most of the research on prison labor concentrated on the United States (Poyker, 2019; Travis, Western, and Redburn, 2014) and the Soviet Union (Gregory and Lazarev, 2013). We also contribute to the literature on long-run development and the long-run impacts of historical institutions on modern day outcomes and attitudes (Dell, 2010; Lowes and Montero, 2016, 2018; Huillery, 2009; Obikili, 2016; Nunn, 2008; Nunn and Wantchekon, 2011; Archibong, 2019).

While previous work has examined the impacts of the institutions like the slave trade (Nunn, 2008) and labor concessions (Dell, 2010; Lowes and Montero, 2016) on development outcomes, interpersonal trust (Nunn and Wantchekon, 2011) and trust in modern medicine (Lowes and Montero, 2018), our paper is the first, to our knowledge, to examine the long-term effects of prison labor systems on trust in legal institutions and views of state legitimacy. Given the discussion in the United States and around the world on the effects of incarceration on views of state legitimacy, for example around the relationship between the high historic racial gap in incarceration between Black and White populations in the US and the Black-white racial gap in trust in legal institutions like the courts or police (Sherman, 2015), it is important to understand how systems of prison labor may affect trust in legal institutions. This is needed, particularly in light of research linking environments of low trust in legal institutions and low views of state legitimacy with conflict (Rohner, Thoenig, and Zilibotti, 2013), low domestic investment and higher transaction costs from weak contract enforcement (Knack and Keefer, 1997), and issues with effective policing, crime and law enforcement

(O'Flaherty and Sethi, 2019).

The paper is organized as follows: Section 2 provides historical background on labor coercion and prison labor in colonial Africa. Section 3 presents the empirical results on the estimates of the value of convict labor to the colonial regime. Section 4 describes the data on prison labor and economic shocks and presents the main results on the effects of economic shocks on incarceration rates and the use of prison labor. Section 5 presents results on the relationship between colonial imprisonment and contemporary trust in legal institutions and views of state legitimacy. Section 6 concludes.

2 Historical Background: Prisons and Forced Labor in Colonial Africa

2.1 Forced Labor and Taxation in Colonial Africa

Prison labor was a small part of a larger regime of domestic forced labor in colonial Africa. A small but rich and growing labor history of colonial Africa has documented the ways in which the so-called "revenue imperative" of colonial governments, whose objectives were to maximize revenue extraction while minimizing costs of administration in Africa, led to the establishment of coercive labor contracts in the region (Freund, 1984; Maul, 2007; Okia, 2012; Gardner, 2012; Cooper, 1996; Harris, 1914; Trevor, 1936; van Waijenburg, 2018; Alexopoulou and Juif, 2017). Following the signing of the Final Act of Congress of Vienna in 1815 to abolish slavery, a series of contentious debates about the nature of forced labor, and particularly the extent to which forced labor could be employed to fulfill the revenue demands in Europe's African colonies continued through the middle of the 20th century (Maul, 2007). The debates highlighted a number of responses to Europe's so-called "Africa labor question", where, faced with the realities of labor scarcity, increased demand for labor from both private

and public sector employers and an indigenous labor force with their own preferences for work, the discussions shifted from questions about how to institute European systems of wage labor and private property ownership in the colonies to the amount of coercion a "civilized government" could use (Cooper, 1996).

The answer to this question involved the employment of a series of coercive labor regimes, enforced by legislation and through the participation of local chiefs or Native Administrators. Over the period from 1900 through 1926, French and British colonial governments invested in public works infrastructure like roads, ports and railways, in particular, to better facilitate revenue extraction from cash crop exports and administration of the colonies (Okia, 2012). Attempts to raise revenue to fund expenditures on these projects crucially rested on the colonial government's ability to raise revenue through direct or indirect taxation and cut costs associated with expenditures. Labor shortages were an endemic feature of the African colonies. Shortages were driven partly by an unattractive wage labor market for government projects, which itself was partly spurred by artificially imposed below-market wage compensation, set both as a cost-cutting measure and to prevent competition with the private sector, and satisfy the economic and political demands of white settler employers (Okia, 2012; Maul, 2007).

Faced with these options - low pay for often dangerous, back-breaking work on railroads or in mines, under sometimes racist[5], difficult employers - many Africans preferred self-employment in subsistence farming to working in the colonial wage labor market (Frankema and Van Waijenburg, 2012; Harris, 1914). To address these constraints, colonial governments enacted a series of strategies to meet labor and revenue demands. Among these strategies included the use of direct taxation like hut and poll taxes requiring cash payment to press

[5]Harris (1914) reports of the comments of a white employer, Mr E Tarlton in Kenya who, in complaining about labor shortages he faced, told the 1912 labor Commission in the East Africa Protectorate that "this is my busiest season and my work is entirely upset, and it is hardly surprising if I am in a red-hot state bordering on a desire to murder everyone with a black skin who comes within sight", p. 821.

Africans into the wage labor market, the use of labor tax legislation to force Africans to donate a certain number of hours of often unpaid labor to private and public sector work, and the use of precolonial communal labor requirements to compel Africans, under the direction of the chiefs, to provide unpaid labor for private and public works projects (Okia, 2012; Harris, 1914; Trevor, 1936; van Waijenburg, 2018; Cooper, 1996).

In colonial Nigeria, forced labor regulation included the Native House Rule Ordinance of 1901 and the Roads and Creek Proclamation of 1903, both of which mandated labor for 'public purposes' for all men between 15 and 50 years old and all women between 15 and 45 years old (Ofonagoro, 1982). The Masters and Servants Proclamations of 1901 and 1903 also instituted forced labor in colonial Nigeria, granting Native Administrators or chiefs the authority to coerce local laborers for up to 24 working days in a year or 1 out of 12 months. Laborers were frequently employed on public works projects and physically intensive manual tasks like porterage, carrying pounds of baggage for British officials through often dangerous environments like military expeditions for "miserable" below market-wage pay (Ofonagoro, 1982; Okia, 2012). Forced labor was recognized by the colonial regime as so essential to the functioning of the state, that in one instance, when the colonial office in Nigeria surveyed commissioners in 1911 on their preferences for terminating the House Rule Ordinance which bolstered the authority of chiefs to obtain labor for the government, the minutes from the meeting report that "Perhaps most interesting evidence of all is that of the Commissioners who with one lament ask how is the administration to be carried out if we cannot go to the Head of a House and demand carriers and paddlers? How is the work of sanitation, road making and clearing to be carried on if we cannot hold the Head of the House responsible for finishing the necessary labour? They are all of the opinion that the necessary labour cannot be got, even at a ruinous price, and that thus the progress and development of the country would be retarded." (Ofonagoro, 1982), p. 213[6]. The labor tax regimes also facilitated an

[6]Ward-Price, op. cit., p.213. See also CO/520/107, 'Native House Rule Ordinance', minutes by Sir Percy

environment of corruption and exploitation of poorer, less connected citizens, since wealthy locals could bribe chiefs to avoid conscription (Ofonagoro, 1982; Okia, 2012; van Waijenburg, 2018; Trevor, 1936).

Following a series of forced labor scandals, one of which was the sanctioning of torture, mutilation and murder of millions of Congolese for the rubber extraction trade under Belgium's King Leopold through the 1890s, another debate on the labor question led to the passing of the Slavery Convention by the League of Nations in 1926 (Hochschild, 1999; Lowes and Montero, 2016). The Convention urged European powers to abolish slavery "in all its forms" and the League requested that the International Labor Organization (ILO) investigate the "best means of preventing forced or compulsory labor from developing into conditions analogous to slavery" (Cooper, 1996). p. 29. These exchanges led to the passing of the Forced Labor Convention at the 1930 ILO conference which forbade the use of forced labor for private industry where forced labor was defined as "all work or service which is extracted from any person under the menace of any penalty and for which the said person has not offered himself voluntarily" (Cooper, 1996). p. 29[7]. The Convention made exceptions for the use of forced labor for public works, 'penal and communal labor in the public sector and compulsory military service' (Kunkel, 2018; Killingray, 1989).

While Britain was the first to sign the ILO article, followed by France and a few other European governments in the mid 20th century, it, and its colonial peers continued, and in some cases intensified forced labor practices through the use of 'unofficial' communal labor for public works projects (Kunkel, 2018). The practice is exemplified in a 1944 statement made by the then district commissioner of Northern Ghana's Builsa district, who, in showing the chief commissioner of the Northern territories the new projects the colonial government had started funding in the region over the past years, among which were schools, rural

Anderson, 18/12/1911.

[7]ILO 29, Article 2 s 2a, c, e, Articles 4 and 5

roads, bridges and dams, argued for the financial viability of the district by informing the commissioner that the chief had supplied the government with unpaid communal labor: "nearly all the labourers I find whom your Honour saw working in the new Sandema dam are 'voluntary' workers, there are only seven names on the time sheet which is encouraging." (Wiemers, 2017), p.239. Many of these coercive labor practices continued through the end of the 1930s and as late as the 1950s in some regions, when African workers began to actively organize labor unions and strikes to protest labor contracts with fixed low wages amidst rising food prices in the mid to late part of the 1930s after the Depression (Cooper, 1996). Among the most famous strikes were the 1935 Copperbelt strike of African miners in Northern Rhodesia, the Mombasa general strike, the Dar es Salam dock strike and a number of strikes on the railways of the Gold Coast in 1939 (Cooper, 1996).

2.2 Prisons and the Use of Convict Labor

Of the many forms of forced labor, from indentured servitude and labor taxes to slavery, that have received scholarly attention in the economics literature in recent years, the use of the prison labor, remains relatively understudied (Nunn and Wantchekon, 2011; Acemoglu and Wolitzky, 2011; van Waijenburg, 2018; Bernault, 2007; Freund, 1984; Juif and Frankema, 2018; Killingray, 1999). One well-known case of the use of convict labor for industrial projects was in the 19th century in the United States of America, where laws, punishment and convict labor were part of a regime involving the criminalization of Black populations following the abolition of slavery (Fogel and Engerman, 1995; Myers, 1998; Worger, 2004; De Vito and Lichtenstein, 2013; Browne, 2007). The use of primarily Black prison labor to work on public works projects like the roads or the railroad in the US South has been well documented in the historical literature (Fogel and Engerman, 1995; Myers, 1998; Worger, 2004; Browne, 2007). The US case shared many of the same features of labor exploitation of domestic populations for public works and private industry consumption in the 18th, 19th and 20th centuries with

American, African and Asian colonies under European control; including the "agricultural penitentiaries" of French north Africa and the exploitation of convict labor in De Beer's Mining Company in South Africa (Brown and Dikotter, 2007; Arnold, 1994; Paton, 2004; Worger, 2004)[8].

The use of convict labor was often a significant part of the empire-building efforts of European colonial regimes, with well-documented examples from periods of British, French and Portuguese rule in the 19th and 20th centuries (De Vito and Lichtenstein, 2013; Branch, 2005; Bretschneider, Bernault, and Roitman, 2011). Two main reasons for the use of convict labor emerge in this literature. First, prisoners were employed to work as punishment for crimes, as defined by regimes, and second, prisoners were viewed as a source of cheap labor, particularly for industrial projects during the industrial booms of the 18th and 19th centuries (Adamson, 1984). In Europe's colonies, penal labor was viewed as a necessary component of punishment with a civilizing effect on "native" African populations who were stereotyped as lazy, and prone to avoidance of work without outside inducement (Adamson, 1984; Okia, 2012; Cooper, 1996; Harris, 1914; Buell, 1928)[9]. Prison conditions were often unhealthy, unsanitary environments (despite colonial accounts to the contrary) and high mortality rates among prisoners were noted as a feature of prisons in the early part of the colonial period across many parts of British colonial Africa (Branch, 2005; Killingray, 1989; Abiodun, 2017).

Similar crimes did not correspond to similar punishment, a fact which was sometimes exploited by European regimes in African colonies to address fiscal pressures and accompa-

[8]In the US case, a series of laws from vagrancy laws and the Black Codes that limited access to owning property, voting and laws that criminalized everything from loitering to "breaking curfew", sometimes served to increase the prison population in periods of higher labor demand and increased labor shortages (Adamson, 1984; Myers and Massey, 1991; Fraser and Freeman, 2012). The construction of public works projects like roads and railroads in particular were sometimes entirely funded by convict labor with one example being the Western North Carolina Railroad from 1855 to 1894 in the US (Abrams, 1976).

[9]A prominent example of this view comes from the 1953 comments of the Prisons Commissioner of Southern Rhodesia, who stated that "The aims of prison labor are to: 1. Make [the African] amenable to discipline, 2. To develop habits of industry, and 3. To rehabilitate him". Southern Rhodesia, Report of the Secretary, Department of Justice for the Year 1951. (Hynd, 2015).

nying labor shortages (Branch, 2005). An example of this can be found in another account from British Kenya between 1895 and 1939 where Anderson (2000) outlines the ways in which a combination of labor demands by the colonial government and racist views around physical punishment as a 'necessary evil' for 'civilizing' African populations, led to differential prosecution of African convicts versus their European and Asian counterparts under alleged violations of the 1906 Masters and Servants Ordinance. The Ordinance regulated employment contracts between workers and employers in the region and heavily favored private employers, most of whom were white European settlers in disputes. Among the possible punishments for violations of the ordinance, which included 'desertion' from work without prior notice, "absence during work hours", "careless or improper work" and "using insulting language to the master", were fines, prison time extending up to 6 months and whipping (Anderson, 2000), p. 462. Europeans and Asians convicted for breach of the Masters and Servants Ordinance were much more likely to get fines than prison time or whipping, with Africans more than three times likely to get prison time than their European counterparts and the only group to be whipped as punishment between 1931 and 1938 as shown in Figure 2.

2.3 Prisons and Convict Labor in British Colonial Nigeria

Prisons as a means of punishment were largely an invention of the colonial period in sub-Saharan Africa, where there is little evidence of a prison system in the precolonial period[10]. In British colonial Nigeria as in much of British Africa, labor taxes and labor laws worked in concert with Masters and Servants Ordinances, vagrancy laws, labor registration, pass laws and Native Authority Ordinances that mandated the conscription of African laborers to work on colonial public works projects (Hynd, 2015). Though there is little disaggregated data

[10]Notable exceptions include the emirates and Sokoto Caliphate in Northern Nigeria, where prison or confinement was used mainly as a tool against political prisoners like opponents of the emir, but not as a punishment for common crime (Branch, 2005; Killingray, 1999).

on the types of crimes individuals were convicted of, available data from colonial records in Nigeria show that over 50% of total convictions in colonial courts were from "offences against revenue laws, municipal, road and other laws relating to social economy of the colony"[11] between 1920 and 1937 as shown in Figure 3.

Alongside the growth of coercive laws in the colonies, was the increased use of the prison system and convict labor to work on private and public works projects, particularly in the early part of the 20th century (Hynd, 2015; Akurang-Parry, 2000; Abiodun, 2017; Bernault, 2007). Individuals who refused or were unable to pay direct or labor taxes or the fines associated with non-payment, or committed petty crimes against the colonial regime or their Native Authorities, were arrested and placed in prison, after which their labor was subsequently used to work on colonial public works projects. An example of this is presented in accounts by Felix Ekechi (1989) and Stacey Hynd (2015) where a sizable number of the inmates in the Owerri prison in South-Eastern Nigeria were young men who had resisted mandated labor under the labor regulations, after which they were imprisoned and employed as convict labor. In Nigeria and the Gold Coast, Roger Thomas (1973) notes that convict labor was often used to manage labor shortages in cash crop production and mining through the 1920s.

In Nigeria, as of the time of its amalgamation from two separate Northern and Southern Provinces to a single entity under the governorship of Sir Frederick Lugard in 1914, the need for cheap labor combined with the reticence of indigenous workers to work at below market rate wages on often grueling industrial railroad, road construction and other public infrastructure projects, motivated Lugard to pass the 1916 Prisons Ordinances act giving, among other things, control of the use of convict labor to the Governor (Kingdon, 1923; Abiodun, 2017). The Prisons Ordinance along with the 1914 Native Courts Ordinance also

[11] British colonial Blue Books, multiple sources.

outlined the functioning of Nigeria's dual prison system, with the colonial prisons under the management of the Director of Prisons and Native Authority Prisons overseen generally by the local chiefs[12] (Kingdon, 1923; Abiodun, 2017).

Colonial prisons served a dual mandate, functioning as centers of control and repression of African populations, and a source of cheap labor, allowing the regime to address chronic labor shortages by providing government administrators with a steady supply of convict labor (Saleh-Hanna, 2017). So significant was the role of prison labor in the revenues and expenditures of the colonies, that in 1911, the Governor of Northern Nigeria remarked that "The value (calculated at 2/3 of the market rate) of prisoners' labor in connection with public works, which would otherwise have had to be paid for in cash was 3,878 pounds. If calculated at the ordinary market rates the value of the prisoners' useful labor would have exceeded the entire cost of the Prison Department" (Salau, 2015), p. 323.

Following Lugard's Order in Council act on July 20, 1916, colonial prisons were classified into three types: convict prisons, with prisoners serving 2 or more years to life sentences, provincial prisons, with prisoners serving greater than 6 months and less than 2 years sentences, and divisional prisons, with prisoners serving less than or equal to 6 months sentences (Kingdon, 1923; Abiodun, 2017). Most prisoners were unskilled laborers, with 65% to 90% of them in provincial or divisional prisons, having short sentences of less than 2 years, mainly for defaulting on tax payments, and minor offenses like petty thefts (Hynd, 2015; Report, 1925). Popular departments for the use of prison labor were Railways and Harbors, Native Administration, Police, Public Health and Education, particularly for short-term prisoners (with sentences less than 2 years). A robust prison industry system including bakeries, tailoring, shoe-making, carpentry, printing and blacksmithing, among others, meant that longer term

[12]There is little historical information on the functioning of the Native Authority prisons, and we use records on colonial prisons here. This means the number of prisoners presented here represent only a fraction of the total number of people imprisoned during this period. We provide further detail on Native Administration prisons in Section 2.3.1.

prisoners (with sentences greater than 2 years) were taught and tasked with learning a trade like carpentry, basket making, and cloth weaving to create furniture, uniforms etc which could be sold for cash returns that were remitted to the prison department's funds (Hynd, 2015; Report, 1925). They were also tasked, as part of the partly punitive, partly "reformatory" motivation of prison work, with hard labor including activities like stone breaking and stone carrying.

Short-term prisoners were tasked with activities like "road construction, street clearing, grass-cutting, wood cutting, sanitation, conservancy and farm work", with the labor of short-term prisoners contributing significantly to public works projects like quarries in Abeokuta province, coalfields in Enugu, industries in Lagos, and the Eastern Railway extending from Port-Harcourt in Owerri province which used large gangs of prison labor (Abiodun, 2017; Foreign and Office, 1937). The colonial government was heavily reliant on convict labor, with many of the coal mining projects and railroad construction work in southeastern Nigeria, for example through the early to mid 20th century, staffed by prison labor (Abiodun, 2017; Foreign and Office, 1937).

The recruitment of prisoners for labor was also sometimes stated explicitly, as illustrated in Abiodun (2017)'s account of the response of colonial government officials to a request for increased funds for the employment of wage labor by a British sanitary inspector in 1923: "the officials asked the prison department to find ways to either increase the prison population or recruit convicts from outstation prisons to complete the tasks."[13]. This use of convict labor for colonial public works projects continued through the 1940s, and in some cases the 1950s in British colonial Africa with an estimated between 1 in 300 and 1 in 500 Africans imprisoned over 1930 through the 1950s, in contrast with 1 in 2000 British natives in Britain (Hynd, 2015). The practice of prison labor continued sporadically through

[13]NAI, CSO 26/2 09591 Vol.1 'Lieutenant Governor Southern Province to Resident Calabar Province: Memorandum on Prison labor' 23rd April 1923.

the 1950s, and ended prior to Nigeria's independence in 1960 with increasing protest from anti-colonial groups and labor unions (Killingray, 1999; Abiodun, 2017).

2.3.1 On Native Administration versus Colonial Government Prisons and Colonial Classifications of Prison Labor

As mentioned previously, there is a dual system of prison administration in Nigeria, under the Native Administration, overseen by local chiefs under indirect rule. Under indirect rule, areas with more centralized precolonial institutions were granted more autonomy to oversee local administration, including on the creation and administering of Native Authority prisons[14](Archibong, 2019). Although we don't have detailed Native Administration prisons data over the 1920 to 1938 period, Figure A1 in the Appendix shows the distribution of Native Administration prisons in 1940, for the first year of available data in the colonial archives. Native Authority or Administration prisons were more heavily concentrated in the Northern provinces, which had a more extensive history of organized precolonial institutions around courts than their southern counterparts (Killingray, 1999). While prison labor was a feature of all colonial era prisons, both Native Administration and colonial government prisons, since Native Authority prisons were more numerous than colonial prisons[15], Native Authority prisons processed more prisoners than colonial prisons in the north, with the share of prison labor coming primarily from Native Authority prisons in the Northern provinces.

Under the colonial convict labor system, unpaid prisoners were outsourced to other government departments, who then remitted payment to the prison department for the use of their labor. To make the system more efficient, prisoners' labor was classified into three

[14]Results from Table A4 in the appendix, confirm a significant positive correlation between the level of precolonial centralization as defined in Section 5.1 and the numbers of native prisons.

[15]On average there were 18 colonial prisons over 1920 to 1938 in the Northern provinces vs 56 Native Authority prisons in 1940. The ratio for Southern provinces over those periods was 54 to 9. Source: colonial archives.

broad types: unskilled hard labor, skilled hard labor, and light labor[16]. Unskilled hard labor included work for which "no training was needed", with examples given including "coaling ship, grass-cutting, painting and refuse disposal". Skilled hard labor included work for which "special training was necessary" including jobs like "basket-weaving, brick-making, carpentry, clerical work, cooking, laundering, mat-making, masonry and tailoring". Light labor consisted of "easy duties suitable to the bodily or mental infirmity of the prisoner" including "cell-cleaning, lamp-trimming, sweeping and preparation of foodstuffs for cooking"' (Foreign and Office, 1937). In Nigeria's Southern Provinces, between 73% and 91% of prisoners were engaged in hard or light labor over the 1920 to 1937 period of available data[17]. Prisoners engaged in hard labor alone made up over 70% of convicts over the same period. The vast majority of prisoners had to work, usually on public works projects like roads, railroads, building construction and in the mines[18].

3 Estimating the Value of Convict Labor to the Colonial Regime

3.1 Data

To assess the significance of prison labor to colonial public works expenditures and infrastructure construction or the value of convict labor, we digitized archival records on the prison population, wages, public works expenditure and revenue from the British colonial Blue Books between 1920 and 1938. We also use supplementary data on prisons from the colonial Annual Report on the Prisons Department. The Blue Books were statistical returns that governors of British dependencies were required to submit on an annual basis and

[16]Source: British Blue Books, Nigeria, multiple years. Other similar classifications included "industrial labor, domestic labor and unskilled labor", where 'domestic labor' was considered light labor and industrial and unskilled labor were considered hard labor.

[17]Between 9% and 26% of prisoners were considered 'unfit' for work either due to being non-sentenced debtors or other not yet sentenced individuals in custody awaiting trial or being too sick to work. Source: British Blue Books, Nigeria, multiple years.

[18]Source: British Blue Books, Nigeria, multiple years.

report a complete record of prisons and colonial public finance between 1920 and 1938 in Nigeria[19]. These data sources and the variables we use in our analysis are described in detail in Appendix A.1.

Figure 5 shows a map of Nigeria with its provinces and colonial prison locations labeled, and including the extent of the colonial railroad. We note an important point here: the colonial prisons data represent only a fraction of the overall prison population, since we lack detailed data on Native Prisons administered by local chiefs in the Blue Books and in the colonial archives in general prior to 1940[20]. Available data on Native prisons from 1940 show that the addition of Native prison estimates to the colonial estimates presented in this paper would almost double the incarceration rate in 1940 from around 224 per 100,000 population to 399 per 100,000 population, which suggests that the data we have from the 1920 to 1940 period is an underestimate of the total level of incarceration during this period. Using the available data from colonial prisons, we present results here as lower bound estimates on the true value of convict labor over this period.

3.2 Empirical Strategy

We measure the value of convict labor to the colonial regime by adapting the strategy from van Waijenburg (2018) to estimate the share of unpaid, prison labor in colonial public revenues and public works expenditure. In essence we ask, 'how much would the colonial state have had to pay if they had to hire all these non-remunerated prison workers for a market rate cash wage?'. This measure captures the benefits accrued from labor coercion and examines how those benefits evolved over time.

[19]Nigeria is amalgamated from separate regions into a single country in 1914 and although the Blue Books data extend back to 1914, some information is missing between 1914 and 1920, so we start our analysis in 1920 for completeness. The Blue Books data on prisons and public finance ends in 1938, and there is less detailed reporting on these outcomes provided in data provided after 1938.

[20]A map of Native prisons as of 1940 is shown in Figure A1.

We calculate the overall value of unpaid labor or labor coercion in each year t as;

$$Value\,of\,convict\,labor_t = Annual\,wages_t * Number\,of\,prisoners_t. \quad (1)$$

This gives us an overall value of benefits accruing to the benefactors of prison labor. As a measure of wages, we use the annual average market wages paid to unskilled laborers as recorded in the colonial archives. This captures the wages for some of the types of jobs that prisoners would have been required to perform, including felling trees and breaking rocks to clear areas for road and railroad construction (Abiodun, 2017; Foreign and Office, 1937). To measure the number of prisoners we use the daily average number in prisons. This measure takes the average of the number of people in prisons throughout the year and captures the amount of labor that was available on a given day. To estimate the relative value of prison labor, we divide the results from Equation 1 by public works expenditures, prison expenditures and overall expenditure and revenue figures from the Blue Books. We estimate various versions of Equation 1 in alternate specifications, including estimates factoring in the cost of prisoner upkeep, using alternate wage measures, and addressing potential bias in prisoner estimates by computing a weighted average measure of people committed to prison for penal imprisonment in each year. The trends in the results remain largely unchanged and are detailed in the appendix.

3.2.1 Statistics on Wages, Prisoners and Classifications of Workers

The Blue Books report various data on wages although the exact type of data reported changes through the sample. In general, wages are categorized into three groups; government employment, agricultural employment, other industrial employment, and domestic service. Under government employment, different wage categories are reported. Wages are reported for "established employees", "skilled artisans", and unskilled workers. Industrial wages are

listed for different sectors ranging from soap manufacturing to logging and saw-milling. The wages are reported as the "average rates of wages distinguishing whether monthly, weekly, daily, per hour, per task including the value of any payments in kind". In most years the wages are reported as absolute wages, however in some instances, wages are not reported as absolute numbers but as a range[21]. The number of hours worked per week are also reported for certain types of employment[22].

We compute the annual wages for different categories of workers, focusing on unskilled laborers and for bricklayers in the trade and manufacturing category. These wages are typically lower than government employment of unskilled labor but capture the types of wages that would have been paid for the type of work done in prisons. In some instances, annual wages are reported directly in the Blue Books. In other cases, wages are reported as monthly prices, in which case, we compute the annual wage as simply the total wages for 12 months[23].

In Figure 6(a) we plot wages paid to unskilled laborers categorized alternatively as "Labourers and Carriers" and "Unskilled Labourers" in the colonial records[24].The data shows an overall downward trend in average annual wages over the period of study. Wages start out relatively high in 1920 at $24, increase in the following year, peaking at around $35 and then fluctuate through the 1920s period until around 1930 when wages crash and remain relatively low at around $10 through the 1930s.

The wages serve as a starting point for calculating the value of unpaid convict labor.The

[21]In the range case, we use the more conservative, lower bound estimate where applicable.

[22]Figure A2 in the Appendix shows one of the wage tables reported in the Nigeria 1927 Blue Book.

[23]In the few instances where only daily wages are reported, we calculate the annual wage assuming the employee worked five days each week for the fifty-two weeks in a year. Note, this is a lower bound estimate than used in Frankema and Van Waijenburg (2012) and van Waijenburg (2018) which assume 6 days per week of labor.

[24]We use the 'unskilled laborers' category under the government public works Section to attain a lower bound estimate of wages that would have accrued to prisoners working as unskilled laborers in public works projects. In alternate specifications, we use relatively higher wages from the unskilled laborers category under the government railways Section with results unchanged.

second variable needed is the prison population and its evolution over time. The Blue Books report the daily average number of prisoners across the colonial prisons. Figure 7 shows the evolution in the number of prisoners between 1914 and 1938. The average number of prisoners rises up until the late 1920s and then declines. Note, the Blue Books and records from the prison department explicitly state that all prisoners were required to work (Foreign and Office, 1937) and as noted in Section 2, in the Southern provinces, between 73% and 91% of prisoners were engaged in hard or light labor over the period of study[25]. The data on wages paid and the number of prisoners allow us to calculate a measure of the value of prison labor, and study how that measure evolves during the period of observation. We provide raw numbers on the daily average in prisons and wages disaggregated by Northern and Southern provinces in Table A1. There are both fewer colonial prisons and fewer colonial prisoners in the Northern provinces than in the Southern provinces as shown in Table A1 and Figure 5[26]. More detail on the wage measures is provided in Section A.2 in the Appendix.

3.2.2 Convict Labor and Public Works Expenditure

Since prisoners were most often put to work on public works projects as discussed in Section 2, to understand the role of prison labor in public works construction, we estimate the share of unpaid, convict labor in public works expenditures (Ofonagoro, 1982). Examples of the types of work prisoners were assigned to are reported by then Inspector of Prisons, W.H. Beverley, in the 1915 Annual Report on Prisons as including 'quarries in Abeokuta province, baggage-moving, porterage, conservancy and grass-cutting in Calabar and Port-Harcourt, in the coalfields at Enugu' and on 'public works and industrial undertakings' in Lagos (Foreign and Office, 1915). The demand for prison labor for public works consumption is also very

[25]We do not have data on the proportion of prisoners employed in work for the Northern provinces and so use the full prisoner data in calculating our estimates.

[26]There are more Native Administration prisons in the Northern provinces as shown in Figure A1 and the level of precolonial centralization appears to significantly predict the number of Native Administration prisons as shown in Table A4.

explicitly stated by Beverley in the 1916 Annual Report on Prisons where he lists two main reasons for creating categories of prisons according to prison sentence as (a) to place 'special prisons' in "townships which are on good lines of communication and afford the most suitable description of penal labour. (Abeokuta, Enugu, Lagos , and Port Harcourt, on the eastern and western lines of the Nigerian Railway, provide quarrying, industrial work, labour connected with shipping and transport, etc.)" and (b) "the ensuring, as far as possible, of an automatic and constant supply of prisoners to each class of prisons. At the end of the year, the system appeared to be working well; the long and medium sentence men were in the prisons appointed to retain them, the prison population was evenly distributed, and nowhere was there shortage of convict labour." (Foreign and Office, 1915). Note, the railway, a major employer of prisoners, was constructed almost entirely during the colonial period and was near completion in the 1930s; it reached its maximum extent in 1964 (Archibong, 2019; Ayoola, 2006). It has been largely non-functional in the post-colonial period (Archibong, 2019; Ayoola, 2006). Prisons and prisoners were often explicitly placed near the railroad as shown in Table 1.

Although prisoners were most often employed on public works, public works expenditure was a small fraction of overall colonial expenditures between 1920 and 1940, composing an average of 2.8% of colonial expenditures over the period[27]. As of 1920, 30% of expenditure was on railways, 12% on servicing public debt, and 19% of expenditure was devoted to defense spending on 'marine, political and West African Frontier Force'. The majority of revenues in 1920 were from customs (46%) and railways (23%). By 1936, the share of expenditure on railways had dropped to 8% of overall expenditure, with public debt, and pensions and gratuities remaining as the top spending categories for the colonial regime. Public works expenditure in both years remained low at around 2%. While revenue from the railway could be used to service railroad expenditure, only 2.8% of colonial expenditures,

[27]Author's estimates from Annual Report on Prisons Data over 1920 to 1940.

on average, was allocated for less costly public works projects, like spending on civil roads, canals, bridges and "buildings not of a military nature" (e.g. court houses and hospitals). A breakdown of the top ten, where available, categories for estimated public works expenditure in 1920 and 1935 for the Northern and Southern provinces is shown in Figure 8[28]. In the Northern provinces in 1920, roads, public offices, hospitals and court houses accounted for 80% of overall public works expenditure, while government quarters, industrial plants and roads accounted for 68% of overall public works expenditure in Southern provinces in the same year. By 1935, the major public works expenditure categories in both the Northern and Southern provinces were waterworks, electricity infrastructure projects and government offices with 100% and 95% of overall public works expenditure in Northern and Southern Provinces respectively. Convict labor, by colonial officials' own admissions, was an essential part of funding these public works projects (Foreign and Office, 1915).

3.3 Value of Convict Labor Results

Figure 9(a) shows the progression of the estimated value of convict labor accruing to the colonial government over the period of study. The benefits decline from a high of over $236,000 thousand a year in 1926, and on average continues to decline until our last year of observation in 1938. The decline in labor coercion in earlier years is driven by the decline in wages. Prior to 1929 the average number of prisoners in rising but not fast enough to account for the drop in wages. The wages stabilize at a relatively lower level from the 1930s but the average number in prison starts to decline as well .

To get a sense of how large the value of labor coercion which accrued to the colonial government was, we contrast it with various other expenditures by the colonial government. Specifically, we compare the value of labor coercion to overall prison expenditure, expenditure

[28]We use estimated rather than actual expenditure in a given year to reflect colonial government expectation around expenditure and to account for unfinished projects and multiple missing entries in the 'spending to date' values provided in the Blue Books records.

on public works, and overall expenditure by the colonial government. Note that the majority of the prison expenditure figure is composed of salary payments to prison employees as noted in the Blue Books records. Figure 9(b) shows the ratio of the value of labor coercion to overall prison expenditure. Two facts stand out. First, the value of labor coercion accruing to the colonial government is larger than the overall expenditure on prisons for most years pre 1930, with the ratio of value to prison expenditure greater than 1 for 5 out of 9 years between 1920 and 1930. The ratio drops and remains below one after 1930, reaching .6 at its lowest levels. This implies, at least from a profitability perspective, that the prisons were value for money, with the indirect returns on prisons positive once the value of labor was considered. The graph also shows the trend of the decreasing benefits of prison labor coercion continues even after taking prison expenditure into account. Similar trends are also apparent when comparing the value of labor coercion to overall spending on public works expenditure by the colonial government in Figure 9(c). The value of labor coercion is larger than overall public works expenditure in 5 out of the 9 years pre 1930 in the sample. The general trend shows a declining value of prison labor to public works expenditure ratio, with the ratio falling to about 40% of overall public works expenditure by 1938 and reaching its maximum extent at 140% of public works expenditure as shown in Figure 9(c) and documented in Table 2.

Finally, comparing the value of labor coercion to overall expenditure by the colonial government in Figure 9(d) shows that the benefits were economically significant. At its peak the value of labor coercion from prison labor was equivalent to more than 3% of overall expenditure. The relative value of these benefits decline throughout the 1930s period in particular, plateauing at around 1% of overall expenditure in 1938. The numbers for the share of labor coercion in overall colonial expenditures are numerically small which is expected, given the fact that convict labor itself represented a very small fraction of overall labor coerced in the colonies, as discussed in Section 2. Overall the data suggests that the value accruing to the colonial government from convict labor was considerably large in

the earlier years of the sample especially in the earlier part of the 1920s, relative to other expenditure. That value however appears to have had a generally decreasing trend, falling almost continuously throughout the period of observation, with notable drops in the post 1930 period. Our estimates of the value of unpaid prison labor are also considerably higher than the reported value of prison labor in colonial estimates, particularly in the pre-1930 period as shown in Table 2 and discussed in the proceeding section.

3.3.1 Comparing Author Estimates of Value of Convict Labor to Colonial Estimates

As an additional robustness check, we compare our estimates of labor coercion to the colonial authority's own estimates of the value of prison labor, shown in Table 2. In some years, the colonial authorities published more detailed information on prisoners and their use of prison labor in annual prison reports. In these reports they published their estimated total value of labor of prisoners in Nigeria. They described this as the amount of the prisoners' earnings for the prison department during the year, both in terms of cash and their valuations of prisoners' work. This in essence was a measure of the colonial authorities own estimate of the value of the labor provided by the prisoners. Though detailed information on how colonial officials' decided on the value of prisoners' labor is not available, reports from multiple Director of Prisons accounts in the Blue Books suggest that the prisons departments may have been trying to price prison labor low enough to both minimize colonial government expenditure and balance the prison department's overall expenditure.

The colonial officials[29] or Directors of Prisons recorded per diem estimates of the value of labor between 1916 and 1921 in the Lagos colony and southern provinces for Nigeria. Using the classification of labor into skilled hard labor, unskilled hard labor and light labor, described in Section 2.3.1, hard labor, both unskilled and skilled are given a value of 5 pence

[29]For example, W.H. Beverly, E. Jackson or W. Reeder in the southern provinces over 1915 to 1921

per day, with light labor given a value of 3 pence per day in 1916. Starting in 1917, skilled hard labor is given a value of 1 shilling and 6 pence or 18 pence, unskilled hard labor is assigned a value of 5 pence and light labor is assigned a value of 3 pence. The rates for unskilled hard labor stay the same from 1918 through 1921, with no reporting on the exact value assigned to skilled hard labor or light labor over this time. After 1921, the reports appear to stop including information on the per diem value assigned to the different classes of labor.

We compiled these estimates where available, and they provide us with comparable data from 1919 to 1935. Figure 10 shows our estimates of the difference in the daily market wage rate versus the prison rate in the Lagos colony and southern provinces for laborers or unskilled hard labor and for carpenters and joiners and bricklayers and masons, two classes of skilled hard labor. Lacking data past 1921 on the per diem prison rates, we assume, based on the past record, that the rates remain stable through 1925. As shown in Figure 10, prisoners performing unskilled hard labor, which made up the majority of the prison population (prisoners with shorter-term sentences), were assigned a value between about 60% to 80% below the market wage rate over 1919 to 1925[30]. Our measure of the value of convict labor is significantly higher than the estimates of the colonial authorities, though there appears to be a convergence towards the later years.

[30]This confirms the report written by Beverley himself in the 1915 Annual Report on Prisons where he states that values assigned to prisoners' labor is below "wages demanded by workmen in civil life". He recommends a doubling of values to balance prison expenditure amounts, illustrating the balance sheet calculus that appeared to drive the setting of values of prison labor.

4 The Effects of Economic Shocks on Incarceration Rates and the Use of Prison Labor

4.1 Data

Given the economic significance of prison labor for colonial public works expenditures shown in Section 3, to understand the impacts of economic conditions on the use of prison labor and to demonstrate that colonial officials are indeed using the prisons as a tool of coercion, we examine the effects of economic shocks on incarceration rates over the colonial period. We use the same data on colonial prisoners from the Blue Books over 1920 to 1938, and aggregate up to the province level to calculate prisoners per 100,000 population for each colonial province. The prisoner data is broken down by length of prison sentence, classified as short-term (less than 6 months), medium-term (between 6 months and 2 years) and long-term (greater than 2 years) prisoners. We use this classification of sentences for falsification tests, to test the hypothesis that yearly variation in economic shocks should affect short-term prisoners whose populations are more elastic than long-term prisoners. As an additional falsification test, and to test the hypothesis presented in the introduction that the impacts of shocks on incarceration should differ between the colonial and post-colonial period due to changes in the economic structure between the two periods, we use available data on post-colonial incarceration rates at the current state level between 1971 and 1995 from Nigeria's Annual Abstract of Statistics[31].

To measure economic shocks, and test the hypothesis presented in the introduction that positive shocks will increase incarceration rates under a regime that prioritizes prison labor and the use of convicts to serve economic interests, we use two sets of data. First, we use rainfall data from 69 weather stations recorded in the Blue Books to construct measures

[31]The postcolonial data does not include breakdown by sentence.

of rainfall deviations or z-scores, as deviations from the province long-term mean. We use this to estimate the effects of rainfall shocks on incarceration rates[32]. For our falsification test in the post-colonial period, we use precipitation data from the National Aeronautics and Space Administration (NASA) MERRA-2 database[33]. Second, we estimate the impacts of productivity shocks on colonial incarceration rates using export crop price data on the major cash crop exports in colonial Nigeria, cocoa, palm oil and groundnuts, from the Wageningen University African Commodity Trade Database (ACTD) (Frankema, Williamson, and Woltjer, 2018). We combine the price data with land suitability and crop production data from the Global Agro-Ecological Zones (GAEZ) and Blue Books databases respectively to enable us to identify which prices would theoretically affect which districts.

4.2 Summary Statistics

Summary statistics are presented in Table 3. The average incarceration rate falls by almost a third between the colonial and postcolonial periods from around 241 prisoners per 100,000 people to 92 respectively as shown in Table 3 and Figure 11. The spatial distribution of prisoners between the colonial and post-colonial period also changes significantly with prisoners being clustered in the Southern provinces over the colonial period, and significantly more spatial dispersion in the post-colonial period as shown in Figure 12, already providing suggestive evidence of different mechanisms at play regarding incarceration in both periods.

Short-term prisoners make-up the vast majority of the colonial prison population at 58% of all prisoners and 84% of penal imprisonment on average between 1920 and 1938. The share of long-term prisoners in penal imprisonment is comparatively much smaller at

[32]In alternate specifications, we test results with interpolated data from the University of Delaware database, and confirm that while there is a significant positive correlation between the rainfall values, the correlation is low and does not translate to the z-scores which are the main explanatory variable used here. Given that the Delaware values from 1920 are less fine interpolations than the weather station data, we use the weather station data here for our main results.

[33]The NASA MERRA-2 data is not available prior to 1980.

5% over the same period. The shares of prisoners with previous convictions are similarly low, with 11% of prisoners having 1 previous conviction and only 2% of prisoners with 2 or 3 previous convictions.

Figure 13 shows the spatial distribution of cash crop production over the colonial period. Palm oil and cocoa are produced in the Southern Provinces, while groundnut is the major cash crop export produced in the Northern Provinces. The time series of export cash crop prices are shown in Figure 14. Prices remain relatively stable, after an initial decline in 1920, through 1930, before there is a sharp Depression-era drop in export prices through 1935. Prices start to rise again briefly before another decline towards the end of the 1938 period. The top charts in Figure 14 show the average incarceration rates in the colonial (left) and post-colonial (right) periods over time. There is clear cyclicality to colonial incarceration rates, driven largely by fluctuations in short-term imprisonment as shown in the Figure. In contrast, post-colonial incarceration rates rise steadily through the 1970s till around 1984, after which it remains largely stable at around 125, before dropping significantly after 1990 to its prior 1971 levels. Post-colonial incarceration rates seem to peak during the years where Nigeria experienced significant drops in oil export prices between 1980 and 1986.

4.3 Empirical Strategy

To examine the impacts of economic shocks on incarceration rates and the use of prison labor in the colonial period, we use three estimating equations as follows: a nonlinear specification, that allows the effect of rainfall shocks on incarceration to vary more flexibly and test the hypothesis on the impacts of positive shocks on incarceration rates, a linear specification that identifies the impacts of moderate positive shocks in particular on incarceration, and a linear specification with an interaction term for prices, to test the hypothesis of the impacts of positive productivity shocks on the use of prison labor in the colonial period. We include district (province or current state) and year fixed effects in all specifications, along with

clustered standard errors at the district level and wild cluster bootstrap p-values to account for potentially low numbers of clusters. The rationale behind each empirical strategy is discussed in further detail in the proceeding sections.

4.3.1 Nonlinear Effects of Economic Shocks on Incarceration Rates

Following the conceptual framework presented in Section 1 and the historical discussion in Section 2.3, positive economic shocks that boost economic productivity, should increase incarceration rates via the use of prison labor as new agricultural tax revenue pushes forward work on important public works and infrastructure projects like the railroad needed to transport cash crops from the interior to the coast for export. Colonial officials push forward the timing of construction on infrastructure like the railroad, but facing severe labor shortages due to the increased relative value of African laborer/farmer outside options, change the prosecutions/sentencing of certain crimes to short term prison sentences to better utilize forced prison labor as shown in Figure 3, where the majority of crimes leading to imprisonment are "crimes against the colonial economy" or largely tax default. Our hypotheses here are that: (a) the dominant functional form relationship between rainfall shocks and incarceration rates in the colonial period is an inverted-u, where the use of prison labor peaks during periods of moderate positive rainfall shocks, with extremes in rainfall, droughts and floods, having a relatively lower effect on incarceration rates; and (b) as a falsification test, the relationship should be u-shaped during the colonial period, where prison labor is not a feature of the labor market and droughts and floods increase incarceration rates through increases in economic crimes like theft. The nonlinear relationship between rainfall and agricultural output has been highlighted in previous literature as well (Lesk, Rowhani, and Ramankutty, 2016; Kaur, 2019; Sarsons, 2015).

We can then estimate the causal effect of rainfall shocks on incarceration rates by estimating the following nonlinear, quadratic specification:

$$\text{Prisoners}_{it} = \beta_1 \text{RainfallDev}_{it} + \beta_2 \text{RainfallDev}_{it}^2 + \mu_i + \delta_t + \epsilon_{it} \quad (2)$$

where $Prisoners_{it}$ is the incarceration rate or prisoners per 100,000 population in province i at year t; $RainfallDev_{it}$ is the rainfall deviation in each province and year[34], z-score term; μ_i and δ_t are province and year fixed effects respectively. The coefficient of interest is β_2 which should be significantly negative if hypothesis (a) holds and positive if hypothesis (b) holds.

Given the different shares of Native to colonial prisons in the Northern (more Native prisons) versus Southern (more colonial prisons) provinces, and the implications of those shares for how prisoners were used for prison labor as discussed in Section 2.3, our third hypothesis is that: (c) the relationship between positive shocks and the use of prison labor should hold more strongly in the Southern provinces than the Northern provinces over the colonial period. We examine heterogeneity by region as well.

4.3.2 Identifying the Impacts of Positive Rainfall Shocks on Incarceration Rates

While Equation 2 allows us to identify the effects of rainfall shocks on incarceration rates and the use of colonial prison labor more flexibly, it does not allow us to distinguish between positive shocks and negative shocks. More specifically, it does not allow us to distinguish between moderate positive shocks that signal improvements in agricultural productivity and potential increases in labor demand, and extreme positive and negative shocks that signal floods and droughts respectively that can reduce productivity.

A problem that arises when trying to distinguish positive and negative shocks, and identify droughts and floods from moderate positive shocks using rainfall, is that the identification

[34]We find no effects when we test the specification using lagged rainfall deviations instead following results in previous literature (Amare et al., 2018).

is often highly dependent on the particular regional context/climate, and as mentioned previously, the relationship between rainfall and agricultural output is often non-linear (Lesk, Rowhani, and Ramankutty, 2016; Sarsons, 2015; Kaur, 2019; Amare et al., 2018; Jensen, 2000). Additionally, while there is a robust literature on rainfall shocks and agricultural productivity in South Asia, there is relatively little research on the links between rainfall shocks and productivity in West Africa (Amare et al., 2018; Papaioannou and de Haas, 2017; Dillon, McGee, and Oseni, 2015; Jensen, 2000). Since we do not have data on agricultural output, we adapt definitions of rainfall shocks in Africa from previous literature (Dillon, McGee, and Oseni, 2015; Amare et al., 2018; Jensen, 2000) and estimate transition points from non-parametric loess models linking rainfall deviations to colonial incarceration rates. From the transition points, we distinguish between moderate positive shocks and extreme positive and negative shocks as follows: (a) Positive shock (M), where 'M' is moderate, is an indicator equal to 1 if $0 < RainfallDev_{it} < 0.75$ and a proxy for increases in agricultural productivity; (b) Positive shock (E), where 'E' is extreme, is an indicator equal to 1 if $RainfallDev_{it} > 0.75$, and signifies floods that reduce agricultural productivity and (c) Negative shock (E), is an indicator equal to 1 if $RainfallDev_{it} < -0.5$, and signifies droughts that also reduce agricultural productivity.

We can then estimate the causal effect of moderate positive rainfall shocks on incarceration rates by estimating the following linear specification:

$$\text{Prisoners}_{it} = \alpha \text{Positive shock (M)}_{it} + \mu_i + \delta_t + \epsilon_{it} \tag{3}$$

where Positive shock $(\text{M})_{it}$ is the moderate positive rainfall shock and other variables are as defined previously in the text, and α is the coefficient of interest, defined as the effect of moderate positive shocks that increase agricultural productivity on the incarceration rate. In

alternate specifications, we include the extreme positive and negative rainfall shock variables to check the robustness of our results. We also examine heterogeneity by southern and northern province and examine the effects of positive shocks on postcolonial incarceration rates, repeating the heterogeneity and falsification exercises in Section 4.3.1.

4.3.3 Effects of Cash Crop Price Shocks on Colonial Incarceration Rates

Finally, following the literature on commodity price shocks and agricultural productivity (Dube and Vargas, 2013; Naidu and Yuchtman, 2013), to examine the impacts of plausibly exogenous positive agricultural export price shocks signaling increases in agricultural productivity on colonial incarceration rates and the use of prison labor, we estimate equations of the following form:

$$\text{Prisoners}_{it} = \gamma \text{Cash Crop}_i * \text{Cash Crop Price}_t + \mu_i + \delta_t + \epsilon_{it} \tag{4}$$

where Cash Crop_i is an indicator that equals 1 if province i is both suitable for and produces one of the 3 major export cash crops, cocoa, palm oil or groundnut over the colonial period, and Cash Crop Price_t is the natural log of the export price in year t. The coefficient of interest is the interaction term γ in the fully specified regression of Cash Crop_i and Cash Crop Price_t on the colonial incarceration rate.

4.4 Results

4.4.1 Nonlinear Effects of Economic Shocks on Incarceration Rates Results

To examine the causal effect of rainfall shocks on incarceration rates, we first present the results of Equation 2 in Table 4. While the quadratic term is negative and not significant when we examine all penal imprisonment over the colonial period in column (1), the results are

significant and with hypothesis (a) in columns (2), (3) and (4). Column (2) shows that the β_2 is negative and significant for short-term incarceration rates but not longer-term incarceration rates in (3) and (4), consistent with a inverted-u shape relationship between rainfall deviation and short-term imprisonment or the use of prison labor discussed previously.

The effect is even stronger when we examine heterogeneity by Southern and Northern province in Table 5, with β_2 negative and significant for short-term imprisonment in the southern provinces, but positive and significant for northern provinces, following the discussion in Section 2.3. Given the higher share of Native Administration prisoners in the northern provinces as discussed in Section 2.3, an explanation is that colonial prisons in the North contained fewer prisoners than their Native counterparts, who may be more likely to be incarcerated in colonial prisons after committing crimes that are specifically targeted against Europeans or non-African natives, like theft or violations of the aforementioned 'colonial economy' laws (Abiodun, 2017). So while there is prison labor in both regions, the colonial prisons in the southern provinces, being the only arm of the prison system for most southern provinces[35] are used more intensely for prison labor in response to increases in economic productivity than their northern colonial prison counterparts. Consistent with the hypothesis that there should be no effect of yearly economic shocks on long-term prisoners, we see no effect for this category, disaggregated by region in Table 5. Consistent with the u-shaped hypothesis, positive rainfall shocks increase short-term imprisonment and the use of prison labor, particularly in the southern region where colonial prisons are often the only source of prison labor.

The results of the falsification test for postcolonial imprisonment are shown in column (5) of Table 4 and again in the right-most column of Table 5. Consistent with hypothesis (b) from Section 4.3.1 that the impacts of rainfall shocks on incarceration rates should be

[35]There are 56 Native prisons in the Northern provinces vs only 9 in the South, and concentrated entirely in the southwest region as of 1940 as shown in Figure A1.

u-shaped when prison labor is not a feature of the labor market, and imprisonment increases instead primarily as a response to increases in economic crimes like theft, in the aftermath of negative productivity shocks like drought or floods, β_2 from Equation 2 is positive and significant for postcolonial incarceration rates.

4.4.2 Identifying the Impacts of Positive Rainfall Shocks on Incarceration Rates Results

The results from Equation 3 identifying the effects of moderate positive rainfall shocks that raise agricultural productivity, versus extreme positive or negative rainfall shocks, signifying floods or droughts respectively that reduce productivity on incarceration rates can be found in Table 6. The results from our main specification in column (1) show that moderate positive rainfall shocks have a significant positive effect on short-term imprisonment over the colonial period. Column (2) shows the opposite result for extreme negative rainfall shocks which reduce short-term imprisonment under a system where prisons are primarily a source of convict labor. The results are robust to the inclusion of both extreme positive and negative rainfall shocks in column (3), and consistent with the results from the nonlinear specification in Equation 2. Again, there are no effects of rainfall shocks on long-term colonial imprisonment as shown in columns (4) to (6) and consistent with the results from Section 4.4.1. The results on heterogeneity by region here are also similar to the results from Section 4.4.1, as shown in Table 7: the effect of moderate positive rainfall shocks that increase agricultural productivity are concentrated in the southern provinces, where colonial prisons are mostly the only source of convict labor.

In contrast, the postcolonial results show that while moderate positive economic shocks have no significant effect on postcolonial incarceration rates (column 7), extreme negative (column 8) and extreme positive (column 9) rainfall shocks increase the postcolonial imprisonment rates, again consistent with the hypothesis that the effect of economic shocks on

incarceration rate should be u-shaped and reversed from the colonial period in an era where prison labor is not a feature of the labor market and prisons are not being used primarily as a source of convict labor. The results are also in line with the results from the specification in Section 4.4.1.

4.4.3 Effects of Cash Crop Price Shocks on Colonial Incarceration Rates Results

Finally, the results from Equation 4 are presented in Table 8. The results show that the impacts of plausibly exogenous positive agricultural export price shocks signaling increases in agricultural productivity on colonial incarceration rates and the use of prison labor is concentrated in crops growing in the southern provinces, and particularly in the palm oil provinces in the southeast region, where colonial prisons are the only source of convict labor. The coefficient γ is positive and significant in the fully specified model, in the first column of Table 8, and the results remain unchanged when the model is run with individual crops and prices instead. The coefficient on the other cash crop interaction in a southern province, cocoa, is positive but not significant, with the effect possibly dampened by the presence of a few[36] Native Administration prisons that also provide convict labor. The coefficient on the interaction term for the sole northern province cash crop, groundnut, is negative but not significant in the fully specified model, with the interpretation of the sign again in line with the results from Section 4.4.1 and Section 4.4.3 on the heterogeneity in the impacts of economic shocks on colonial imprisonment by southern and northern provinces. Positive price shocks in areas where colonial prisons are the sole source of prison labor, increase the share of imprisonment and intensify the demand for and use of convict labor.

[36]Nine, as of 1940, the earliest year of available records.

5 Colonial Imprisonment and Contemporary Trust in Legal Institutions

5.1 Data

Given the rich literature on the long-term impacts of historical institutions, and coercive labor institutions in particular, on contemporary attitudes and outcomes, to explore the long-term impacts of exposure to colonial imprisonment driven primarily by economic motives around prison labor, on views of state legitimacy, we use geocoded data from all rounds of the Afrobarometer surveys for Nigeria. We use Afrobarometer surveys from all 5 rounds from 2003, 2005, 2008, 2012 and 2014. Our main outcomes of interest are, following previous literature (Nunn and Wantchekon, 2011; Lowes and Montero, 2018), respondent reported trust in institutions or individuals variables. Specifically, we use data on trust in historical legal institutions namely: trust in courts, police, and trust in tax administration and interpersonal trust: trust in neighbors, trust in relatives, trust in the president and trust in the local governing council member to test the hypothesis that long-term exposure to colonial imprisonment centered around prison labor reduces views of state legitimacy through lowered trust in legal institutions, with no effect on interpersonal trust.

In addition to individual level controls for age and gender and education fixed effects, to control for potential covariates that could impact both exposure to long-term colonial imprisonment and trust in legal institutions, we combine the Afrobarometer data with population density, geographic controls, disease controls and controls for precolonial and colonial institutions, with descriptions of the data and summary statistics shown in Table 9 and in the Appendix. Precolonial political institutions are proxied using Murdock's (1967) "Jurisdictional Hierarchy Beyond the Local Community Level" called the Precolonial centralization index here. The precolonial centralization index or "Jurisdictional Hierarchy Beyond the

Local Community Level" variable is an index of "political complexity" that assigns a score between 0 to 4 to each ethnic region unit and describes the number of political jurisdictional hierarchies above the local community level for each unit. The score is defined as follows: 0 represents so-called "stateless societies","lacking any form of political organization", 1 and 2 are petty and larger paramount chiefdoms, 3 and 4 are large, more organized states. The colonial institutions Nunn and Wantchekon (2011)'s total number of exported slaves in the trans Atlantic and Indian ocean slave trades from 1400-1900. Disease controls are included for malaria by using climatic suitability for malaria transmission from Adjuik et al. (1998) to address the various hypotheses in the literature on the negative impacts of malaria on African development outcomes (Gallup and Sachs, 2001) and tse tse fly suitability following Alsan (2015). Geographic controls include land suitability for agriculture, mean elevation in km, ruggedness, and indicators for sea coast and petrol, to control for access to trade routes and mineral wealth on trust outcomes.

5.2 Empirical Strategy

To test the hypothesis that long-term exposure to colonial imprisonment centered around prison labor reduces views of state legitimacy through lowered trust in legal institutions, with no effect on interpersonal trust, we estimate equations of the following form:

$$\text{Trust}_{aigst} = \beta \text{Prisoners}_i + \mathbf{X}'_{aigst}\theta + \mathbf{X}'_g\phi + \mu_s + \delta_t + \epsilon_{aigst} \tag{5}$$

where Trust_{asit} is the trust outcome of interest for individual a residing in historical colonial province i, in current sub-district or local government area (LGA) g, in state s for the Afrobameter survey administered in year t. We include vectors of individual level covariates $\mathbf{X}'_{aigst}$ and LGA level covariates $\mathbf{X}'_g$. All regressions include state and year fixed effects. Standard errors are clustered at the province level and wild cluster bootstrap p-values are

included to account for potentially low numbers of clusters.

We measure Prisoners_i or long-term colonial imprisonment with the average of long-term colonial imprisonment over 1920 to 1938 for each province. The rationale here is that though there is a significant, high positive correlation between short-term and long-term colonial imprisonment (.61, $p < .001$), when it comes to the long-term effects of colonial prison-labor systems, what stands out in public memory is the stock (long-term imprisonment) not the flow (short-term imprisonment) of incarceration rates. And while there is little recorded information on the determinants of long versus short-term sentences, the historical literature has documented that crimes against Europeans and colonial officials were often punished and sentenced more harshly (Abiodun, 2017; Killingray, 1999; Bernault, 2007). So one hypothesis is that a higher share of long-term imprisonment, consisting of relatively more political prisoners, or prisoners that have committed crimes against European colonists, when coupled with the existing system of convict labor, is highlighted in local long memory as unjust, and reduces residents' views of the legitimacy of the state via its historical legal institutions, like courts, police and systems of tax administration that were the main economic arm of the colony, via which a majority of people were incarcerated as shown in Figure 3. A key assumption here is that there are relatively low levels of inter-province migration, with most people residing in their provincial homelands[37].

As a falsification test, we examine the impacts of long-term colonial imprisonment on interpersonal trust, and hypothesize that the effects of colonial imprisonment should only be significant for trust in legal institutions, largely created during the colonial era, but not interpersonal trust which perhaps may be determined by factors before the advent of

[37]Although we don't have available data on migration, previous research has shown significant positive levels of correlation between historic ethnic level residence, similar to the province level, and Afrobarometer respondent locations by ethnicity (.7 between 2008 and 2012 Afrobarometer respondents and historic c. 1850 ethnic location maps as shown in Archibong (2019)), which suggests that this assumption is reasonable in the Nigeria context.

colonialism like the slave trade as shown in Nunn and Wantchekon (2011). As an additional falsification test, we examine the relationship between postcolonial imprisonment and trust outcomes, to check that the result on the negative effect of historical imprisonment on trust in legal institutions only holds for colonial imprisonment but not for postcolonial imprisonment, where prison labor was not a feature of the labor market, and prisons were less likely to be used to satisfy economic or extrajudicial interests. As a final falsification test, to ensure that the associations are not being driven by differences in crime between high and low colonial imprisonment areas, we also test the following 'crime propensity' outcomes from the Afrobarometer: whether the respondent has feared being the victim of a crime in their home, and how often an individual had to bribe a government official to obtain a document or permit in the last year or to obtain household services.

While Equation 5 includes a rich set of controls, β should not be interpreted as the causal effect of long-term colonial imprisonment on trust in legal institutions, but rather as presenting a robust correlation between colonial imprisonment and trust outcomes. It is possible that there is an omitted variable that determines both long-term colonial imprisonment exposure and trust in legal institutions. While we are unable to address this concern with the specification in Equation 5, the quantitative results and falsification tests when coupled with qualitative accounts of Nigerian residents' contentions about the injustices of the colonial penal system, are suggestive of long-term effects of colonial imprisonment on views of state legitimacy and trust in legal institutions.

5.3 Results

5.3.1 OLS Estimates: Relationship Between Colonial Imprisonment and Trust in Colonial Institutions Versus Interpersonal Trust

We present the OLS estimates for the effect of long-term colonial imprisonment on trust in legal institutions versus interpersonal trust in Table 10. Columns (1) to (3) in Table 10 show the results on the association between long-term colonial imprisonment and trust in historical legal institution outcomes, while columns (4) to (7) show the results on the association with interpersonal trust outcomes. High levels of historic long-term colonial imprisonment are significantly negatively correlated with trust in historical institutions, with no significant effect for interpersonal trust. The result does not hold for the relationship between postcolonial imprisonment and trust in legal institutions outcomes, as shown in Table 11. Residents with higher exposure to historic colonial imprisonment functioning under prison labor systems and legal systems viewed by many as fundamentally unjust (Abiodun, 2017; Bernault, 2007; Killingray, 1999), have lower views of state legitimacy as evidenced through their lower trust in these historic legal institutions today.

5.3.2 Falsification Test On Crime and Qualitative Evidence

To check that the result on the negative association between colonial imprisonment and trust in legal institutions is not being driven by underlying differences in crime rates between regions of high versus low levels of colonial imprisonment, we present results on crime in Table 12. There is no significant association between colonial imprisonment and our three crime variables as shown in columns (1) to (3). Respondents from areas with high levels of colonial imprisonment are not more likely to experience or commit crimes. Interestingly, when we examine the impacts of postcolonial imprisonment on crime, there is a small significant positive association with the likelihood of an individual bribing a government official to

obtain a document or permit in column (4), although these are significant associations and the results should be interpreted with caution.

Early qualitative evidence on Nigerian citizen displeasure with the colonial prison system can be found in newspapers from the 1940s and 1950s. Nigerian journalists often publicly denounced 'human rights and unjust practices perpetrated by penal officials', including the use of corporal punishment in prisons and the lock up of political dissidents (Abiodun, 2017)[38]. Other historical accounts include the story of Garrick Braide, an African preacher with a large following whose anti-colonial preaching and anti-alcohol stance in 1916, angered both the British colonial government and European merchants. This lead to his arrest and sentence, after which he spent a 2 year period in prison and died shortly after, dissipating the movement but not his followers' memories, or their practice of his beliefs at a church which exists till today[39] (Kalu, 1977; Ludwig, 1993; Abiodun, 2017).

6 Conclusion

What are the effects on incarceration when prisoners are viewed and used as a store of labor, to serve economic interests? And how does this affect citizens' views of state legitimacy, when an arm of state justice is used to serve economic interests? We answer these questions in this paper using archival data from colonial Nigeria. First, we show that convict labor constituted a significant part of colonial public works expenditure, with the share of convict labor in public works expenditures as high as 140% in some years. We show that the implied value of labor coercion was significantly large but declined through the period of observation.

We examine the effects of economic shocks on incarceration rates under a system of prison labor over the colonial period. We measure economic shocks using rainfall deviations and agricultural commodity prices as signifiers for productivity shocks that might indicate

[38]The Southerner Nigeria Defender, August 25, 1943.
[39]The Christ Army Church of Nigeria.

increased labor demand and shortages. Our results show that positive shocks to agricultural productivity increase incarceration rates and the use of prison labor over the colonial period. Moderate rainfall shocks and positive price shocks increase incarceration rates and the use of prison labor in the colonial period in the regions where prison labor is used more intensively. This is because labor shortages, combined with state mandated ceilings on wages increase the use of coercion. Colonial officials push forward the timing of construction on infrastructure like the railroad, but facing severe labor shortages due to the increased relative value of African laborer/farmer outside options, change the prosecutions of certain crimes to prison to better utilize forced prison labor. The effect is reversed in the postcolonial period where prison labor is not a feature of the labor market and negative shocks increase incarceration rates. The quantitative results support the qualitative historical accounts on the intensive use of prison labor over the colonial period.

We find a strong negative association between long-term exposure to high historical levels of colonial imprisonment and lower trust in legal institutions today, but not interpersonal trust. Legal institutions like modern-day courts, police and tax administration systems are largely colonial products, and historic exposure to systems prioritizing economic interests over 'justice' as an aim of prison/legal systems lower people's view of state legitimacy and trust in legal institutions today. Conversely, effect does not hold for exposure to postcolonial imprisonment. Given the renewed debates on the use of prison labor in the US and globally in an era of rising incarceration rates, our paper is the first, to our knowledge, to provide quantitative estimates on the impacts on incarceration when prisoners are used as a store of labor, and its potential effects on citizens' views of state legitimacy.

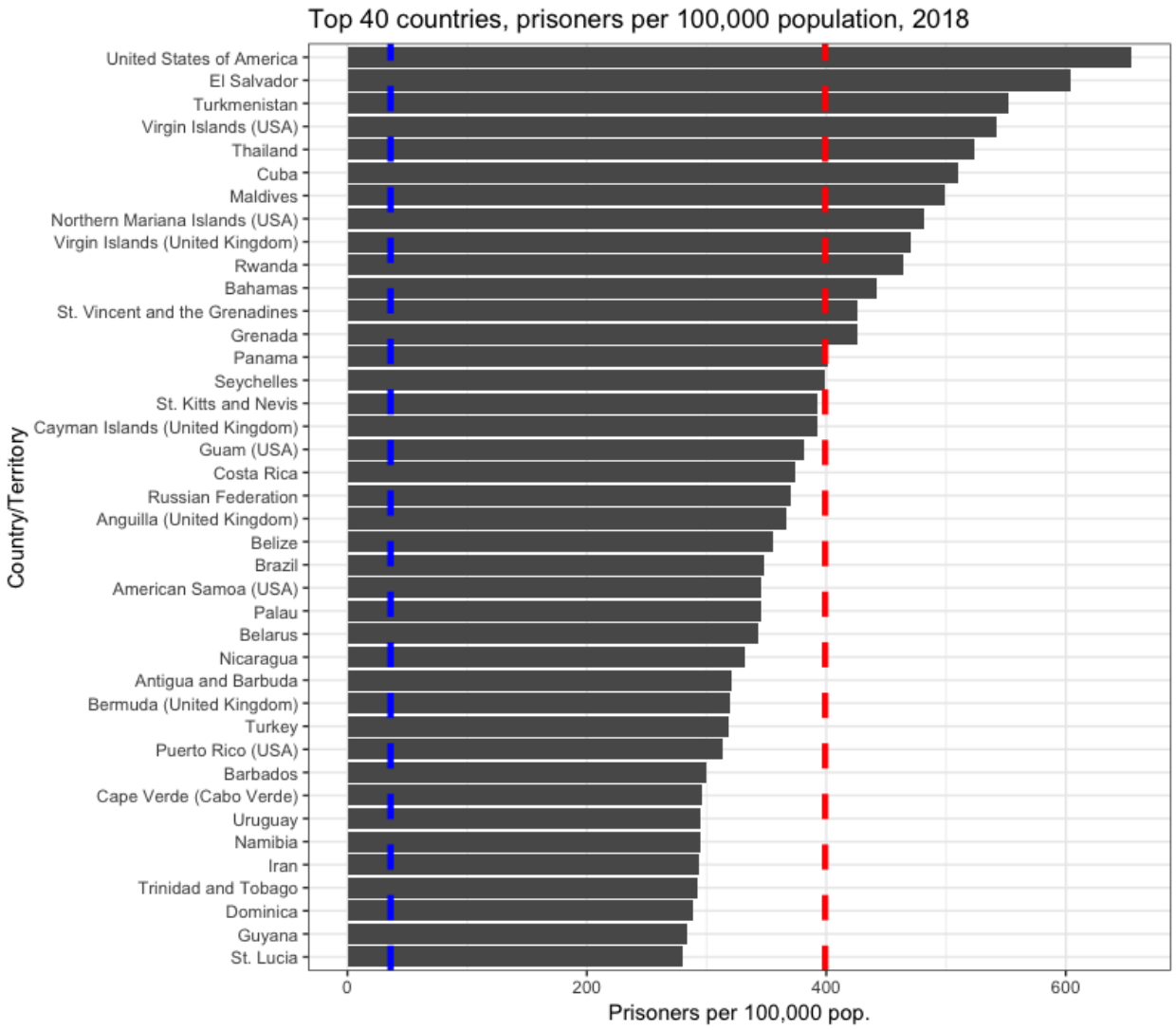


Figure 1: Top 40 countries/territories for incarceration rates, 2018 with Nigeria incarceration rates in red (year 1940) and blue (year 2018). Source: World Prison Brief

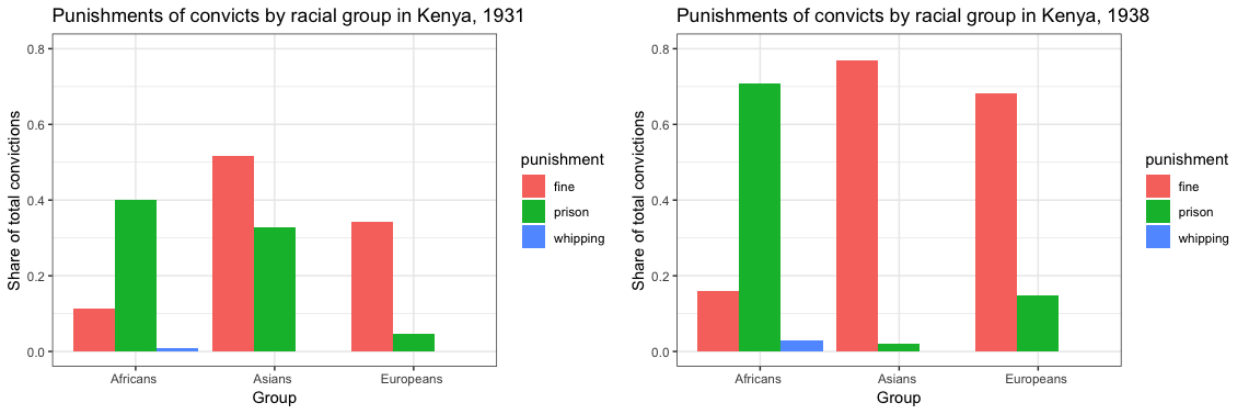


Figure 2: Punishment of convicts by race under Masters and Servants Ordinance in Kenya, 1931 and 1938. Source: Anderson (2000)

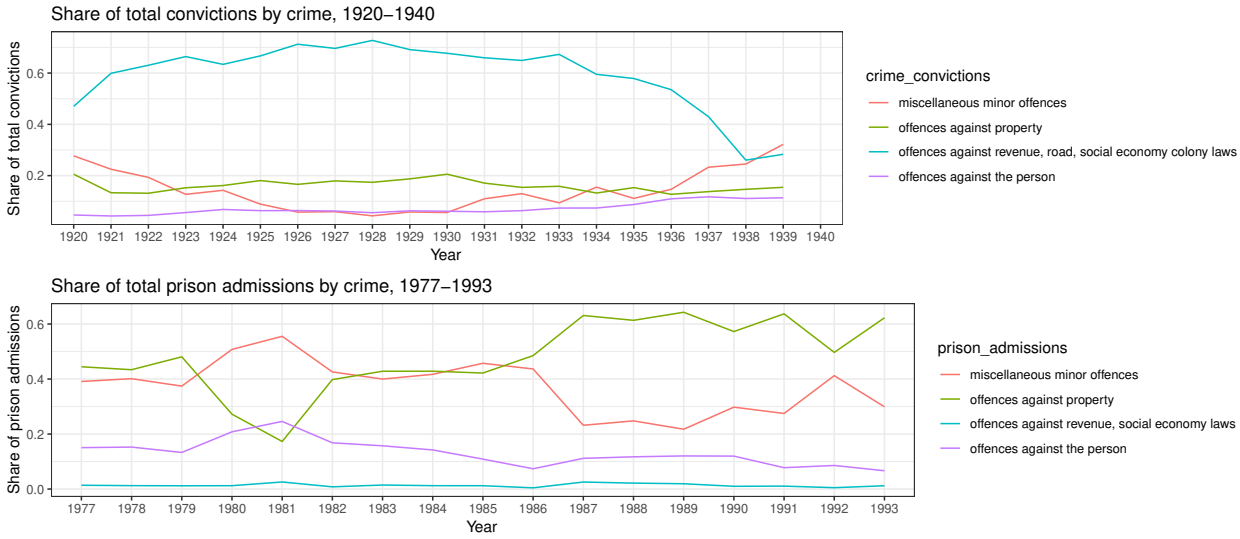


Figure 3: Share of total convictions in colonial courts and share of total prison admissions in postcolonial period by crime in Nigeria, 1920-1993. Source: see text

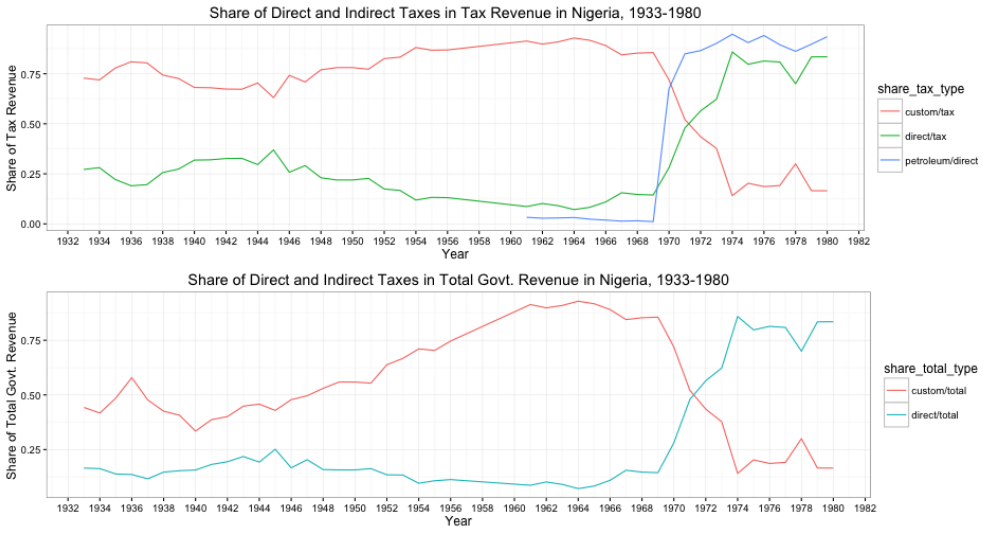


Figure 4: Composition of tax revenue in Nigeria, 1930-1980

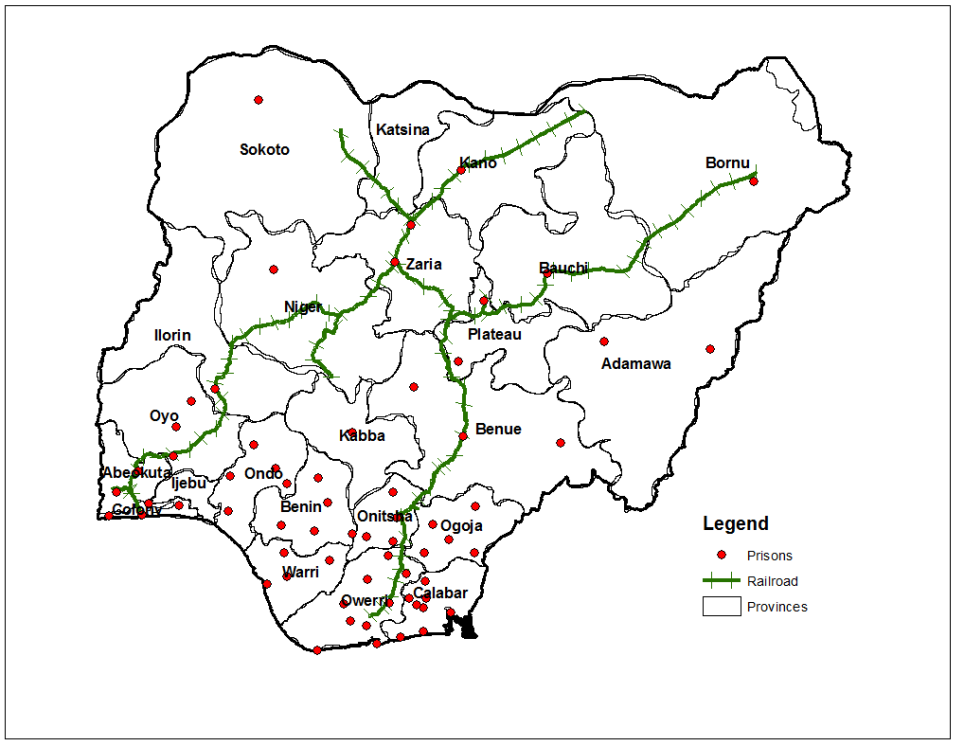


Figure 5: Nigeria provinces with colonial prison locations and railroad network shown

Table 1: OLS Estimates: Relationship between distance to railroad and colonial imprisonment

	All Penal	<= 6 Months	6mo-2y	>= 2yr
	(1)	(2)	(3)	(4)
Distance to Railroad	−3.049**	−1.913**	−0.616***	−0.448***
	(1.185)	(0.941)	(0.181)	(0.174)
	[0.008]	[0.060]	[0.025]	[0.091]
Constant	235.747***	173.652***	36.795***	37.518***
	(26.503)	(25.237)	(4.919)	(2.725)
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	925	923	895	802
Clusters	21	21	21	21
R^2	0.543	0.506	0.334	0.220

Notes: Regressions estimated by OLS. Robust standard errors in parentheses clustered by district, where district is colonial province for colonial data. Wild cluster bootstrap (by district) p-values are in brackets. Observations are individual prisons. Dependent variables in (1)-(5) are prisoners in each prison in Nigeria broken down by all penal imprisonment, custody/awaiting trial, less than 6 months sentence and between 6 months to 2 years sentence and greater than 2 years sentence over 1920-1938. Covariate is distance to railroad in km. District FE are colonial province fixed effects in (1)-(5). ***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level based on clustered standard errors in parentheses.

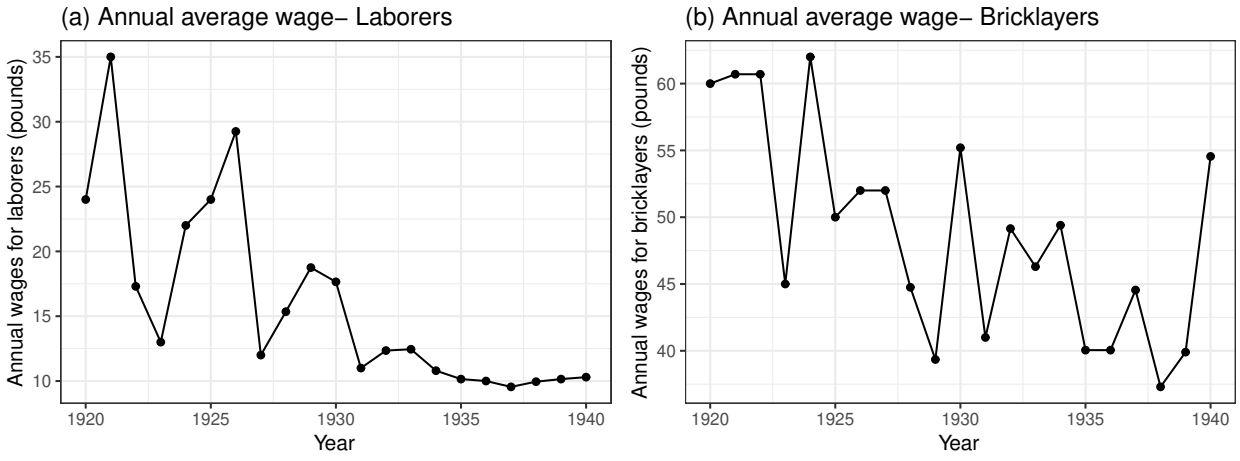


Figure 6: Wages in colonial Nigeria in Pounds Sterling



Figure 7: Daily average in prisons, 1914-1938

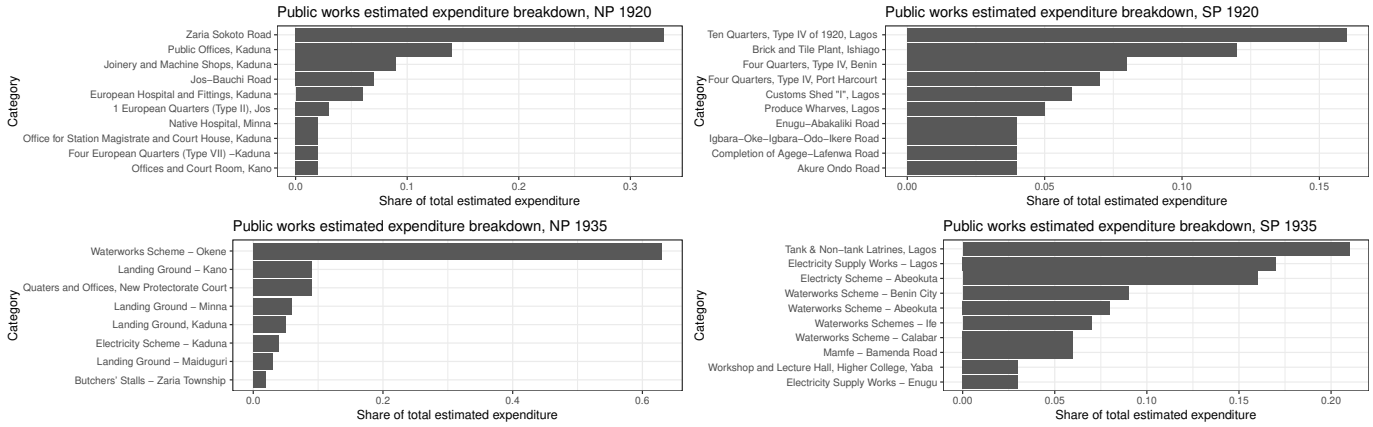


Figure 8: Breakdown of estimated public works expenditure, Northern (NP) and Southern (SP) Provinces, 1920 and 1935

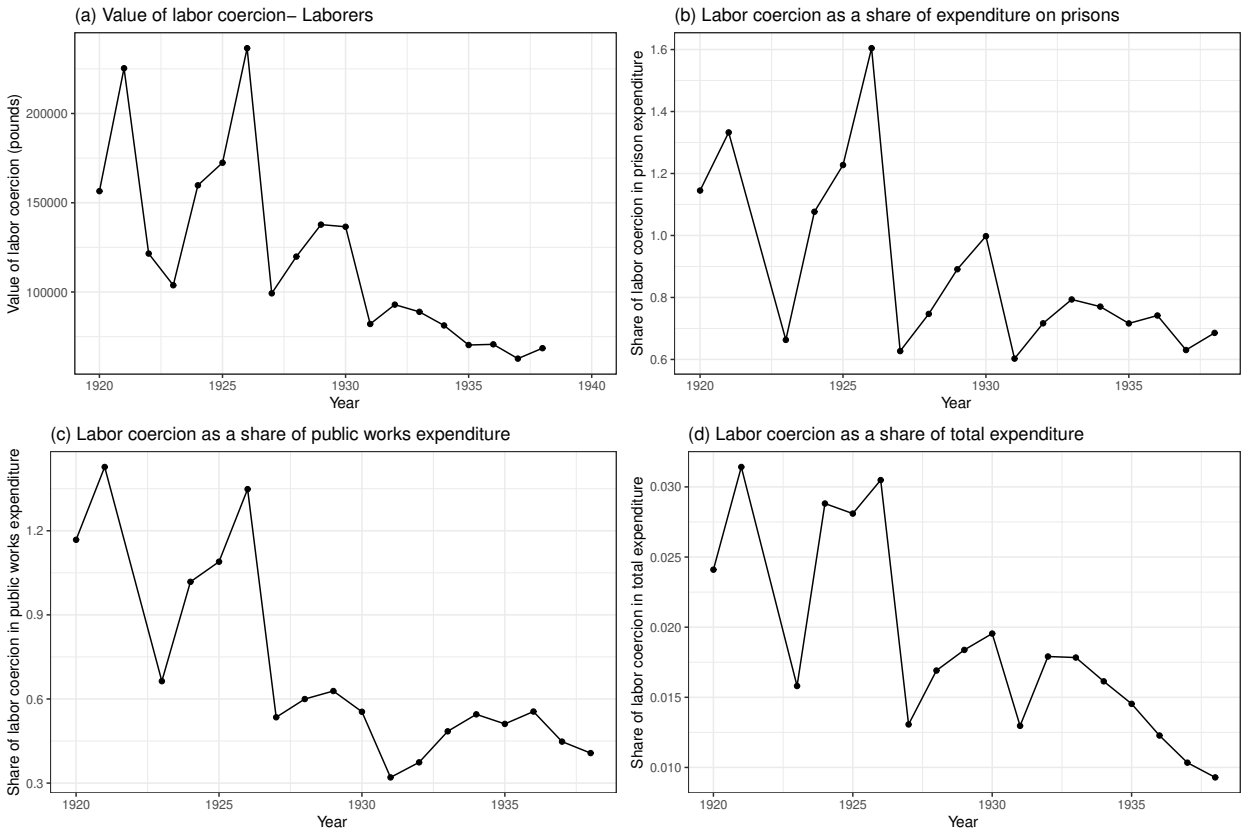


Figure 9: Relative value of labor coercion



Figure 10: Value of wages for different skill categories in prison and market sectors, 1919-1925

Table 2: Value of labor coercion, 1920-1938

Year	Value of labor coercion (LC)	Share of LC in prison exp.	Share of LC in public works exp.	Share of LC in total exp.	Reported value of prison labor
1920	156491.50	1.14	1.17	0.02	
1921	225355.90	1.33	1.43	0.03	53661
1922	121529.00				57312
1923	103771.30	0.66	0.66	0.02	64244
1924	159770.80	1.08	1.02	0.03	62222
1925	172424.60	1.23	1.09	0.03	60492
1926	236593.00	1.60	1.35	0.03	66052
1927	99243.36	0.63	0.53	0.01	67859
1928	119827.50	0.75	0.60	0.02	62358
1929	137753.80	0.89	0.63	0.02	60851
1930	136548.90	1.00	0.55	0.02	62408
1931	82064.73	0.60	0.32	0.01	59090
1932	92915.97	0.72	0.37	0.02	54415
1933	88880.18	0.79	0.48	0.02	52434
1934	81265.03	0.77	0.55	0.02	53956
1935	70301.54	0.72	0.51	0.01	50216
1936	70672.40	0.74	0.56	0.01	48670
1937	62673.50	0.63	0.45	0.01	48766
1938	68514.10	0.69	0.41	0.01	

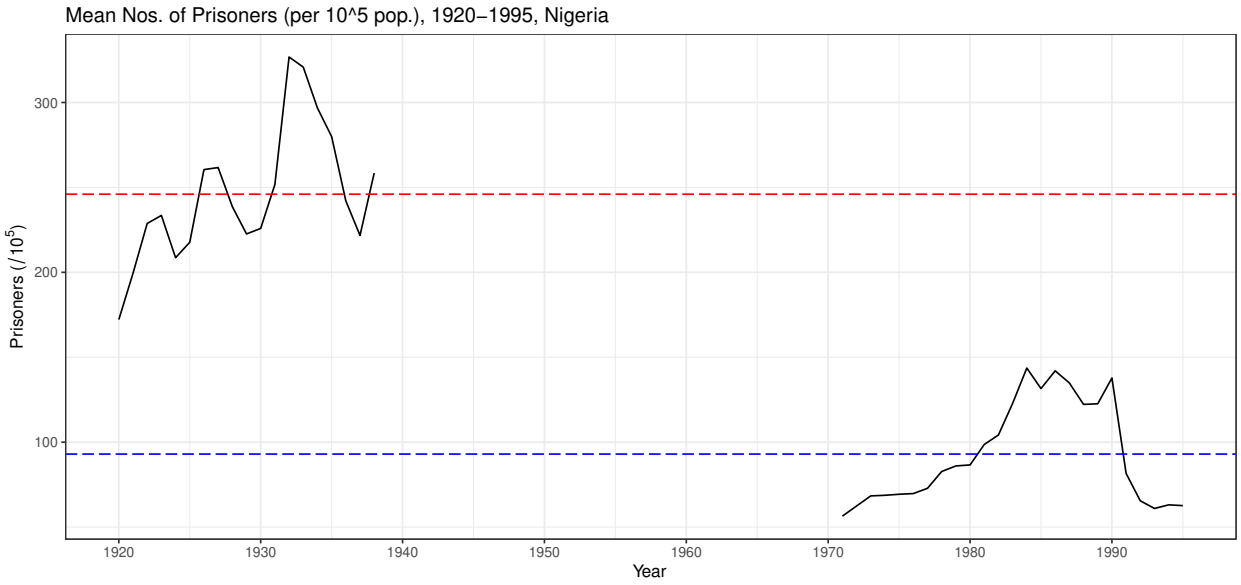


Figure 11: Mean number of prisoners per 100,000 population, 1920-1995

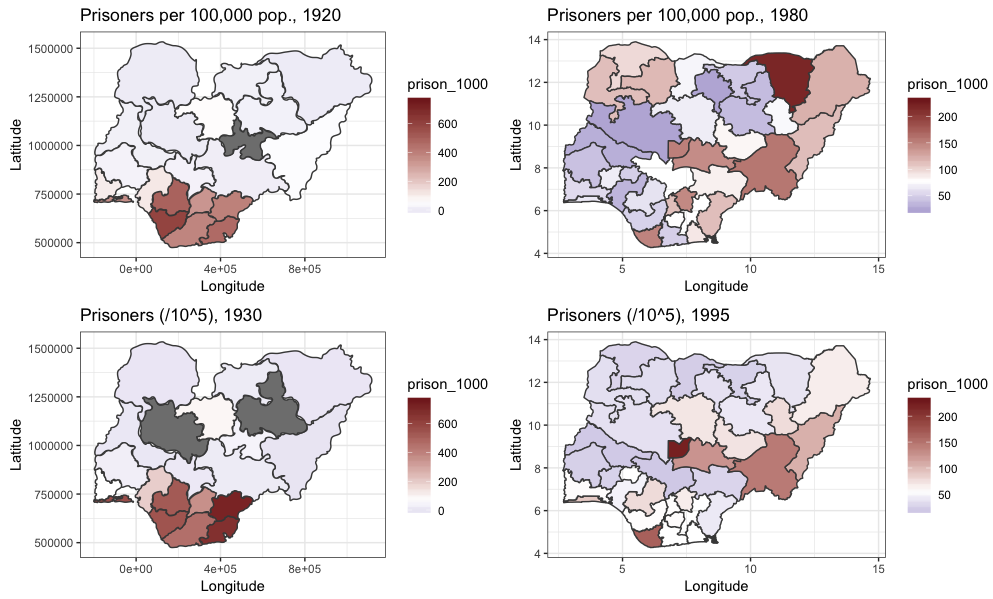


Figure 12: Prison populations in colonial and postcolonial Nigeria

Table 3: Summary Statistics: Economic Shocks and Incarceration Rates

Statistic	N	Mean	St. Dev.	Min	Max
			Prisoners, 1920-1938		
All Prisoners Total	324	1,811.76	2,286.76	3.00	10,231.00
Penal Imprisonment Total	324	1,251.83	1,626.78	2.00	7,010.00
Custody Total	324	509.59	635.57	0.00	3,039.00
<= 6 Months Total	324	1,051.05	1,409.20	2.00	6,377.00
6Mo-2Y Total	324	127.15	171.34	0.00	882.00
>=2yr Total	324	68.93	84.10	0.00	417.00
1 Previous Total	324	285.26	503.19	0.00	2,967.00
2 Previous Total	324	49.51	73.51	0.00	503.00
3 Previous Total	324	31.80	48.07	0.00	321.00
All Prisoners /100,000	324	240.73	254.56	0.26	1,123.30
Penal Imprisonment /100,000	324	162.03	169.55	0.26	759.99
Custody /100,000	324	71.73	83.47	0.00	333.66
<= 6 Months /100,000	324	134.66	144.95	0.16	649.43
6Mo-2Y /100,000	324	16.56	18.26	0.00	80.45
>=2yr /100,000	324	10.18	12.88	0.00	83.45
Share w/ 1 Previous	324	0.11	0.15	0.00	0.90
Share w/ 2 Previous	324	0.02	0.03	0.00	0.32
Share w/ 3 Previous	324	0.02	0.03	0.00	0.18
			Agricultural Commodities and Rainfall Deviation, 1920-1938		
Cocoa Producing	393	0.15	0.35	0	1
Groundnut Producing	393	0.18	0.39	0	1
Palm Oil Producing	393	0.19	0.39	0	1
Log Cocoa Price	393	1.04	0.40	0.47	1.96
Log Groundnut Price	393	0.35	0.36	−0.36	0.88
Log Palm Oil Price	393	0.72	0.53	−0.22	1.69
Rainfall Dev.	393	−0.00	0.97	−2.21	4.08
Rainfall Dev. Sq.	393	0.95	1.83	0.0000	16.67
Positive Rainfall Shock (M)	393	0.17	0.38	0	1
Negative Rainfall Shock (E)	393	0.30	0.46	0	1
Positive Rainfall Shock (E)	393	0.21	0.41	0	1
			Prisoners and Rainfall Deviation, 1971-1995		
All Prisoners Total	871	2,005.81	1,210.56	104.00	7,092.00
All Prisoners /100,000	871	92.48	60.43	9.91	361.99
Rainfall Dev.	560	0.01	0.30	−0.62	1.06
Rainfall Dev. Sq.	560	0.09	0.12	0.0000	1.11
Positive Rainfall Shock (M)	560	0.49	0.50	0.00	1.00
Negative Rainfall Shock (E)	560	0.04	0.19	0.00	1.00
Positive Rainfall Shock (E)	560	0.01	0.11	0.00	1.00

Notes: See text and online appendix for details.

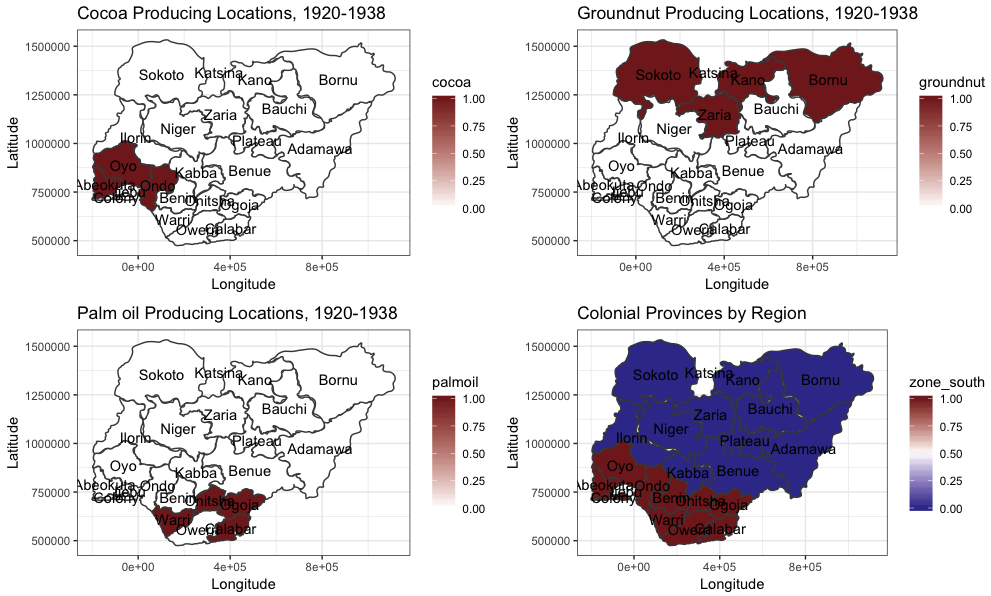


Figure 13: Agricultural commodity production in colonial Nigeria

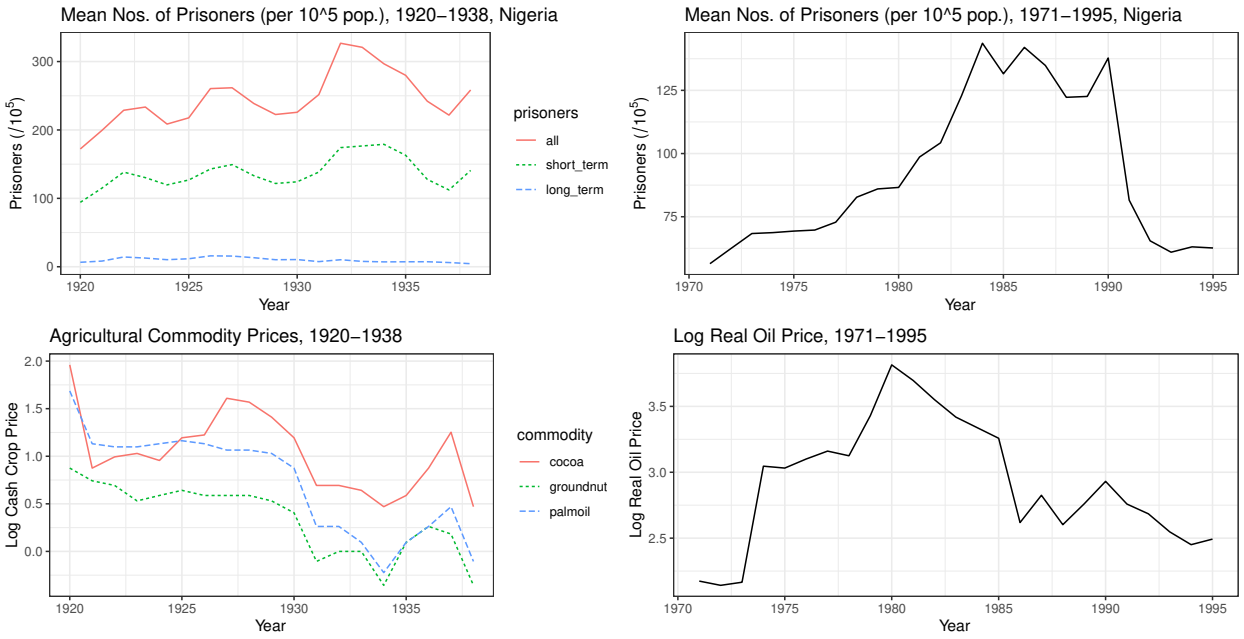


Figure 14: Prisoners, agricultural commodity and oil prices, 1920-1995, Nigeria

Table 4: Rainfall shocks and colonial (1920-1938) and postcolonial (1971-1995) prison populations breakdown

	All Penal	<= 6 Months	6mo-2y	>=2yr	All 1971-95
	(1)	(2)	(3)	(4)	(5)
Rainfall Dev	14.147**	11.995*	1.796	0.759	−6.237
	(6.041)	(6.433)	(1.276)	(1.227)	(8.570)
	[0.038]	[0.065]	[0.212]	[0.655]	[0.454]
Rainfall Dev Sq	−3.569	−4.884*	0.205	0.752	34.275***
	(2.479)	(2.816)	(0.387)	(0.739)	(9.692)
	[0.246]	[0.068]	[0.629]	[0.494]	[<.001]
Constant	36.199***	23.646*	8.720***	7.265***	113.629***
	(12.474)	(11.604)	(2.045)	(1.453)	(4.108)
District FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	324	324	324	324	556
Clusters	21	21	21	21	36
R^2	0.910	0.901	0.794	0.621	0.725

Notes: Regressions estimated by OLS. Robust standard errors in parentheses clustered by district, where district is colonial province for colonial data, and postcolonial state for postcolonial data. Wild cluster bootstrap (by district) p-values are in brackets. Observations are provinces. Dependent variables in (1)-(5) are prisoners per 100,000 population (1939 pop.) by province in Nigeria broken down by all prisoners, penal imprisonment, custody/awaiting trial, less than 6 months sentence and between 6 months to 2 years sentence and greater than 2 years sentence over 1920-1938. Dependent variable in (6) is prisoners per 100,000 population (1990 pop.) by state in Nigeria. Rainfall deviation as defined in text. District FE are colonial province fixed effects in (1)-(5), and postcolonial state fixed effects in (6). ***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level based on clustered standard errors in parentheses.

Table 5: Rainfall shocks and colonial (1920-1938) and postcolonial (1971-1995) prison populations breakdown by region

	<= 6 Months			>=2yr			All 1971-95
	All	South	North	All	South	North	All
Rainfall Dev	11.995*	18.884*	1.978	0.759	−0.071	0.236	−6.237
	(6.433)	(11.046)	(1.234)	(1.227)	(2.201)	(0.338)	(8.570)
	[0.065]	[0.142]	[0.205]	[0.655]	[0.989]	[0.544]	[0.454]
Rainfall Dev Sq	−4.884*	−8.686**	0.860***	0.752	1.381	0.062	34.275***
	(2.816)	(4.235)	(0.309)	(0.739)	(1.346)	(0.098)	(9.692)
	[0.068]	[0.046]	[<.001]	[0.494]	[0.541]	[0.675]	[<.001]
Constant	23.646*	−2.152	4.895	7.265***	4.409**	1.588	113.629***
	(11.604)	(17.529)	(3.564)	(1.453)	(1.963)	(1.338)	(4.108)
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	324	189	135	324	189	135	556
Clusters	21	10	11	21	10	11	36
R^2	0.901	0.844	0.899	0.621	0.567	0.790	0.725

Notes: Regressions estimated by OLS. Robust standard errors in parentheses clustered by district, where district is colonial province for colonial data, and postcolonial state for postcolonial data. Wild cluster bootstrap (by district) p-values are in brackets. Dependent variables are prisoners per 100,000 population (1939 pop.) by province in Nigeria broken down by less than 6 months sentence and greater than 2 years sentence over 1920-1938, for all provinces and Southern and Northern Provinces separately; and prisoners per 100,000 population (1990 pop.) in the postcolonial era from 1971-1995 by state in Nigeria in the last column. District FE are colonial province fixed effects for colonial data, and and postcolonial state fixed effects for postcolonial data. ***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level based on clustered standard errors in parentheses.

Table 6: Rainfall shocks (by type) and colonial (1920-1938) and postcolonial (1971-1995) prison populations breakdown

	<= 6 Months			>=2yr			All 1971-95		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Positive rainfall shock (M)	16.727***		12.142*	−1.638		−0.695	−4.387		−2.320
	(5.456)		(6.964)	(1.319)		(1.437)	(4.132)		(4.564)
	[0.016]		[0.093]	[0.336]		[0.683]	[0.320]		[0.620]
Negative rainfall shock (E)		−20.290**	−17.225*		−1.060	−0.429		22.722***	22.545***
		(9.484)	(10.259)		(2.894)	(3.530)		(7.814)	(7.807)
		[0.057]	[0.139]		[0.762]	[0.886]		[0.016]	[0.012]
Positive rainfall shock (E)			−0.404			3.358			20.423**
			(13.973)			(2.654)			(8.268)
			[0.977]			[0.293]			[0.046]
Constant	22.552**	26.352**	23.473**	8.638***	8.191***	7.004***	116.518***	116.484***	115.218***
	(10.677)	(10.288)	(10.544)	(1.361)	(1.490)	(2.164)	(3.637)	(3.741)	(3.590)
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	324	324	324	324	324	324	556	556	556
Clusters	21	21	21	21	21	21	36	36	36
R^2	0.900	0.901	0.902	0.613	0.612	0.620	0.723	0.726	0.727

Notes: Regressions estimated by OLS. Robust standard errors in parentheses clustered by district, where district is colonial province for colonial data, and postcolonial state for postcolonial data. Wild cluster bootstrap (by district) p-values are in brackets. Observations are provinces. Dependent variables in (1)-(6) are prisoners per 100,000 population (1939 pop.) by province in Nigeria broken down by less than 6 months sentence((1)-(3))and greater than 2 years sentence((4)-(6)) over 1920-1938. Dependent variable in (7)-(9) is prisoners per 100,000 population (1990 pop.) by state in Nigeria. Positive rainfall shock (M) where (M) is moderate, and (E) is extreme as defined in text. District FE are colonial province fixed effects in (1)-(6), and postcolonial state fixed effects in (7)-(9). ***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level based on clustered standard errors in parentheses.

Table 7: Rainfall shocks and colonial (1920-1938) and postcolonial (1971-1995) prison populations breakdown by region

	<= 6 Months			>=2yr			All 1971-95
	All	South	North	All	South	North	All
Positive rainfall shock (M)	16.727***	24.826***	0.392	−1.638	−2.609	−0.573	−4.387
	(5.456)	(7.795)	(1.086)	(1.319)	(2.127)	(0.446)	(4.132)
	[0.016]	[0.009]	[0.729]	[0.336]	[0.408]	[0.174]	[0.320]
Constant	22.552**	−3.062	5.128	8.638***	6.355***	1.781	116.518***
	(10.677)	(15.177)	(3.660)	(1.361)	(2.134)	(1.231)	(3.637)
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	324	189	135	324	189	135	556
Clusters	21	21	21	21	21	21	36
R^2	0.900	0.843	0.895	0.613	0.558	0.790	0.723

Notes: Regressions estimated by OLS. Robust standard errors in parentheses clustered by district, where district is colonial province for colonial data, and postcolonial state for postcolonial data. Wild cluster bootstrap (by district) p-values are in brackets. Observations are provinces. Dependent variables in (1)-(6) are prisoners per 100,000 population (1939 pop.) by province in Nigeria broken down by less than 6 months sentence((1)-(3))and greater than 2 years sentence((4)-(6)) over 1920-1938. Dependent variable in (7) is prisoners per 100,000 population (1990 pop.) by state in Nigeria. Positive rainfall shock (M) where (M) is moderate as defined in text. District FE are colonial province fixed effects in (1)-(6), and postcolonial state fixed effects in (7). ***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level based on clustered standard errors in parentheses.

Table 8: Agricultural commodity prices and colonial (1920-1938) prison populations breakdown

	<= 6 Months				>=2yr			
	All	Palm Oil	Cocoa	Groundnut	All	Palm oil	Cocoa	Groundnut
Palm Oil	213.481***	193.727***			12.583***	6.707**		
	(19.240)	(18.204)			(2.468)	(2.444)		
	[0.016]	[0.012]			[0.052])	[0.083]		
Palm Oil Price	76.228	−14.926			2.874	2.562		
	(45.982)	(10.848)			(5.314)	(1.753)		
	[0.112]	[0.167]			[0.554]	[0.1271]		
Palm Oil x Palm Oil Price	72.530**	68.649**			1.588	4.151		
	(29.037)	(25.441)			(4.355)	(3.416)		
	[0.065]	[0.049]			[0.724]	[0.271]		
Cocoa	−8.002		−38.358*		11.415***		0.347	
	(19.462)		(18.619)		(3.973)		(2.822)	
	[0.718]		[0.190]		[0.061]		[0.929]	
Cocoa Price	−103.894*		3.114		−2.300		5.608***	
	(51.324)		(11.865)		(5.266)		(1.839)	
	[0.055]		[0.781]		[0.664]		[0.010]	
Cocoa x Cocoa Price	29.450		4.146		−7.111		−6.535**	
	(21.660)		(17.959)		(4.520)		(2.722)	
	[0.219]		[0.824]		[0.166]		[0.086]	
Groundnut	60.686***			50.839***	13.839***			9.547***
	(6.220)			(9.245)	(1.127)			(1.198)
	[0.233]			[0.238]	[0.146]			[0.098]
Groundnut Price	−13.026			12.731	6.516			6.816***
	(12.409)			(14.857)	(4.263)			(2.204)
	[0.269]			[0.407]	[0.075]			[<.001]
Groundnut x Groundnut Price	−11.989			−49.111*	−9.858*			−9.130**
	(27.752)			(27.060)	(5.419)			(3.505)
	[0.694]			[0.245]	[0.145]			[0.119]
Constant	70.271**	35.851***	54.162***	20.287**	−0.218	2.919	4.668	3.102*
	(30.156)	(9.602)	(17.542)	(9.397)	(4.319)	(2.417)	(3.004)	(1.688)
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	324	324	324	324	324	324	324	324
Clusters	21	21	21	21	21	21	21	21
R^2	0.910	0.909	0.899	0.900	0.627	0.616	0.617	0.618

Notes: Regressions estimated by OLS. Robust standard errors in parentheses clustered by district, where district is colonial province for colonial data, and postcolonial state for postcolonial data. Wild cluster bootstrap (by district) p-values are in brackets. Observations are provinces. Dependent variables are prisoners per 100,000 population (1939 pop.) by province in Nigeria broken down by less than 6 months sentence and greater than 2 years sentence over 1920-1938. Prices are in logs. District FE are colonial province fixed effects. ***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level.

Table 9: Summary Statistics: Afrobarometer Results

Statistic	N	Mean	St. Dev.	Min	Max
		Trust and Crime Outcomes			
Trust in Courts	11,354	1.21	0.92	0.00	3.00
Trust in Police	11,486	0.69	0.87	0.00	3.00
Trust in Tax Admin.	4,480	1.01	0.85	0.00	3.00
Trust in President	11,450	1.07	0.95	0.00	3.00
Trust Relatives	4,596	1.97	1.03	0.00	3.00
Trust Neighbors	4,682	1.37	1.00	0.00	3.00
Trust Local Gov.	8,961	0.93	0.87	0.00	3.00
Fear Crime	11,584	0.59	1.00	0.00	4.00
Bribery (HHS)	8,082	0.27	0.68	0.00	3.00
Bribery (Doc)	7,987	0.29	0.66	0.00	3.00
		Individual Controls and Fixed Effects			
Age	11,603	31.94	12.05	18.00	95.00
Age Squared	11,603	1,165.29	987.34	324.00	9,025.00
Female	11,654	0.50	0.50	0	1
Education	11,629	3.27	1.92	0.00	7.00
		Geographic and Disease Controls			
Population Density 2006	11,526	450.97	693.01	41.04	2,694.63
Agricultural Land Suitability	8,453	4.71	0.76	1.80	6.00
Malaria	9,095	1.00	0.02	0.79	1.00
Ruggedness	9,095	0.26	0.22	0.03	2.28
Mean Elevation	8,332	248.09	234.70	−0.25	1,284.11
Sea Coast	9,095	0.29	0.45	0.00	1.00
Petrol	9,095	0.34	0.47	0.00	1.00
Tsetse Suitability	7,147	0.91	0.46	−0.78	1.45
		Precolonial and Colonial Controls			
Precolonial Centralization	9,095	1.66	0.78	0.00	3.00
Slave Exports	9,095	150,841.30	206,271.70	0.00	665,966.00

Notes: See text and online appendix for details.

Table 10: OLS Estimates: Relationship between colonial imprisonment and present-day trust in historical legal Institutions versus interpersonal trust

	Trust in Historical Legal Institutions			Interpersonal Trust			
	Courts	Tax	Police	Local Gov	President	Neighbor	Relative
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Prisoners per 100,000 pop.	−0.009**	−0.013**	−0.011**	−0.002	−0.002	−0.012	0.004
	(0.004)	(0.006)	(0.005)	(0.004)	(0.006)	(0.009)	(0.008)
	[0.036]	[0.091]	[0.025]	[0.770]	[0.767]	[0.233]	[0.748]
Constant	1.752	1.309**	1.408*	0.516	0.703	1.319	1.470
	(1.117)	(0.602)	(0.765)	(0.877)	(0.500)	(1.052)	(0.909)
Population Density	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Disease Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Precolonial and Colonial Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,626	2,885	7,718	6,063	7,700	3,181	2,999
Clusters	21	21	21	21	21	21	21
R^2	0.086	0.096	0.100	0.122	0.151	0.173	0.157

Notes: Regressions estimated by OLS. Robust standard errors in parentheses clustered by colonial province. Wild cluster bootstrap (by district) p-values are in brackets. The unit of observation is an individual. Prisoners per 100,000 pop. are averages of long-term (>2 years sentence) prisoners per 100,000 population (1939 pop.) over 1920 to 1938. Trust variables are from the Afrobarometer samples over 2003 to 2016 and as defined in the main text. All regressions use district fixed effects at the state level in Nigeria, year fixed effects, educational attainment fixed effects and controls for sub-district or local government area population density in 2006. Individual controls include age, age squared and gender. Geographic controls at the sub-district level include mean land suitability for agriculture, ruggedness, indicators for petroleum, seacoast and mean elevation in alternate specifications. Disease controls at the sub-district level include malaria suitability and tse tse fly suitability in alternate specifications with results unchanged. Precolonial and colonial controls at the ethnicity-level include the level of precolonial centralization and total exports of slaves from the region during the Atlantic slave trade.

***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level.

Table 11: Falsification Test: OLS Estimates of relationship between postcolonial imprisonment and present-day trust in historical legal Institutions versus interpersonal trust

	Trust in Historical Legal Institutions				Interpersonal Trust		
	Courts	Tax	Police	Local Gov	President	Neighbor	Relative
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Prisoners per 100,000 pop.	0.001	0.0004	0.001	−0.001	0.0005	0.002	−0.0001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	[0.298]	[0.789]	[0.422]	[0.411]	[0.765]	[0.262]	[0.943]
Constant	2.525**	1.381*	1.633***	1.689*	2.017***	2.189***	3.839***
	(1.040)	(0.718)	(0.622)	(0.922)	(0.562)	(0.709)	(0.764)
Population Density	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Disease Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Precolonial and Colonial Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,061	3,065	8,161	6,418	8,143	3,367	3,176
Clusters	36	36	36	36	36	36	36
R^2	0.065	0.041	0.084	0.103	0.099	0.149	0.095

Notes: Regressions estimated by OLS. Robust standard errors in parentheses clustered by colonial province. Wild cluster bootstrap (by district) p-values are in brackets. The unit of observation is an individual. Prisoners per 100,000 pop. are current state level averages of prisoners per 100,000 population (1990 pop.) over 1971 to 1995. Trust variables are from the Afrobarometer samples over 2003 to 2016 and as defined in the main text. All regressions use district fixed effects at the geopolitical zone level in Nigeria, year fixed effects, educational attainment fixed effects and controls for sub-district or local government area population density in 2006. Individual controls include age, age squared and gender. Geographic controls at the sub-district level include mean land suitability for agriculture, ruggedness, indicators for petroleum, seacoast and mean elevation in alternate specifications. Disease controls at the sub-district level include malaria suitability and tse tse fly suitability in alternate specifications with results unchanged. Precolonial and colonial controls at the ethnicity-level include the level of precolonial centralization and total exports of slaves from the region during the Atlantic slave trade.
***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level.

Table 12: OLS Estimates: Relationship between colonial and postcolonial imprisonment and present-day crime outcomes

	Colonial Imprisonment			Postcolonial Imprisonment		
	Bribery Doc	Bribery HHS	Fear Crime	Bribery Doc	Bribery HHS	Fear Crime
	(1)	(2)	(3)	(4)	(5)	(6)
Prisoners per 100,000 pop.	0.0004	−0.003	−0.0003	0.001**	0.001	0.001
	(0.003)	(0.003)	(0.005)	(0.0005)	(0.001)	(0.001)
	[0.907]	[0.502]	[0.971]	[0.102]	[0.398]	[0.249]
Constant	0.278	0.707	0.486	−0.151	0.084	0.923**
	(0.202)	(0.577)	(0.852)	(0.302)	(0.389)	(0.445)
Population Density	Yes	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Disease Controls	Yes	Yes	Yes	Yes	Yes	Yes
Precolonial and Colonial Controls	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,390	5,421	7,784	5,718	5,766	8,239
Clusters	21	21	21	36	36	36
R^2	0.064	0.066	0.070	0.043	0.043	0.040

Notes: Regressions estimated by OLS. Robust standard errors in parentheses clustered by colonial province. Wild cluster bootstrap (by district) p-values are in brackets. The unit of observation is an individual. Prisoners per 100,000 pop. are colonial province level averages of long-term (>2 years sentence) prisoners per 100,000 population (1939 pop.) over 1920 to 1938 in columns (1) to (3), and current state level averages of prisoners per 100,000 population (1990 pop.) over 1971 to 1995 in (4) to (6). Trust variables are from the Afrobarometer samples over 2003 to 2016 and as defined in the main text. Regressions in columns (1) to (3) use district fixed effects at the state level in Nigeria, and in columns (4) to (6) use geopolitical zone fixed effects. All regressions include year fixed effects, educational attainment fixed effects and controls for sub-district or local government area population density in 2006. Individual controls include age, age squared and gender. Geographic controls at the sub-district level include mean land suitability for agriculture, ruggedness, indicators for petroleum, seacoast and mean elevation in alternate specifications. Disease controls at the sub-district level include malaria suitability and tse tse fly suitability in alternate specifications with results unchanged. Precolonial and colonial controls at the ethnicity-level include the level of precolonial centralization and total exports of slaves from the region during the Atlantic slave trade.
***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level.

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A.1 Data and Archival Materials

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- Nigeria, Annual Report on the Prisons Department, Northern and Southern Provinces, 1914-1937
- NAI, CSO 26/2 09591 Vol.1 'Lieutenant Governor Southern Province to Resident Calabar Province: Memorandum on Prison labor' 23rd April 1923

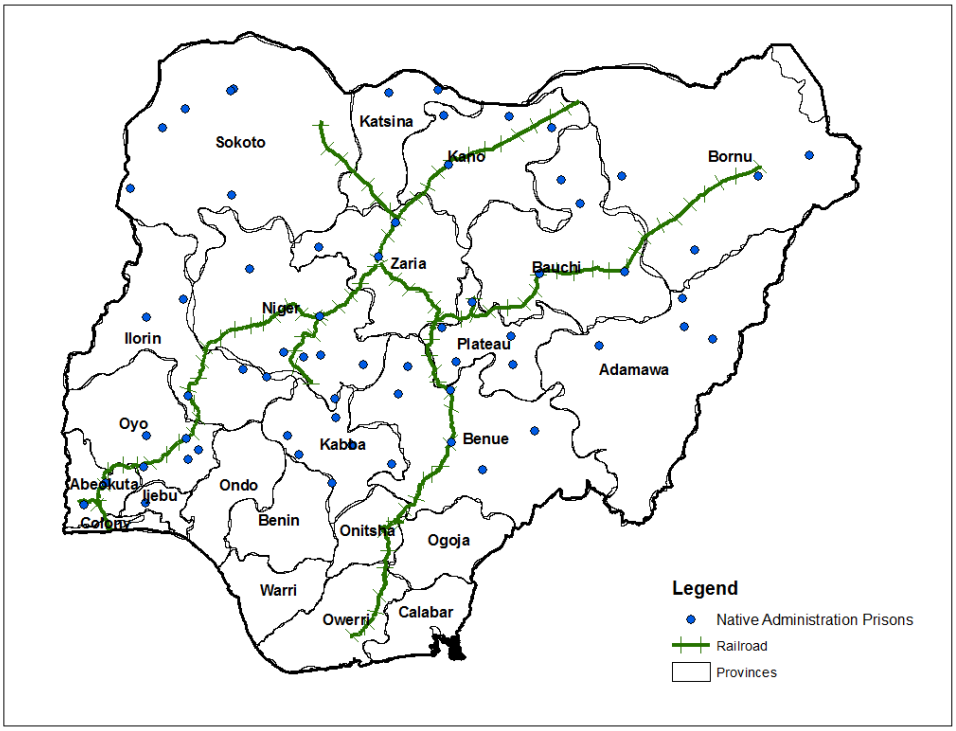
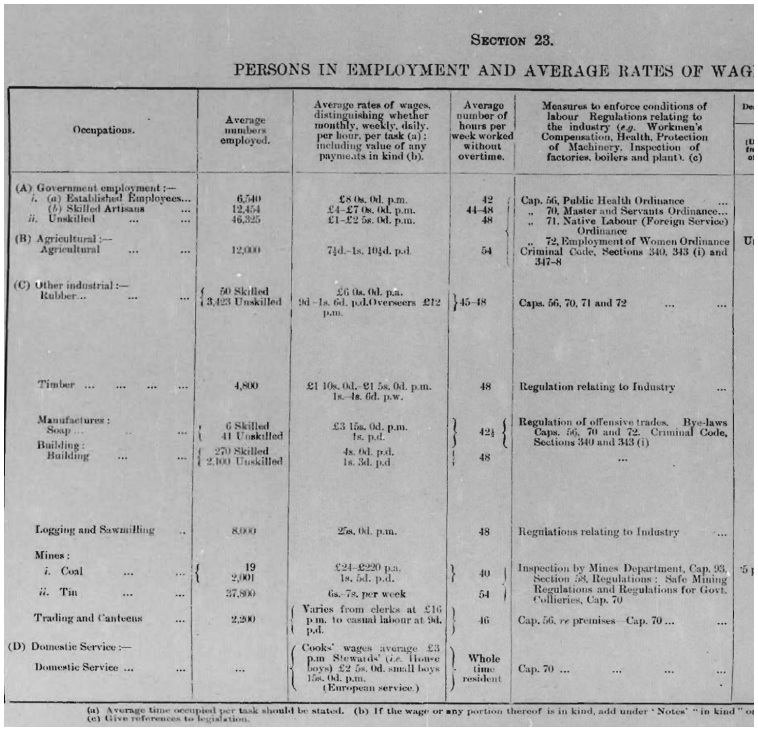


Figure A1: Native administration prisons, 1940



SECTION 23.

PERSONS IN EMPLOYMENT AND AVERAGE RATES OF WAG

Occupations.	Average numbers employed.	Average rates of wages, distinguishing whether monthly, weekly, daily, per hour, per task (a); including value of any payments in kind (b).	Average number of hours per week worked without overtime.	Measures to enforce conditions of labour Regulations relating to the industry (*e.g.* Workmen's Compensation, Health, Protection of Machinery, Inspection of factories, boilers and plant). (c)	De
(A) Government employment:—					
i. (*a*) Established Employees...	6,540	£8 0s. 0d. p.m.	42	Cap. 56, Public Health Ordinance ...	
(*b*) Skilled Artisans ...	12,454	£4–£7 0s. 0d. p.m.	44–48	,, 70, Master and Servants Ordinance...	
ii. Unskilled	46,325	£1–£2 5s. 0d. p.m.	48	,, 71, Native Labour (Foreign Service) Ordinance	
(B) Agricultural:—				,, 72, Employment of Women Ordinance	U
Agricultural	12,000	7½d.–1s. 10½d. p.d.	54	Criminal Code, Sections 340, 343 (i) and 347–8	
(C) Other industrial:—					
Rubber...	50 Skilled 3,423 Unskilled	£6 0s. 0d. p.a. 9d.–1s. 6d. p.d. Overseers £12 p.m.	45–48	Caps. 56, 70, 71 and 72	
Timber	4,800	£1 10s. 0d.–£1 5s. 0d. p.m. 1s.–4s. 6d. p.w.	48	Regulation relating to Industry ...	
Manufactures:					
Soap	6 Skilled 41 Unskilled	£3 15s. 0d. p.m. 1s. p.d.	42½	Regulation of offensive trades. Bye-laws Caps. 56, 70 and 72. Criminal Code, Sections 340 and 343 (i)	
Building:					
Building	270 Skilled 2,100 Unskilled	4s. 0d. p.d. 1s. 3d. p.d.	48	...	
Logging and Sawmilling ..	8,000	25s. 0d. p.m.	48	Regulations relating to Industry ...	
Mines:					
i. Coal	19 2,001	£24–£220 p.a. 1s. 5d. p.d.	40	Inspection by Mines Department, Cap. 23, Section 58, Regulations; Safe Mining Regulations and Regulations for Govt. Collieries, Cap. 70	5
ii. Tin	37,900	6s.–7s. per week	54		
Trading and Canteens ...	2,200	Varies from clerks at £16 p.m. to casual labour at 9d. p.d.	46	Cap. 56, *re* premises—Cap. 70	
(D) Domestic Service:—					
Domestic Service	...	Cooks' wages average £3 p.m. Stewards' (*i.e.* House boys) £2 5s. 0d. small boys 15s. 0d. p.m. (European service.)	Whole time resident	Cap. 70	

(a) Average time occupied per task should be stated. (b) If the wage or any portion thereof is in kind, add under 'Notes' "in kind" or
(c) Give references to legislation.

Figure A2: Wages from the British Blue Books, 1920-1938

"In addition to the bad ones [inmates]- and I call these bad- in addition to them, they're releasing some good ones that we use everyday to wash cars, to change oil in our cars, to cook in the kitchen, to do all that, where we save money. Well, they're gonna let them out. The ones that we use in the work release programs, they're gonna let them out..."

- Steve Prator, Sheriff, Caddo Parish, *Louisiana, USA, 5th October, 2017*

40

[40]Caddo Sheriff Steve Prator's remarks at a press conference to discuss the impact of the Justice Reinvestment Act, a new law allowing for the release of thousands of inmates around the state of Louisiana, on Caddo. As of 2014, Louisiana had the highest incarceration rate of any of the 50 states in the USA, with a rate of 816 per 100,000 population. It is the region with the highest incarceration rate in the world.



Figure A3: African laborers on a railroad c. 1930, Source: Alexander Keese, CEAUP, Porto

A.2 Value of Convict Labor: Estimates of Costs of Prisoner Upkeep

A.2.1 Using Reported Food Costs

We calculate the value of labor coercion in prisons by assuming the authorities are appropriating value through wages that they would have had to pay if they simply hired that labor from the free labor market. However, one possible cost of using prison labor is that they would have incurred the costs of prisoner upkeep; that is for each prisoner they used as forced labor, they would have had to, at the very least, feed the prisoner which implies some costs.

One source to calculate the costs of prisoner upkeep is from the Annual Reports of Prisons. We examine annual prison reports from 1920 to 1937. These reports publish, among other things, the average costs of a prisoner per day as well as the average food costs per prisoner per day. Though detailed records of the average cost breakdown for each year are not available, the reports suggest that food costs alone made up a significant share of total prison expenditure. For example, in 1920, the largest expenditure category on prisoners was food or 'rations' (59%), followed by salaries of prison officials (19%)[41]. For all years where the breakdown of total prison expenditure is available, food and prison official salary expenditures are the top 2 spending categories on prisoners.

Given the significant share of food spending in total prisoner expenditure, we factor in the value of food as the major cost of prisoner upkeep, and estimate the reduction in the value of labor coercion from the inclusion of prisoner food costs. In order to account for the cost of prisoner upkeep we recalculate the value of labor coercion deducting the reported costs of feeding prisoners. We calculate the (net) value of labor coercion as;

[41]Source: Annual Report on the Prisons Department, Colony and Southern Provinces for the year 1920.

$$(net)Value\,of\,labor\,coercion_t = (Annual\,wages_t - Annual\,food\,costs_t) * Number\,of\,prisoners_t. \quad (6)$$

Given that costs per prisoner are reported separately for Northern and Southern provinces, we calculate labor coercion separately for each province and sum them up to get the total value for the country. As is shown in Figure A5(a), the wages are larger than food costs in all years of observation. This implies that the prison labor is not being coerced at a loss, at least as far as prisoner upkeep is concerned. The trends in the value of labor coercion and the shares of labor coercion to prison expenditure and public works expenditure also remain the same as shown in Figures A5(b), A5(c), and A5(d). In general, the value is significant but reduces over time, with detailed figures shown in Table A2.

A.2.2 Using Estimated Food Costs

The measure of food costs used in the previous subSection is the one published in the prison reports. It is uncertain how the numbers reported are calculated and there are differences between food costs for prisoners in the Northern and Southern provinces with costs in the Southern provinces, sometimes more than 4 times higher than costs in the Northern provinces as shown in Table A2 and Figure A5(a). An alternative way to measure food costs would be to use other available market prices for staple foods reported as composing prisoners' diets in the archival records.

For example, in 1925 the reports publish the average food cost of a prisoner a day in the Southern Province as 6.26 pence. Food prices in the same year were reported as 0.41 pence per pound for cassava and 1.63 pence per pound for maize. In Figure A4(a) we compare the annual cost of prisoners per year in the Northern and Southern provinces as reported

in the prison reports and compare it to the average price of a standard cassava and maize basket as in Frankema, Williamson, and Woltjer (2018). A food basket is described as the costs of sustaining an adult male in a year and includes costs for food, energy, and other standard items. As is apparent from Figure A4(a), the costs reported per prisoner in the annual prison reports are significantly higher than the costs of either the cassava or maize baskets, particularly in the Southern province where the majority of prisoners are.

To deal with the potential upward bias from using costs of food in the prison reports, we use the alternative food price cassava baskets to calculate the costs of prisoner upkeep[42].

Figure A6(a) compares wages for laborers with both the cost of cassava and maize baskets. As is apparent, wages for laborers is still significantly larger than the costs of prisoner upkeep. This implies that labor coercion was profitable per prisoner. We recalculate the value of labor coercion using both wages for laborers and deducting the costs of prisoner upkeep as calculated using the food baskets, as in the previous subSection. Figure A6(b) shows this measure of labor coercion over time. The broad trend of a decline in the value over time is still present. Using wages of laborers, the value of labor coercion peaks at 217,844 pounds in 1926 before dropping over time as shown in Table A3.

Figure A6(c) and Figure A6(d) show the evolution of labor coercion as a share of prison expenditure and as a share of public works expenditure. The evolution over time is very similar to those excluding costs of prisoner upkeep. In general, incorporating the cost of prisoner upkeep does not significantly change the patterns in terms of the trends in the value of labor coercion, with the share of prison labor in public works expenditure ranging between 35% and 129% between 1920 and 1938.

[42]Using the maize baskets does not significantly change the results. We use the cassava baskets because they should be closer to yam baskets which was the most common staple food at the time (Robins, 2010).

A.3 Value of Convict Labor: Alternative Wage Measures

The value of convict labor in Section 3.3 used the wages paid to laborers. Given the type of work that prisoners were typically expected to do as described in Section **??**, unskilled laborers are perhaps the best way to broadly categorize the value of prison labor. This measure is however likely to underestimate the true value of convict labor as some prisoners might have accumulated skills. As a robustness check, we use a different occupation to categorize prisoners. We use the average wages paid to bricklayers, a class of skilled labor, as an alternative measure of the value of a prisoner's labor. Using the same technique outlined in Section 3.3, we calculate the value of labor coercion assuming that prisoners would have been paid as bricklayers if they had to be paid by the colonial government.

Wages for bricklayers were significantly higher than wages for laborers as shown in Figure A7(a). Hence, the value of labor coercion is also significantly higher if prisoners are assumed to be used as bricklayers as opposed to just laborers. The declining trend is however apparent through most of the sample.

Another alternative would be to use wages for unskilled urban labor as depicted in Figure A7(a). Urban unskilled labor would theoretically be close to the minimum wage that could be paid for workers in urban areas. This would therefore capture the theoretical minimum value of what it would have cost colonial governments assuming that laborers had no skills, although in the later years the wages for laborers are, in some instances, lower.

The evolution of wages for urban unskilled workers appears to closely mimic the wages for laborers. Although laborers' wages are higher in some years, there is a convergence over time. The value of labor coercion using urban unskilled labor wages are lower on average compared to when laborers' wages are used, but the underlying implications are identical. The value of labor coercion is still significantly large but declining over time.

A.4 Value of Convict Labor: Adjusting for Real Values of Wages

The measures of values of convict labor used so far have been calculated using nominal values. One potential side effect of using nominal values when observing trends over time is that is it difficult disentangle the difference between changes in the observed variable and changes in the price level. To ensure that the trends in our measure of labor coercion are not driven by changes in the price level, we convert the values into real values using 1920 as the base year, following the technique outlined in Frankema (2011)[43].

Figure A7(b) shows the trends in labor coercion using real wages for laborers. As is clear, the trend is similar to that using nominal values. The value of labor coercion declines on average from the 1920s to the 19030s. Figure A7(b) shows that the trends in the value of labor coercion are not driven by changes in the price level.

A.5 Value of Convict Labor: Measuring Bias in Estimates

Using the daily average number of prisoners might not properly capture the entire sample of prisoners whose labor was appropriated by the colonial government. Those who were charged but sent out on bail for instance would still have to commit their labor but would not be counted as being in prison.

As an alternative measure to the daily average in prison, we use the number of people committed to penal imprisonment in each year, that is the number of people who were arrested and sent to jail for one reason or another and who were expected to serve penal labor. The number of people committed to prison however does not imply that they spend the entire year there. Since the Blue Books break down sentences into 3 categories: those committed for over 2 years, those committed for between 6 months and 2 years, and those committed for less than 6 months, we weight the number of people committed to prison by

[43]Using Feinstein (1972)'s British price index data.

the categories of their duration of stay. Specifically, we assume that those with more than two-year sentences spend 2 years in prison, those between six-month and two-year sentences spend 1 year and 3 months in prison, and those with less than six-month sentences spend 3 months in prison. Finally, we assume that imprisonment started at the beginning of the year hence 1 year in prison would run from January 1st until December 31st.

Figure A8(a) compares the daily average number in prison to our weighted average measure of people committed to prison for penal imprisonment in each year. The daily average as measured in the Blue Books tends to be much lower than our weighted average measure of those committed to prison. This is true especially in the earlier years of our sample. There however seems to be a convergence in both measures over time.

Recalculating the value of labor coercion using our weighted measure of people committed to prisons shows that using the average number in prison underestimates the value of labor coercion. At its peak the value of labor coercion is more than 60% larger when using the weighted average of people committed for penal imprisonment compared to using the average number in prison as shown in Figure A8(b). The trend however remains the same with the value declining over time.

Table A1: Wages (pounds) and numbers of prisoners in Northern (NP) and Southern (SP) Provinces, 1920-1940

Year	Daily avg. prisoners NP	Daily avg. prisoners SP	Average annual wages-Laborers	Average annual wages-Bricklayers
1920	956	5674.43	24	60
1921	838	5600.74	35	60.70
1922	782	6242.90	17.30	60.70
1923	666	7316.41	13	45
1924	604	6658.81	22	62
1925	549	6635.36	24	50
1926	775	7313.65	29.25	52
1927	758	7512.28	12	52
1928	728	7078.35	15.35	44.75
1929	601	6745.87	18.75	39.35
1930	563	7173.48	17.65	55.20
1931	481	6979.48	11	41
1932	449	7074.56	12.35	49.15
1933	452	6686.97	12.45	46.30
1934	493	7031.54	10.80	49.40
1935	560	6366.26	10.15	40.05
1936	687	6330.24	10	40.05
1937	698	5864.67	9.55	44.55
1938	682.03	6203.81	9.95	37.30
1939			10.15	39.90
1940			10.30	54.55

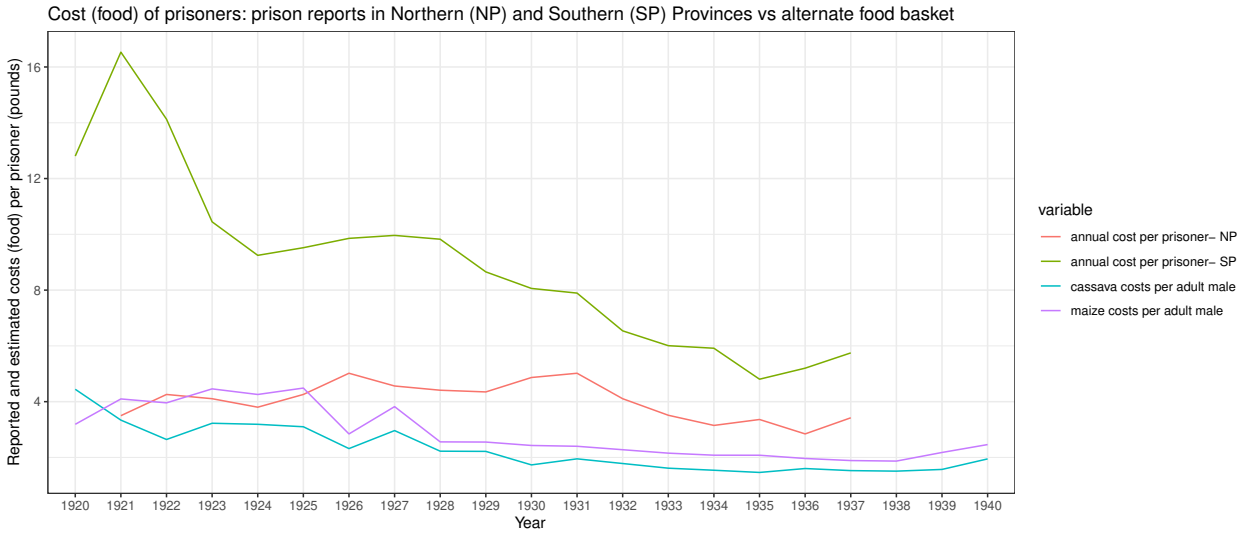


Figure A4: Comparing official prison food costs vs alternative food baskets

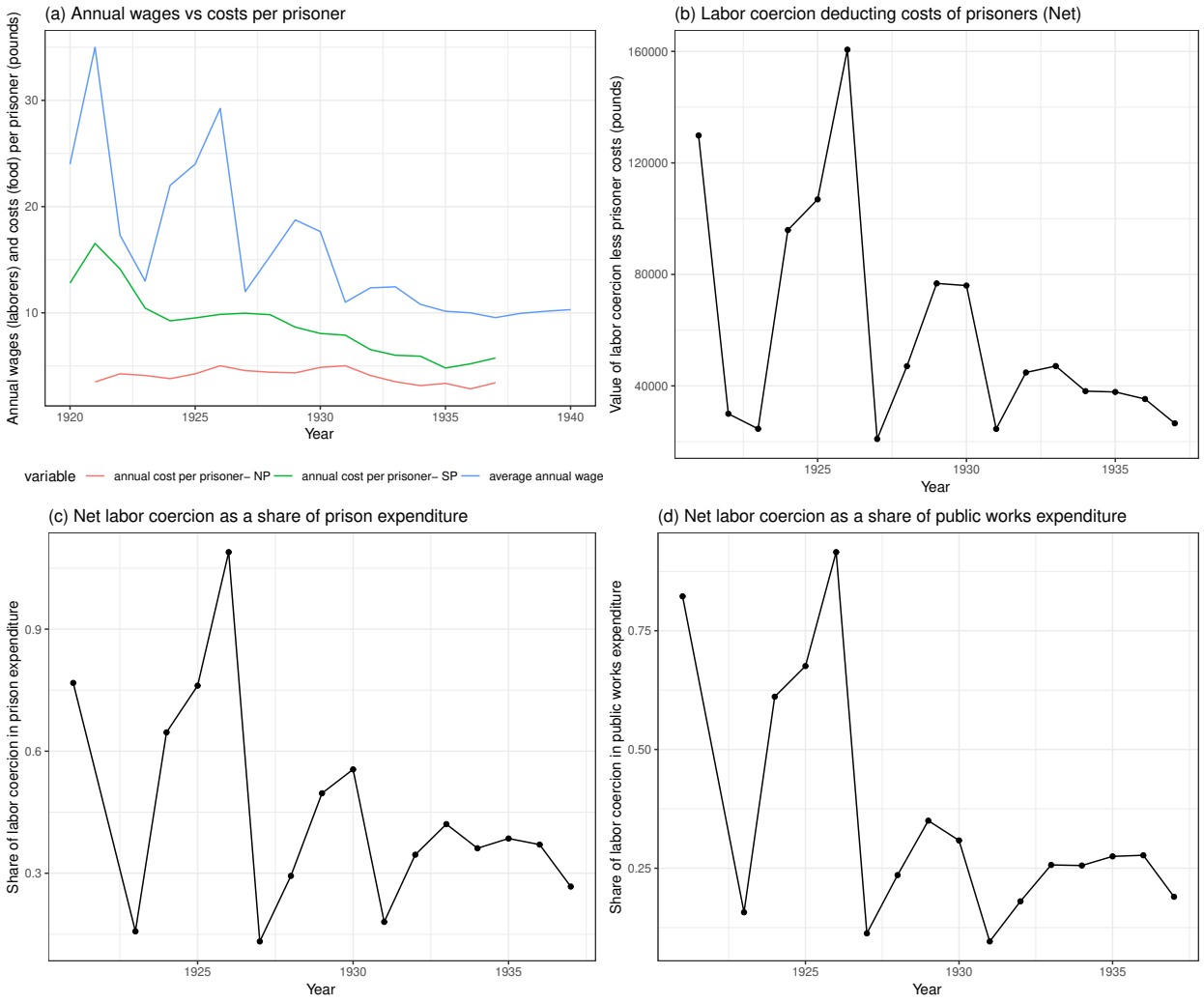


Figure A5: Value of labor coercion deducting colonial estimated costs (food) of prisoners

Table A2: Value of labor coercion, deducting colonial estimated costs (food) of prisoners, 1921-1937

Year	Share of LC (less reported prisoner costs-rpc)	Share of LC in prison exp. (less rpc)	Share of LC in public works exp. (less rpc)	Reported value of prison labor	Annual cost (food) per prisoner NP	Annual cost (food) per prisoner SP
1921	129836.20	0.77	0.82	53661	3.50	16.53
1922	29997.67			57312	4.26	14.13
1923	24593.80	0.16	0.16	64244	4.11	10.45
1924	95913.57	0.65	0.61	62222	3.80	9.25
1925	106915.40	0.76	0.68	60492	4.26	9.52
1926	160627.50	1.09	0.92	66052	5.02	9.86
1927	20951.72	0.13	0.11	67859	4.56	9.96
1928	47074.85	0.29	0.24	62358	4.41	9.82
1929	76764.05	0.50	0.35	60851	4.35	8.65
1930	75987.70	0.56	0.31	62408	4.87	8.06
1931	24561.35	0.18	0.10	59090	5.02	7.89
1932	44807.58	0.35	0.18	54415	4.11	6.54
1933	47121.67	0.42	0.26	52434	3.51	6.01
1934	38114.12	0.36	0.26	53956	3.15	5.92
1935	37824.17	0.39	0.27	50216	3.36	4.81
1936	35293.44	0.37	0.28	48670	2.84	5.20
1937	26570.51	0.27	0.19	48766	3.42	5.75

Table A3: Value of labor coercion, deducting costs of prisoners using alternate food basket measure, 1920-1938

Year	Value of LC (less estimated prisoner costs-epc)	Share of LC in prison exp. (less epc)	Share of LC in public works exp. (less epc)	Reported value of prison labor	Maize costs- epc	Cassava costs- epc
1920	127513.40	0.93	0.95		3.19	4.44
1921	203858.60	1.21	1.29	53661	4.10	3.34
1922	102954.30			57312	3.96	2.64
1923	78018.08	0.50	0.50	64244	3.96	2.64
1924	136613.10	0.92	0.87	62222	4.26	3.19
1925	150147.10	1.07	0.95	60492	4.49	3.10
1926	217844.20	1.48	1.24	66052	2.84	2.32
1927	74739.21	0.47	0.40	67859	3.82	2.96
1928	102461.60	0.64	0.51	62358	2.56	2.22
1929	121462.10	0.79	0.55	60851	2.55	2.22
1930	123139.00	0.90	0.50	62408	2.43	1.73
1931	67516.89	0.50	0.26	59090	2.40	1.95
1932				54415		
1933	77350.74	0.69	0.42	52434	2.15	1.62
1934	69664.70	0.66	0.47	53956	2.08	1.54
1935	60169.00	0.61	0.44	50216	2.08	1.46
1936	59344.20	0.62	0.47	48670	1.96	1.60
1937	52643.55	0.53	0.38	48766	1.89	1.53
1938	58122.22	0.58	0.35		1.87	1.51

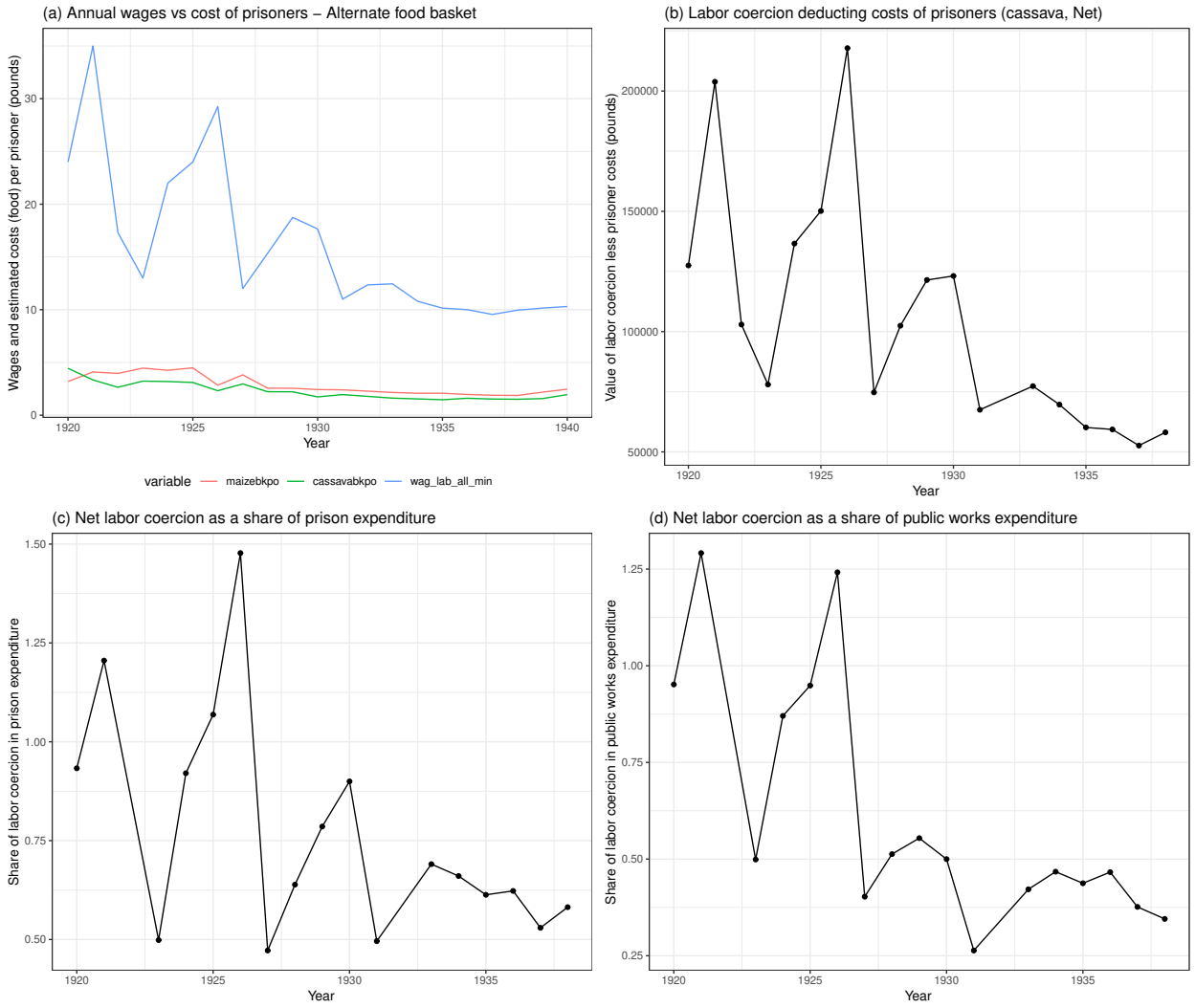


Figure A6: Value of labor coercion deducting cost of prisoners using alternative food basket measure



Figure A7: Wage alternatives and value of labor coercion, incl. real values



Figure A8: Alternate prison and value of labor coercion measures

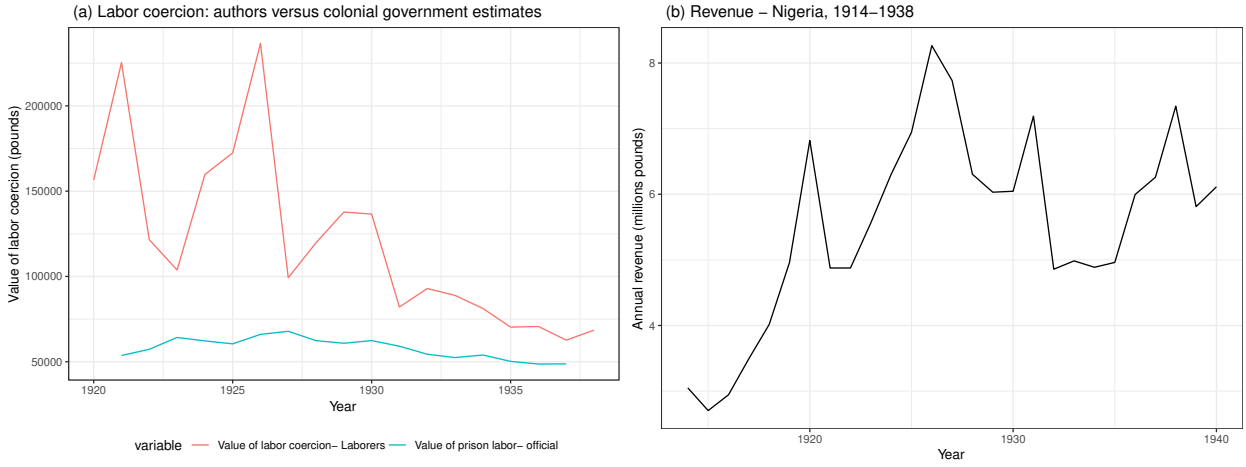


Figure A9: Labor coercion: authors versus colonial government estimates and colonial revenues

A.6 Regressions: Robustness Checks

Table A4: Relationship between precolonial centralization and number of colonial vs native prisons

	Native prisons	Colonial prisons
	(1)	(2)
Precolonial centralization	0.599*	0.515
	(0.316)	(0.339)
Constant	1.447***	2.112**
	(0.265)	(0.969)
Observations	22	19
R^2	0.124	0.026

Notes: Regressions estimated by OLS. Robust standard errors in parentheses. Unit of observation is Murdock ethnic region. Precolonial centralization is Murdock centralization index as defined in text.
***Significant at the 1 percent level, **Significant at the 5 percent level, *Significant at the 10 percent level.