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Colonial Persistence

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COLONIAL PERSISTENCE

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ABSTRACT. We review the present-day impacts of colonial rule on former colonies. Persistence exists because of multiple equilibria, path dependence, institutions, culture, knowledge, and technology. Empirical work in this literature primarily uses tools from applied econometrics, though best practices are needed to overcome the limitations of these tools. Colonial interventions relating to institutions, infrastructure, land, forced labour, the slave trade, and human capital all have measurable impacts in the present. And yet many colonial interventions have failed to persist or have led to reversals. These cases are informative about why colonial rule still matters, as are cases where precolonial influences have had persistent impacts despite, or even because of, colonial rule.

1. PERSISTENCE MATTERS

In their classic paper, Acemoglu, Johnson and Robinson (2001) made a case for the colonial origins of underdevelopment. They asked why some of the countries that were colonised by Europe were more developed than others. They traced the discrepancy to institutions, focusing on the protection of property rights. To separate the effect of institutions from other unobserved but confounding variables, they used mortality rates of early European settlers. The intuition for their approach is that places with lower rates of settler mortality were more conducive to sustained colonial settlement, leading to institutions that fostered economic development. In places with higher rates of mortality, which proved more difficult to settle, colonisers established institutions that were extractive and that led to underdevelopment over time.

The literature on colonial persistence initially aimed to understand whether history can explain cross-country differences in economic development in the present, particularly in contexts lacking the data needed to study shorter-term effects of colonial rule. The literature has since evolved, both in focus and in tools. The focus of

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the literature has expanded beyond property rights. Iyer (2010), for example, finds that the districts of India that were under indirect British rule, as Princely States, have had better access to schools, health facilities, and roads since independence. Nunn (2008) establishes a negative relationship between the number of slaves shipped from a country between 1400 and 1900 and modern economic development. He cites greater internal conflict, including raids and kidnapping to sustain the slave trade, as having caused long-term damage to state formation.

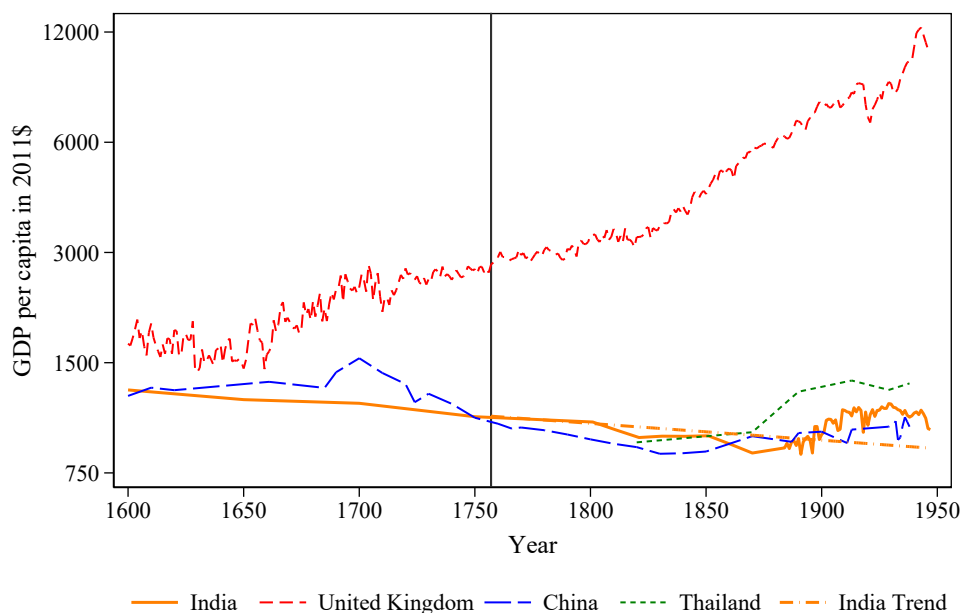
The methods used to study the lasting impacts of colonial rule have expanded to include more rigorous tools from applied econometrics, granular sources of spatial data, and approaches from structural modeling. Let us consider three examples. Dell (2010) studies the long-term impact of a forced labour system, the *mita*, imposed by the Spanish colonial regime on parts of Peru and Bolivia. She compares districts on either side of the historical border separating the area subject to the policy from the area that was not. This narrow comparison helps weed out the impacts of other local factors, such as geography, from the effect of the *mita* regime. Jedwab and Moradi (2016) divide Ghana into 11km x 11km grid cells to study the impact of colonial era railway construction on urbanisation, and create a geographic information system (GIS) database on the railway and road network from 1850 to 2000 in the process. They find large and positive effects of railway access on cocoa production and urbanisation, with the urbanization effects persisting even after the railways became defunct. Donaldson (2018) combines archival data with structural modelling to study the effects of the colonial railroad on the Indian economy. He builds a Ricardian trade model with multiple regions and multiple commodities, showing that railroads reduced trade costs and raised rural incomes. As the model predicts, a single endogenous variable – the share of a district’s expenditure that it sources from itself – captures the impact of the railroad on welfare.

1.1. The Quest for the Counterfactual. Why should we focus on the evolving rigour of empirical tools? Rigor is essential in credibly answering questions of colonial persistence. Consider India, colonised by Britain in the 18th century. There is much discussion on the economic consequences of the subsequent two centuries of colonial rule. The Indian politician Shashi Tharoor begins his popular book *Inglorious empire* with a causal claim: that India’s decline from 27% of world GDP in 1700 to 3% in 1947 was because of British rule (Tharoor, 2018). This effect, he argues, justifies reparations – a symbolic £1 per year.¹ This claim has been criticized; using evidence from Broadberry and Gupta (2006) and Broadberry, Custodis and Gupta (2015), Roy (2018) notes that Indian wages and per capita incomes were both low by European standards

¹Speech to the Oxford Union, 28 May 2015.

before the colonial period. A second example comes from Ferguson (2012), who makes another causal claim: that although Indian incomes rose only 14 per cent between 1757 and 1947, most Indians might have been worse off under Mughal rule. His evidence comes from two observations: that the “village economy’s” share of total after-tax income rose under British rule, and that the Mughal elite consumed perhaps 5% of national income. Regardless of their accuracy, claims like these give rise to two points. First, if empirical tools are not used to estimate the effects of colonialism, other approaches will fill the gap. Second, any claim about the effects of colonialism is, implicitly or explicitly, a counterfactual claim.

FIGURE 1. Counterfactuals for India



Data from Bolt and Van Zanden (2020). Vertical line at 1757.

What is India’s counterfactual? Consider Figure 1, in which we plot data on Gross Domestic Product (GDP) per capita in 2011 dollars from Bolt and Van Zanden (2020). We add a vertical line at 1757 – one possible date for the start of colonial rule in India. If India’s counterfactual is the United Kingdom, then India was already behind its potential at the start of the colonial period and was very far behind by the end. What if the counterfactual is instead a large Asian country like China, where colonisation was later and lighter? What if it is a country like Thailand that was never colonised at all?² What if the counterfactual is instead India’s trend from 1600 to 1750, extrapolated through to 1947? The effect of colonisation on GDP depends on the choice of the

²Neither Olsson (2009) nor Ertan, Fiszbein and Putterman (2016) code China or Thailand as colonised.

counterfactual. The growth impacts of colonial rule were modest if inferred from a comparison with China, but negative if inferred from a comparison with Thailand. They were positive if the counterfactual is India's own extrapolated trend from 1750.

Perhaps no counterfactual can be constructed to give a credible answer to the question "How would India's economy have developed had it never been colonised?". In the absence of systematic data, two possible alternatives emerge: the first is to construct counterfactuals of where India might have been in 1947 without colonial intervention, based on statistical evidence from the first half of the 18th century. For example, it is possible to project the path India's textile exports might have taken if they had grown at same rate as in the 18th century, and if there was no deindustrialization in India in the 19th century. Gupta (2019), however, shows that movements in these textile exports were not correlated with GDP between 1600 and 1870, so the reliability of such projections is suspect. The second alternative is to explore statistical relationships between colonial interventions and present-day outcomes, using the tools of applied econometrics. Studies that take this second approach often tackle smaller questions, such as the long-run impact of a specific colonial intervention in a specific context – how the *mita* affected one part of Peru, or how the railway affected one part of Ghana. In this survey, we will lean more heavily towards the second approach.

The scope of this review is empirical studies of former European colonies outside of Europe with a primary independent variable dating to the colonial period and a primary dependent variable dating after the end of colonial rule. We use the word "empirical" here as it is frequently used by economists. That is, we focus on studies that use reduced-form tools from applied econometrics, including fixed effects, regression discontinuity, and instrumental variables.

1.2. Persistence studies. While persistence studies have a place in economics, whether focused on former colonies or not, that place is a small one. Economic history accounts for only about 4% of papers published in leading economics journals, and persistence papers constitute less than 10% of that already small share (Cioni, Federico and Vasta, 2021). The persistence studies that are published in economics journals are cited more than other economic history papers published in the same journals, though this difference is driven by a small number of heavily cited papers (Cioni, Federico and Vasta, 2021).

The place of persistence studies within the field of economic history is also a small one. Journals such as the *Journal of Economic History* and *The Economic History Review* publish and cite few of these papers (Cioni, Federico and Vasta, 2022), though there are some exceptions, such as work by Abel (2019) on the long-run impacts of

Apartheid-era forced resettlement on trust in present-day South Africa. And history journals such as the *American Historical Review* that eschew empirical work altogether do not, as a consequence, publish persistence studies. Within economic history journals, there are few publications that focus on developing countries, and so studies of the persistence of colonial forces in these countries are particularly rare (Fourie and Gardner, 2014; Frederick, Juif and Meier zu Selhausen, 2024).

There are now several reviews of the literature on persistence, with Nunn (2009) being one of the first. Spolaore and Wacziarg (2013) review the “deep” determinants of development at the country level. Nunn (2014*a*) outlines the importance of history for economic development. Cirone and Pepinsky (2022) provide a review focused on political outcomes. Morales-Arilla, Ricart-Huguet and Wantchekon (2022) highlight the literature on the role of factors such as geography, institutions, and human capital in explaining long-term development outcomes, while stressing the need to incorporate policies and state intervention into these explanations. Frankema (2021) and Michalopoulos and Papaioannou (2020) both review the role of history in explaining development in Africa today, while Valencia Caicedo (2023) provides a similar review for Latin America. Indeed, the persistence literature is now mature enough to have its own historiography; Cioni, Federico and Vasta (2021) and Cioni, Federico and Vasta (2022) take stock of how persistence studies themselves fit in the literature. Our review differs by focusing specifically on former European colonies, on empirical persistence studies, on targeting an audience of both economists and economic historians, and in incorporating work published more recently than is covered in these other reviews.³ Most closely related to our review is Guardado (2022), who provides a review of the literature on the long-run effects of colonialism. Our review is broader in scope, with a more explicit focus on channels of colonial persistence, including non-persistence and persistence through colonialism. We also discuss criticisms of persistence studies.

1.3. Road Map. We begin by discussing why persistence makes sense and the mechanisms through which historical variables can affect present outcomes. We focus on mechanisms identified by Nunn (2009) – multiple equilibria and path dependence, domestic institutions, culture, and knowledge and technology – and highlight recent theoretical work that has deepened our understanding of these channels. We then

³Other relevant reviews include Cantoni and Yuchtman (2021) on natural experiments in economic history, Ashraf and Galor (2018) on the macrogenoeconomics of comparative development, Michalopoulos and Papaioannou (2017) on the long shadow of history, Fenske (2010) on the use of applied microeconomics in African history, Heldring and Robinson (2012) on the impacts of colonialism in Africa, the studies collected in Akyeampong et al. (2014) on the role of history in African development, and La Porta, Lopez-de Silanes and Shleifer (2008) on the economic consequences of legal origins.

review the tools employed in persistence studies, noting both applied econometric tools and the growing importance of structural estimation.

Next, we review the empirical literature on the impacts of colonial factors on later and modern-day outcomes. We begin with results that show persistence, focusing on the impacts of property rights and land, political institutions, infrastructure, forced labour, the slave trade, and human capital. We also discuss empirical work that has shown both persistent and non-persistent effects of variables that predate colonial rule on outcomes after independence. In some instances, persistence is despite contrary colonial interventions. In others, colonial intervention is what ended persistence. A third possibility is that persistence of precolonial variables was aided by colonial intervention. We turn next to cases of null results and reversals, as these are equally informative about why and when the impact of colonialism persists. We conclude by reviewing major criticisms of persistence studies – compression of history, spatial correlation, data quality, and the interpretation of coefficients – noting best practices that researchers use to alleviate these concerns.

2. MECHANISMS OF PERSISTENCE

Why might history affect the present? Several studies outline plausible channels through which history can persist, and we emphasize these mechanisms in our review. Nunn (2009) identifies four major sources of persistence: multiple equilibria and path dependence, domestic institutions, culture, and knowledge and technology. These factors are hard to change, and so allow for persistent effects of colonial interventions, even when the context has changed.

In a model with multiple equilibria, a historical shock can push an economy from one path to another – and these paths may diverge permanently. In this case, outcomes become path dependent, contingent on previous outcomes. Examples include the persistence of the QWERTY keyboard and VHS cassettes, despite technologically superior alternatives (Puffert, 2019). Such persistence is common in economic geography, where agglomeration forces lead firms and workers to co-locate in already important places. Bleakley and Lin (2012) show that portage sites along the last set of rapids in the southern United States have remained important, despite the declining importance of water transport to their economies. Recent theoretical developments have pushed forwards our understanding of multiple equilibria and path dependence. Allen and Donaldson (2020) provide a general economic framework with agglomeration externalities and forward-looking agents. In this type of environment, historical events can have long-lived, even permanent impacts.⁴

⁴A parallel literature in management also examines path dependence within organizations (Sydow, Schreyögg and Koch, 2009).

For Nunn (2009), institutions are deep determinants of long-run economic performance. Here too, recent theoretical developments have sharpened our understanding. Acemoglu, Egorov and Sonin (2021) demonstrate two channels of institutional persistence: “stasis,” when current power-holders are happy with the status quo, and “strategic stability,” when a change initially preferred by the powerful might lead to a further cascade of changes no longer favourable to them, which in turn precludes the initial change.⁵

Culture consists of “knowledge, technology, values, beliefs, and norms that can be transmitted across generations and between individuals” (Nunn, 2021). For Nunn (2009), culture matters because it shapes norms of behavior. For example, Roy and Tam (2022) find that British efforts against child marriage in India, despite initial backlash, durably lowered child marriage rates over the twentieth century. Several studies have identified trust as a mechanism linking colonial treatments to later outcomes.⁶ Yet again, recent theoretical developments have deepened our understanding (Bisin and Verdier, 2023).

Finally, history can create barriers to the diffusion of knowledge and technology, allowing initial advantages to be compound (Spolaore and Wacziarg, 2013). Technology adoption 3,000 years ago continues to predict technology – and hence incomes – across countries today (Comin, Easterly and Gong, 2010). Recent theoretical work has also improved our knowledge of this mechanism. Bezin (2019) provides an economic model in which cultural socialization can complement new technologies, creating path dependency. In her example, environmental preferences, a product of socialization, complement green technologies.

3. TOOLS FOR STUDYING PERSISTENCE

Simple empirical strategies, even basic correlations between the past and present, can be informative about persistence. Acemoglu, Johnson and Robinson (2002), for example, show a negative correlation between population density in 1500 and Gross Domestic Product (GDP) per capita in 1995 among former colonies. Even in the absence of a causal claim, this correlation is inconsistent with geographic variables directly determining development the same way in both eras.

The primary tools of persistence studies are, however, largely those of applied econometrics (Angrist and Pischke, 2009; Cunningham, 2021), including fixed effects estimation, regression discontinuity, and instrumental variables. These tools are

⁵Parallel literatures in sociology and management also examine institutional persistence (DiMaggio and Powell, 1983; Lawrence and Suddaby, 2006).

⁶See Abel (2019), Guardado (2018), Okoye (2021), Archibong and Obikili (2023), Blouin (2022), Nunn and Wantchekon (2011), Lowes and Montero (2021*b*), and Jones (2021).

particularly useful due to the presence of unobserved confounding variables, and to the absence of direct observation of the counterfactual. Imagine an outcome variable for a unit of observation i is defined as y_i , and the measure of the colonial variable for the unit is defined as x_i . Note that y_i is generally measured much later in time than x_i . For example, y_i could be present-day GDP per capita in district i , and x_i could be the rate of investment during colonial rule. If we posit a linear relationship between the two, namely

$$y_i = \alpha + \beta x_i + \epsilon_i,$$

then the coefficient obtained from a regression of y_i on x_i gives us the parameter of interest β *only if* everything else that affects GDP per capita other than x_i , captured by the error term ϵ_i , is uncorrelated with x_i . This expectation is often unreasonable. A common first step towards causal inference is to control for observable confounders, but a causal interpretation of the result requires that the variation in ϵ_i , residual of these controls, is uncorrelated with the residual variation in x_i .

Studies using fixed effects approach this problem by comparing observations within the same group – for instance, multiple villages in the same subdistrict, or multiple children of the same mother. The intuition for this approach is that units within a group have similar “unobserved” variables. Within-group comparison can, then, allow the study to isolate the effects of the colonial variable. With fixed effects, the above linear relationship is modified to

$$y_{ig} = \alpha + \beta x_{ig} + \delta_g + \epsilon_{ig},$$

where δ_g is a vector of dummies, or “fixed effects,” one for every group, g . These dummies control for all observed and unobserved variables that do not vary across observations i within group g . For this tool to isolate a causal impact of x_{ig} , it must be the case that unobserved variables that vary within groups – captured by the error term ϵ_{ig} – are uncorrelated with the within-group variation in x_{ig} .

As an example, Huillery (2009) creates fixed effects for neighbourhoods, i.e. for small groups of contiguous districts in French West Africa, in order to compare districts that received more colonial investments with similar neighbors that received fewer investments.

Studies using regression discontinuity designs (RDDs) use a different strategy to focus on a different type of narrow comparison. RDDs compare units that fall on opposite sides of a cutoff across which the colonial variable x_i varies discontinuously. This cutoff can often be a physical border. Studies that use regression discontinuity, such as Dell (2010), generally take pains to show that places being compared on both

sides of the border look similar on most observable characteristics. Dell (2010) assumes that unobserved residual factors ϵ_i do not change discontinuously on average when crossing from one side of the *mita* border to the other. Exposure to the colonial variable x_i – in this case exposure to the forced labour regime – does change discontinuously. If this assumption holds, the change in y_i when crossing the boundary is attributable to exposure to the *mita* regime.

Studies using instrumental variables, by contrast, exploit exogenous variation in the independent variable of interest x_i that is due to an instrumental variable z_i . Figure 2 explains the relationship that is required for a variable to be a valid instrument for x_i . While ϵ_i comprises unobserved variables that might drive both the outcome y_i and the colonial variable x_i , an instrument z_i causes variation in x_i while having no links to, or being uncorrelated with, ϵ_i . The presence of the relationship between z_i and x_i can be tested and confirmed statistically. But instrumental variables requires that z_i is uncorrelated with ϵ_i (exogeneity), which also implies that no direct link exists between z_i and y_i . This crucial assumption can be supported by contextual knowledge and corroborating evidence but cannot be proven definitively by statistical testing.

Acemoglu, Johnson and Robinson (2001), for example, use early settler mortality as an instrument z_i for institutional development x_i . In this example, places whose climate and geography were more inhospitable for early settlers were less likely to become settler colonies, and consequently less likely to inherit inclusive institutions that fostered development y_i . For this exercise to reveal the causal effect of institutions, the mortality rate z_i must not be correlated with unobserved factors ϵ_i impacting long-run development of institutions in former colonies.

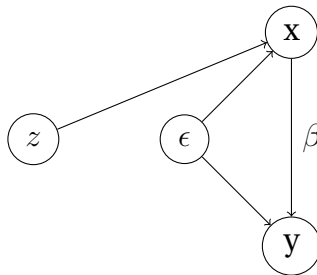


FIGURE 2. Instrumental variable z is used to identify β

In another example, Iyer (2010) exploits the death of a ruler without a natural heir in India between 1848 to 1856 as an instrument z_i for a district coming to be directly ruled by the British x_i . Lord Dalhousie was Governor-General of India from 1848 to 1856. During his tenure he applied a Doctrine of Lapse, annexing several states whose rulers died without a natural heir, rather than permitting them to adopt an heir. Iyer (2010) considers whether direct British rule, as opposed to indirect rule as a Princely

State, might have long-run implications for development measures y_i such as irrigation and fertilizer usage. For this exercise to reveal the causal effect of direct British rule, death without an heir between 1848 to 1856 z_i must not be correlated with unobserved factors impacting long-run development ϵ_i . The case for exogeneity in this example is particularly strong, since neither death without an heir nor a ruler's death in the 1848 to 1856 period matter on their own for whether a district fell under British rule. It is the double coincidence of these events that predicts exposure to the colonial variable x_i .

While actual randomization does sometimes exist in history (e.g. Bleakley and Ferrie (2016)), most studies in this literature base the causal interpretation of results on claims that the natural experiments they exploit and the empirical approaches they use minimize the scope for omitted variables bias. These claims are supported by careful arguments of why there is no correlation between z_i and ϵ_i . A study that has *internal validity*, and so can be interpreted causally, does not automatically have *external validity* that allows its results to generalise to other contexts. Persistent effects of colonial forced labour regimes might be present in one context (Acemoglu, García-Jimeno and Robinson, 2012) but absent in another (Geloso, Kufenko and Arsenault-Morin, 2023).

New developments in econometrics mean that best practices with these tools are constantly evolving (e.g. Andrews, Stock and Sun (2019); Cattaneo and Titiunik (2022)). Further, we expect that persistence studies will come to use structural estimation more heavily in the future. A structural estimation study will generally write an economic model with specific functional form assumptions, use data to estimate the parameters of the model, and simulate counterfactual outcomes under alternative policies (Low and Meghir, 2017). This approach allows researchers to account for general equilibrium effects that bedevil even randomized controlled trials (Glennerster and Takavarasha, 2014), and to form counterfactuals robust to the Lucas (1976) critique. For example, Heblich, Redding and Voth (2022), considering the impact of colonies on the coloniser, combine spatial data with structural modelling to study the effects of slavery on the British industrial revolution. They build a model of an economy with three sectors – agriculture, industry, and plantation – and show that access to enslaved labour in the plantation sector increased access to collateral, giving rise to greater capital accumulation. Acemoglu, García-Jimeno and Robinson (2015), similarly, model investment in building state capacity in Colombian municipalities as a network game for which there may exist positive or negative spillover effects across municipalities. They use spatial variation in the presence of state officials and agencies in the colonial period as a source of exogenous variation in state capacity, and find that state capacity investments are strategic complements across municipalities. As a result, an increase

in state capacity in one municipality induces other municipalities to make similar investments. Neglecting this strategic response would lead to underestimates of the total impact of a policy that increased local investments. We anticipate more studies such as these to appear soon in the literature on colonial legacies.

4. COLONIAL PERSISTENCE

In this section, we review the empirical evidence on the persistent effects of colonial legacies, focusing on property rights and land ownership, political institutions, infrastructure, forced labour, the slave trade, and human capital. Work on colonial institutions has found that forms of property rights and governance that increased investment incentives and the accountability of local governments have favored development over the long term, while those that entrenched the power of an elite have generally done the opposite. Policies that increased land inequality in the colonial period have, in some cases, left behind paradoxically positive legacies for development. This is in part because large estates provided public goods at the local level. Infrastructure investments reshaped local economic geography. As a result, the areas that received these investments frequently continue to have higher incomes in the present compared to similar areas that did not receive such investments. This persistence is due both to agglomeration forces and to the presence of sunk investments. Forced labour in the colonial period has hindered development outcomes by undermining institutions of local government. The slave trade has hindered African development both through its institutional and its cultural effects. Investments in health and human capital, often provided by missionaries, have had long-lasting effects on education, health, labour market outcomes, and fertility.

4.1. Property Rights and Land. Property rights and legal protection are fundamental institutions that have been linked to long-run development. Some of the earliest empirical work on the importance of colonial-era property rights documented cross-country correlations between these institutions and modern development of former colonies. La Porta et al. (1997, 1998) show that weaker investor protections provided by French civil law are predictive of lower levels of modern-day financial development and greater concentration of share ownership in a sample of 49 countries. Acemoglu, Johnson and Robinson (2001) link protection against the risk of expropriation to GDP per capita in 64 former colonies, using colonial settler mortality as an instrument for institutional quality. Acemoglu and Johnson (2005) use both precolonial population density and early settler mortality as instrumental variables in the same sample to find that the protection of property rights leads to higher GDP per

capita, financial depth, and investment. Contracting institutions predicted by English legal origin, on the other hand, matter little.

More recent work using micro-level data in natural experiment settings also documents the continued importance of colonial era property rights on modern development. Dippel, Frye and Leonard (2024) show how non-transferrable plots of land on reservations in North America, allotted to Native Americans in the late nineteenth and early twentieth centuries, have lower rates of development and agricultural cultivation in the present. The gap with transferable plots has been growing since the 1970s, starting with 4% lower land utilisation in 1982, which widened to 10% lower utilisation by 2012. In Canada, indigenous communities without treaties have higher incomes than those with treaties (Feir, Gillezeau and Jones, 2023), with an average difference in gross income of about 7000\$. This gap has only emerged after the recognition of Aboriginal rights in the 1982 Constitution. This recognition created ambiguity in non-treaty communities, an ambiguity that enhanced their bargaining power against the state.

In many former colonies, land ownership was concentrated among a small elite during the colonial period, often on large plantations and estates (Frankema, 2010). Urban spaces were often segregated (Baldomero Quintana, Woo-Mora and de la Rosa-Ramos, 2023). There is now considerable evidence that colonial land inequality has shaped later outcomes in Latin America (Eslava and Valencia Caicedo, 2023). Recent empirical work has largely found that the long-run consequences of colonial land systems depend on whether these systems increased local state capacity and, consequently, led to more provision of public goods and schooling. *Haciendas* in Mexico (Arias and Flores-Peregrina, 2023) and *encomiendas* in Colombia (Faguet, Matajira and Sánchez, 2022) both predict greater development along various dimensions in the present. Donatary captaincies in Brazil, on the other hand, split up the land into narrow strips for private colonists, leading to smaller states and worse provisioning of public goods (Secco, Laudares and Valencia Caicedo, 2023).

4.2. Political Institutions. The nature of political institutions during colonial rule, for example direct rule by Europeans or indirect administration through a local ruler, have also had long-run effects. Even the length and timing of colonial rule could be decisive – Feyrer and Sacerdote (2009) use prevailing wind patterns to predict the timing of colonisation in a sample of islands, finding that an exogenous increase in the length of colonial rule increases GDP per capita in the present, by almost 40-70% for every additional century the island was colonised. They emphasize the identity of the coloniser and the length colonial rule after the start of the Enlightenment in Europe as key drivers of their results. Lange (2004) shows that increased prevalence of customary

court cases during the colonial period – a proxy for the importance of indirect rule – predicts lower present-day political development in a sample of former British colonies.

More recent work has employed micro-level and meso-level (Michalopoulos and Papaioannou, 2018) data to show persistent effects of colonial institutions. This more granular data has allowed for more convincing approaches to causal inference. Much of this evidence comes from Africa. Acemoglu, Reed and Robinson (2014) find lower political competition and worse development outcomes in chiefdoms of Sierra Leone with fewer ruling families – those recognized under British rule – that can contest the position of paramount chief. Lee and Schultz (2012) compare local development in villages within modern Cameroon on either side of the boundary separating the French-ruled and the British-ruled areas of the country, using a regression discontinuity design. They find that the former British-administered villages have higher wealth and better provision of public goods. They point to the system of indirect rule on the British side and the prevalence of forced labour on the French side during colonial times as having produced different local institutional development.

In India, colonial rule often relied on local elites. Banerjee and Iyer (2005) use the timing of annexation as a source of exogenous variation in the nature of land revenue institutions across districts in colonial India. They find that districts that were under landlord-based tax systems have received fewer public goods and agricultural investments since independence. They argue that the difference emerged after independence, and stems from how class-based antagonisms in former landlord districts have hindered these districts in claiming a share of public investment. These differences may also reflect lower levels of colonial-period state capacity at the village level in landlord-dominated districts (Lee, 2019). Cheema et al. (2018) find a similar result using an RDD across a border separating landed estates from smallholder villages in Pakistan.

In contrast, Iyer (2010) finds better public goods provision in India's former Princely States compared to districts under direct colonial control. A possible mechanism is that worse rulers were more likely to be deposed. Thus, existing princely rulers raised more tax revenue, and their longer tenures incentivized them to make investments with longer time horizons. Malik, Mirza and Rehman (2023) use an RDD to show that areas of Pakistan just inside the boundary of the region governed as a frontier – in which locals had less access to formal institutions and local elites had more power – have experienced an increase in anti-state violence since 2001. This institution of frontier governance had its origins under British rule.

The Americas provide further evidence of how the political nature of colonial institutions can be pivotal. Within Peru, Guardado (2018) shows that household consumption is lower in the present in areas where colonial governors paid more for their offices. Provinces with more potential for extraction had higher prices for office, and so negative selection of governors. These regions, in the present, have more political conflict, less trust, and lower cultural assimilation. On average, a 10% greater price paid for the office causes a 3.2% reduction in household incomes in the present. Similarly, tribes from different polities that were compelled to govern reservations jointly in the United States are poorer today, due to continuing social and political divisions (Dippel, 2014). In Brazil, exposure to natural resource booms in the colonial period led to more intense extractive institutions whose effects have persisted over time across municipalities (Naritomi, Soares and Assunção, 2012). Municipalities that originated during the sugar boom have greater inequality in terms of land holding in the present day, whereas municipalities that emerged during the gold boom have worse governance outcomes today.

Colonial institutions have also had an impact on beliefs and culture. Chaudhary et al. (2020) compare nearby Rajasthani villages, one in the directly ruled portion of the state and one in the indirectly ruled portion, finding that individuals on the directly ruled side of the boundary contribute more in an experimental cooperation game. They argue that several factors account for this reduction of in-group bias, including greater contact with outsiders, greater presence of the nationalist movement, and a more modern colonial-era municipal board. Anderson (2018) uses an RDD that compares respondents near each other but on opposite sides of national borders within sub-Saharan Africa to show that the greater bargaining power given to married women under civil law translates into lower rates (by 1.5-2%) of human immunodeficiency virus (HIV) infection today. Civil law is a colonial inheritance, and grants women better outside options on divorce than does common law, increasing their bargaining power within the family. These women have more say on safe-sex practices. Lechler and McNamee (2018), similarly, use an RDD to find a negative impact of indirect rule on support for democracy by comparing respondents just inside the part of Namibia that was directly ruled to Namibians just outside this region.

Colonisation has been shown to unravel existing cultural norms like polygyny and bring long term changes in gender roles (Henderson and Whatley, 2014). Where Christian missions weakened traditional institutions and beliefs in areas under indirect rule, these missions had durably negative effects on trust (Okoye, 2021). The reaction against colonial rule could also have long-run impacts; García-Ponce and Wantchekon (2024) show that countries whose independence movements were led by rural

insurgencies are more likely to be autocratic today. While rural insurgency normalized violent collective action, peaceful urban protests strengthened democratic norms.

4.3. Infrastructure. Several studies have found persistent agglomeration effects due to colonial infrastructure investments. In Africa, colonial railways created an equilibrium population distribution that has remained stable even after the railways have fallen into disuse. For Ghana in particular and for Africa in general, Jedwab and Moradi (2016) find that urban settlements in 2000 were still concentrated along colonial railway lines. Roads had a similar impact in Ethiopia (Bertazzini, 2022). For Kenya, Jedwab, Kerby and Moradi (2017) show that both sunk investments, such as hospitals, and the resolution of coordination failures help explain the population impacts of railways. Roessler et al. (2020) find that similar sunk investments – principally in roads, railways, and electricity generation – help explain why regions that produced colonial cash crops in Africa remain more developed today.

In Asia and the Americas, there is similar evidence that railways shaped modern city growth. In India, this positive impact was smaller in size than in Africa, but still present (Fenske, Kala and Wei, 2023). Indian railways also raised incomes (Donaldson, 2018), promoted literacy (Chaudhary and Fenske, 2023), and reduced vulnerability to famine (Burgess and Donaldson, 2010). Incomes remain elevated, to the present day, in districts that were connected to the railway network earlier when proxied by nightlights (Maitra and Yu, 2021). Liew, Rahman and Siah (2023) find similar evidence in Malaysia.

Several regions also provide evidence of the long shadow of a broader range of infrastructure investments. In Mexico, both legal and illegal colonial ports facilitated agglomeration over the long run (Alvarez-Villa and Guardado, 2020). Sites in Java that had sugar factories under Dutch rule are more industrialized today, due to agglomeration effects, transportation infrastructure, and public goods investments (Dell and Olken, 2020). Infrastructure spending arising out of post-war treaties with colonial powers has also had long-run agglomeration effects. Jia (2014) shows that the former treaty ports in China – locations in which extraterritoriality allowed for European commercial law – have grown more rapidly than other locations since the 1980s, as the country has opened economically. Population growth in the treaty ports was faster due to migration into these places and economic activity grew in the commercial sector and in services. On some occasions, infrastructural investments during colonial rule have had complicated long-term effects. Districts of India that had canals by 1931 adopted new crop varieties during the Green Revolution but suffer from greater groundwater depletion today (Dar, 2019).

4.4. Forced Labour. Several empirical papers have identified adverse long-run impacts on development of the forced labour regimes that often accompanied colonial

rule. While there is no singular mechanism explaining these consequences, institutional channels such as the quality of local government are common.

Much of this evidence comes from Africa. In Nigeria, the colonial use of prison labour durably eroded trust in legal institutions (Archibong and Obikili, 2023). Lowes and Montero (2021*a*) use a border RDD to show a negative long-run effect of colonial rubber concessions on present-day education, health, and living standards in the Congo. This effect works in part through the legacies of indirect rule. Chiefs inside the former concessions are, in the present day, more likely to be hereditary rather than elected. In Rwanda and Burundi, Hutus whose ancestors were subjected to forced labour for Tutsi chiefs are less trusting of Tutsis in the present, and make fewer insurance agreements with them (Blouin, 2022). Forced migration from Burkina Faso that persisted into the 1940s is still visible in greater rates of male migration and lower fertility today by about 50-64% (Dupas et al., 2023).

Similar evidence of the adverse long-run impacts of forced labour regimes has accumulated from the Americas. Within Colombia, slavery predicts current poverty (Acemoglu, García-Jimeno and Robinson, 2012). Bruhn and Gallego (2012) use sub-national within-country comparisons in the Americas to show that regions that practiced the large-scale use of forced labour have lower GDP per capita today. This effect is explained in part by political representation; these areas also have fewer seats per capita in the lower house of Parliament. The Spanish colonial system of forced labour, *concertaje*, in Ecuador, has been linked to higher poverty and lower income in the present day (Rivadeneira, 2020). As mentioned above, Dell (2010) finds that the forced labour system, the *mita*, hindered the growth of large estates with a dedicated labour force, which caused the persistence of subsistence agriculture in the former *mita* regions. The landowners could lobby to get investment in roads, which remain today. Over time, *mita* villages experienced greater isolation from road networks and reduced education, which has led to lower household consumption and more child stunting in the present. Valencia Caicedo and Laudares (2023) use a spatial RDD exploiting the border between the Spanish and Portuguese empires within modern Brazil to show that, on the Portuguese side where slavery was more widespread, there is more inequality and larger racial gaps in the present. These results are driven not by coloniser identity, but by earlier structural transformation and greater wealth on the Portuguese side.

4.5. The Slave Trade. The export of slaves from Africa predates direct colonial rule on the continent, and the classification of the Trans-Atlantic slave trade as a colonial phenomenon has been criticised (Austin, 2008*b*). However, given that the trade was carried out by European powers that later colonised Africa, and because slaves were

transported to work in other colonies, we consider it as an institution whose existence and continuity were aided by colonialism. Across Africa, slave exports have reduced modern GDP (Nunn, 2008). They have hindered state formation, and resulted in deeper ethnic divisions (Whatley and Gillezeau, 2011*a*). The practice of capturing and selling of people as slaves has caused long term obstacles to suitable conditions for growth, through lowered trust (Nunn and Wantchekon, 2011), which has hampered firms' access to formal finance (Pierce and Snyder, 2018). Other long term effects include reduced literacy (Obikili, 2016*a*) and the creation of aristocratic slave regimes (Whatley, 2022). The resulting ethnic heterogeneity led to local political and ethnic fragmentation, which has persisted over time (Obikili, 2016*b*; Whatley and Gillezeau, 2011*b*).

The forced transportation of large numbers of men from the continent encouraged polygamy (Dalton and Leung, 2014; Edlund and Ku, 2011), which has been shown to heighten rates of HIV infection (Bertocchi and Dimico, 2019). The gender imbalance of the population also raised female labour force participation and women's bargaining power, and these effects persist to this day (Teso, 2019). The proliferation of capture and trade of human beings spurred greater belief in witchcraft (Gershman, 2020).

4.6. Human Capital. Several colonial interventions had short-run impacts on human capital – namely education and health – that have persisted over the long run. These interventions have had persistent effects both because investments such as schools and clinics have themselves survived, and because these investments have changed economic and cultural outcomes at the local level. The stylized fact that British colonies had greater levels of education than other colonies at independence is well known and can help explain why coloniser identity predicts post-independence growth (Bertocchi and Canova, 2002; Grier, 1999). Several researchers argue that it is the human capital introduced in settler colonies by Europeans, rather than institutions, that explains why these colonies have developed more than others (Acemoglu, Gallego and Robinson, 2014; Easterly and Levine, 2016; Glaeser et al., 2004).

A considerable wealth of micro-level and meso-level evidence has accumulated that complements these country-level patterns. The division of German Togoland after 1914 created a border between the British-ruled and French-ruled portions – and the difference is still present in education rates in contemporary survey data (Cogneau and Moradi, 2014). Within districts of French West Africa, greater educational investments in the past imply higher levels of education today, because of the persistence of these health and infrastructure investments (Huillery, 2009). Bubb (2013) uses a spatial RDD to show that British-French differences in educational spending were still apparent

during the 1980s in higher education levels on the Ghanaian side of the border with the Ivory Coast.

Many studies on colonial effects of human capital focus on one particular channel: missions (Okoye, 2022). At the cross-country level, Protestant missions predict democracy in the present (Woodberry, 2012). In Africa, missions provided education differentially, by denomination and gender. Protestant missions, consequently, are correlated with long-run effects on female literacy, but do little to predict male literacy. For Catholic missions there was no long-run correlation with education of women and a large correlation with men's education (Nunn, 2014*b*). In Benin, the earliest missions provided education that raised living standards for the first generation of students and created spillovers at the family and village levels, even for those who did not receive education (Wantchekon, Klačnja and Novta, 2015). Missions predict spatial differences in education in Ghana today, though evidence on whether they also predict wealth and development is mixed (Boateng et al., 2020; Jedwab, Meier zu Selhausen and Moradi, 2021). Where missions had printing presses, education and newspaper readership are both greater today (Cagé and Rueda, 2016).⁷ The link between missions and education helps explain why they predict greater intergenerational educational mobility in Africa in the present (Alesina et al., 2021). Okoye and Pongou (2024) use a spatial RDD within Nigeria that exploits restrictions on missionary activity in some of that country's Emirates. Where missions were allowed, education and wealth are higher today. Being in the same local government area as a colonial mission leads to 4 additional schooling years on average, while fertility in these areas is lower. By contrast, by encouraging ideas of female domesticity, female Catholic missionaries in the Congo had lasting positive effects on fertility (Guirkinger and Villar, 2022). In fact, competitive forces between Catholic and Protestant missionaries might have led to beneficial impacts on education (Gallego and Woodberry, 2010).

Corroborating evidence of the long reach of colonial education and health investments, including those by missionaries, has emerged from Asia and the Americas. Across districts of India, colonial spending in primary education in 1911 had a positive and persistent correlation with literacy into the 1970s (Chaudhary and Garg, 2015). Using an instrument that exploits the Boxer uprising and consequent relocation of Protestant missions across China, Bai and Kung (2015) identify a positive impact of these missions on modern-day urbanisation levels. Missions in India continue to affect development in the present through their influence on the prevalence of higher education (Calvi, Hoehn-Velasco and Mantovanelli, 2022; Castelló-Climent, Chaudhary and Mukhopadhyay, 2018). Distance from a colonial protestant mission is

⁷See also Pengl, Roessler and Rueda (2022) on printing and ethnic salience.

correlated negatively with present-day health outcomes, suggesting that these missions had long-run positive impacts on health potential and hygiene (Calvi and Mantovanelli, 2018). Missions also correlate with differences in female education across locations within India today (Lankina and Getachew, 2013). In Argentina, Brazil, and Paraguay, the persistent legacy of Jesuit missions, among the Guaraní, has been greater education and income, driven by employment outside of agriculture (Valencia Caicedo, 2018).

Jedwab, Meier zu Selhausen and Moradi (2022) have noted two selection problems relevant to the literature on missions. First, there is sample selection; widely used sources such as Roome (1925) and Beach (1903) cover older, larger, missions whose impacts may not generalize to the broader set of missions that can be measured in sources such as the colonial Blue Books. Second, missions' locations were selected – they arrived earlier and received more investment in areas that were more favorable in terms of the disease environment, railway access, and cash crop cultivation. Failure to account for this second type of selection can lead to overestimates of the impacts of missions (Fourie and Swanepoel, 2015). Missionary expansion may also have been driven by local demand (Frankema, 2012). The best studies in this literature are those, such as Okoye and Pongou (2024), Waldinger (2017), or Wantchekon, Klašnja and Novta (2015), that exploit exogenous variation in mission presence and those, such as Cagé and Rueda (2016), that compare locations that contain missions of differing types.

In several instances, colonial investments in health and education have had detrimental effects. Health interventions done badly – as with campaigns against sleeping sickness in French Equatorial Africa that proved largely ineffective but often led to severe, even fatal, side effects – have permanently eroded trust in modern medicine (Lowe and Montero, 2021*b*). While parts of Africa near missions that provided health services have lower rates of HIV today, missions that were not combined with health services led to changes in behavior that have increased the prevalence of HIV (Cagé and Rueda, 2020). Residential schools in Canada and the United States that attempted to forcibly assimilate indigenous people have had negative effects on the education of subsequent generations. Jones (2021) argues that this reversal occurred because forced assimilation reduced trust in mainstream education and left many children without parental role models.

5. PERSISTENCE MEETS COLONIALISM

Colonialism continues to matter today for ex-colonies, both directly and through precolonial factors that persist as a result of colonialism. In a sample of European colonies, only half of the variation in log GDP per capita in 1995 can be attributed to

the log of settler mortality.⁸ In part, this incomplete determination reflects changes since independence that have helped weaken colonial legacies. But it also reflects cases where variables pre-dating colonial rule continue to matter in the present, some with the aid of colonialism. In this section, we focus on three types of study: those that highlight persistence of precolonial factors despite colonial rule, those that document colonial processes counteracting precolonial ones, and studies that focus on the role of colonialism in helping precolonial variables persist.

5.1. Persistence despite colonialism. What factors predate colonialism and continue to matter despite colonial intervention? We focus here on the direct and indirect effects of geography, on states, and on other forms of social organization

Geography continues to be an important determinant of long term economic outcomes, despite decades of colonial rule. Africa's size, agricultural environment, and disease profile led to low population densities that shaped the continent's precolonial institutions in ways that still matter in the present (Austin, 2008*a*; Fenske, 2013; Hopkins, 1973; Iliffe, 1995). Of these, pathogens and diseases continue to constrain its growth prospects (Bloom and Sachs, 1998). Malaria, in particular, continues to shape patterns of development and conflict on the continent (Cervellati, Esposito and Sunde, 2017, 2022; Depetris-Chauvin and Weil, 2018). The impacts of the tsetse fly on contemporary African development are not a result of present-day direct effects on livestock and humans, but rather the limitations that sleeping sicknesses placed on historical state centralization (Alsan, 2015).

Geography also continues to exert several indirect legacies, because of how it has shaped equilibria, institutions, culture, and knowledge in the past. One important aspect of geography is suitability for certain types of production. Societies with biogeographic conditions favourable to the adoption of agriculture had a head start in economic development, one with impacts visible both in 1500 and in the present (Ashraf and Galor, 2011; Diamond, 1997; Olsson and Hibbs Jr, 2005). Where land was more suitable for agriculture, African societies were more likely to practice it, leading to greater education and wealth today (Michalopoulos, Putterman and Weil, 2019). Bantu whose ancestors migrated southwards through the equatorial rainforest are less likely to keep livestock and raise dryland crops compared to those whose ancestors did not take the same path (Blouin, 2021).

Land suitability for plough-favorable crops continues to shape female labour force participation and political participation in the present (Alesina, Giuliano and Nunn, 2013). Land with greater returns to fallowing is less likely to be subject to group rights (Le Rossignol, Lowes and Montero, 2023). By creating location-specific human capital,

⁸Computed using data from Acemoglu, Johnson and Robinson (2001).

land heterogeneity continues to predict ethnic diversity today (Michalopoulos, 2012). These impacts of suitability extend beyond crop cultivation. Land suitable for pastoralism has influenced infibulation in the present through the practice of pastoralism itself (Becker, 2021). In Mexico, indigenous communities with access to cochineal production were more resilient in the face of colonial pressure (Diaz-Cayeros, Espinosa-Balbuena and Jha, 2022). Natural ports that fostered Hindu-Muslim cooperation in long-distance medieval trade have seen fewer religious riots in the present (Jha, 2013).

However, geographic endowments may themselves not be fixed. Consider, for example, the introduction of new crops during the Columbian Exchange. These crops changed the agricultural potential of the Old World in ways that differed across space, and changes of this sort are often exploited as natural experiments in studies of persistence (Frankema, 2021; Galor and Özak, 2016). We return to geography as an outcome of colonial rule below.

The long-run impacts of precolonial states are still visible despite the colonial interlude. At the country level, Bockstette, Chanda and Putterman (2002) show that a long history of state capacity predicts higher levels of GDP per capita in the present. Within Africa, a longer history of state presence predicts less conflict today, even comparing locations within modern countries (Depetris-Chauvin, 2015). Often the persistent effects of states are driven by the impact of states on culture and ethnic diversity. Individuals whose ancestors were exposed to the Kuba kingdom, in the present-day Democratic Republic of the Congo, are more likely to cheat in a laboratory experiment and less likely to follow rules (Lowe et al., 2017). This result is consistent with models in which formal institutions crowd out parental investments in instilling socially desirable values. By contrast, exposure to the Nyiginya Kingdom in Rwanda strengthened norms of obedience (Heldring, 2021). In Vietnam, Dell, Lane and Querubin (2018) use a spatial RDD across the boundary of Dai Viet in 1698 to show that longer exposure to the Dai Viet state has improved economic outcomes by crowding in norms of cooperation.

Other forms of social organization that predate colonial rule also have measurable impacts in the present. Married women in historically matrilineal societies continue to have greater bargaining power despite the intervening colonial period (Lowe, 2022).⁹ Using an RDD across borders shared by multiple ethnic groups, Moscona, Nunn and Robinson (2020) find that African societies with segmentary lineages, i.e. where members trace familial links far beyond their immediate household, have higher levels

⁹Evidence is mixed on whether matriliney erodes gender differences in competition (Gneezy, Leonard and List, 2009; Lowe, 2021).

of conflict as a result of retaliatory violence. Religious institutions in Pakistan that predate colonialism, proxied by geographical concentration of shrines, have a significant impact on development outcomes. When a coup in 1977 resulted in power over public goods distribution being vested in local political leaders, it led to poorer school infrastructure and management in areas with a higher concentration of shrines, which resulted in lower literacy rates (Malik and Mirza, 2022).

5.2. Reversals led by colonialism. While many variables predating colonial rule continue to matter today, one consequence of colonialism has been that many other variables have been diminished or extinguished in their importance. In other cases, colonialism has led to complete reversals. The converse of more widespread Christianity in parts of Africa that were exposed to colonial missions is the decline of African religions in these same areas (Nunn, 2010). Missionary influence helps explain the decline in both polygamy and twin infanticide in Africa (Fenske, 2015; Fenske and Wang, 2023).

Acemoglu, Johnson and Robinson (2002) provide the most famous example of colonial anti-persistence; it is the least populated, least urbanized countries in 1500 that, by becoming settlement colonies with European-style institutions, became richest in the present. Reversals driven by colonial rule have also occurred within countries. After the slaughter of the Great Plains bison, peoples reliant on bison went from being among the tallest in the world to being poorer than their neighbors (Feir, Gillezeau and Jones, 2024). In India, the negative correlation between precolonial conflict and post-colonial violence is explained, in part, by the expansion of state capacity spurred by initial levels of conflict, a process that continued during the colonial period (Dincecco et al., 2022).

5.3. Persistence with the aid of colonialism. The factors that have been persistent in their importance through the colonial period have not always been so despite colonialism, but in many cases because of it. We focus here on how colonial rule has shaped the long-run impacts of geography and precolonial states.

For many countries, geography itself is a product of colonial rule, since borders were imposed by Europeans (Michalopoulos and Papaioannou, 2020). Landlocked countries are at a disadvantage (Faye et al., 2004) – a disadvantage that exists in part because colonial powers chose to draw the borders that they did. Africa’s artificial borders have hindered growth (Alesina, Easterly and Matuszeski, 2011) and increased ethnic divisions, often with negative consequences for conflict and public goods provision (Easterly and Levine, 1997; Michalopoulos and Papaioannou, 2016). Internal migration patterns were also subject to colonial borders, and have had long-run effects on marriage markets and HIV prevalence in Mozambique (Denton-Schneider, 2024).

Engerman and Sokoloff (2002) document how, in the Americas, precolonial factor endowments – principally whether geography favored crops such as sugar that have economies of scale – interacted with colonial rule to give rise to colonial inequality, entrenched elites, restrictions on political participation, limits on the spread of primary schooling, and ultimately to lower economic growth.

Further, agglomeration effects imply that geography persists in part through how it shaped colonial investments. Maloney and Valencia Caicedo (2016) show that precolonial population densities still predict within-country differences in population today in the Americas, reflecting both geographic fundamentals and the importance of agglomeration forces. They present case studies that suggest the geographical fundamentals that attracted pre-colonial populations also attracted colonial investment. These incentives were further strengthened by the presence of the local population, which provided a source of human capital, eventually leading to agglomeration effects and persistent economic geography. Ricart-Huguet (2022) finds that colonial investments in Africa were, similarly, concentrated in areas with harbors and capes that made them favorable for trade.

Colonialism has had a major role in determining how the impacts of precolonial states have persisted. While a history of state capacity predicts present-day development, what matters most is the historical state capacity of the ancestors of the population living in a given location (Putterman and Weil, 2010). The Parliament that exists in Ottawa today is more like the one in London than any Algonquin precedent. The post-1500 population flows that have created a mismatch between historical and ancestral state capacity are, largely, colonial flows of European settlers, African slaves, and Asian laborers. While there may have been a post-1500 reversal of fortune across countries, for peoples and their descendants, there has been persistence (Chanda, Cook and Putterman, 2014). Indeed, inequalities across populations in ancestral state history, within present-day countries, are predictive of income inequality in the present (Putterman and Weil, 2010).

Because of colonial policies of indirect rule, the role and legacies of precolonial states were transformed by the colonial process. One reason precolonial state centralization predicts within-country income differences today is that collaboration with colonising powers facilitated the more rapid adoption of Western technologies (Gennaioli and Rainer, 2007; Michalopoulos and Papaioannou, 2013, 2015). Descendants of chiefs who were recognized under colonial rule have been overrepresented in Sierra Leone's elite since independence (Dupraz and Simson, 2023). Without collaboration with the national or colonial center, the benefits of precolonial centralization at the local level could disappear or reverse, through punitive underinvestment in public goods

(Archibong, 2018, 2019). Native Authorities in British colonial Africa that coincided with precolonial states raised more revenue per capita in the colonial period (Bolt and Gardner, 2020), a pattern that may not have existed in French colonies (Müller-Crepon, 2020). Dincecco et al. (2022) find greater colonial tax capacity in the parts of India that, due to conflict exposure in the precolonial period, had developed greater state capacity before colonisation. Frankema and Van Waijenburg (2014) argue that differences in state capacity across colonies more generally reflected adaptation to local conditions. In the Americas, precolonial levels of hierarchy shaped forced labour regimes used under colonial rule (Arias, Girod et al., 2014). In Botswana, colonial rule preserved forums that allowed commoners to criticize chiefs, and the post-independence leadership inherited the legitimacy of precolonial authorities (Acemoglu, Johnson and Robinson, 2003). Chiefs' powers over land in Ghana were recognized by colonial authorities and shape investment behavior today (Goldstein and Udry, 2008).

6. NULL EFFECTS AND POST-COLONIAL REVERSALS

In this section, we note studies that find null results of colonial factors. In the absence of multiple equilibria, or where countervailing forces have offset colonial influences on domestic institutions, culture, or knowledge and technology, these influences should not be expected to have persistent effects. Summerhill (2010), for example, finds no links between slavery or historical land inequality in São Paulo – both rooted in the colonial period – and long-run development. Similarly, a negative correlation between historical and later outcomes could emerge. Such anti-persistence could be the result of backlash against colonial policies, among other channels. For example, in Libya, areas from which Italian settlers were expelled reverted to traditional cropping patterns; these formerly commercial regions are indeed less commercialized than others today (Bertazzini, 2019). Identifying these null effects and reversals is important in avoiding publication bias (Voth, 2021). Nulls are also informative about mechanisms. For example, Davis and Weinstein (2002) find Allied bombing during the Second World War did not permanently disrupt Japanese settlement patterns. They take this as evidence of a combination of location fundamentals and increasing returns determining the equilibrium distribution of settlement. Similarly, Gaikwad (2014) finds that precolonial trade networks are better indicators of modern economic transformation than colonial factors.

Where multiple equilibria do not exist, or where policy interventions have moved societies to equilibria not set under colonial rule, studies have found null impacts of colonial interventions. While railways had permanent effects on development in Northern Nigeria, they had no similar effects in the South. In the South, they were

expensive compared to other modes of transport, and access to ports was substantial even before the construction of the railway (Okoye, Pongou and Yokossi, 2019). The population impacts of the *mita* and *encomienda* in Peru were eroded by migration that occurred prior to independence (Abad and Maurer, 2025). Lehne (2019) finds no persistence in the elevated levels of irrigation and policing that were present in India's opium-growing regions before 1912; underinvestment in education in these areas has, by contrast, persisted to the present. Iyer and Weir (2024) show that some long-run impacts of indirect rule and landlord-based revenue systems have dissipated since 1991, particularly where policies have been targeted towards equalizing access to public goods.

Failure of colonial rule to change institutions and culture, as well as post-colonial changes in these variables, have also undermined colonial persistence. National-level institutions in Africa are partly inherited from colonial states. And yet differences in these institutions across national borders often fail to show up in differences in development outcomes within the territories of ethnic groups partitioned by these national borders (Michalopoulos and Papaioannou, 2014). Bubb (2013) uses an RDD to find that property rights over land do not differ at the border separating Ghana from the Ivory Coast, despite the different legal regimes surrounding land and property the two countries inherited from their colonisers (British and French respectively). Henn, Larreguy and Schmidt-Padilla (2021) find that the effects of missions on political participation differ across democracies, competitive authoritarian regimes, and dictatorships, indicating no clear relationship. Gaps in financial development emerged between the regions of Shanghai that were subject to British and French legal traditions after the establishment of Mixed Courts in 1869. The Mixed Courts led to the application of common law in the British concession. These gaps eroded after the 1926 Provisional Rendition Agreement instead applied Chinese civil law in both concessions (Levine et al., 2023). Many African countries have become more democratic since the 1990s, even if colonial rule had left them with differing levels of democracy prior (Canen and Wantchekon, 2022). Similarly, Lee and Paine (2019*a*) find that, while democracy increased in many colonies immediately after independence, gains in terms of development and conflict were more muted (Lee and Paine, 2019*b*). Geloso, Kufenko and Arsenault-Morin (2023) show that the adverse wage effects of seigneurial tenure in Canada dissipated within two decades of its abolition, in part because those subject to it did not internalize norms of servitude. In South Asia, Hindu-Muslim harmony in medieval international ports, which developed due to complementary skills and economic cooperation over centuries, persisted through colonialism despite European trade disrupting the relevance of these skills (Jha, 2013).

Limited transmission of colonial investments, as well as later changes in knowledge and technology, have also overcome colonial legacies. Smaller mission stations may not have had the same long-run development effects as major mission stations (Jedwab, Meier zu Selhausen and Moradi, 2022). Colonial investments in education and health predict contemporary outcomes in former French colonies better than in British colonies in Africa, in part because greater economic growth has disrupted persistence in former British colonies (Ricart-Huguet, 2021). Canning, Mabeu and Pongou (2022) use a spatial RDD to show that, while female education is greater in former British colonies in Africa, fertility is only greater in former French colonies where market access is low and has not raised the opportunity cost of childbearing. Educational gaps themselves have disappeared and re-emerged over time between the formerly British-ruled and formerly French-ruled parts of Cameroon, depending on the educational policies of the post-independence government in power (Dupraz, 2019; Mabeu and Pongou, 2022). And so it is the combination of postcolonial policies and colonial education systems that explains why students do better in math today on the French side of the former border (Bekkouche and Dupraz, 2023).

7. CRITICISM

The literature on persistence has grown mature enough that several standard critiques exist of persistence studies. We focus on four: the compression of history, spatial correlation, data quality, and the interpretation of coefficients.

Austin (2008*b*) notes two types of compression in persistence studies. The first is temporal, as when Acemoglu, Johnson and Robinson (2002) regress development in 1995 on population density in 1500. The second is conceptual, as when Acemoglu, Johnson and Robinson (2001) make a coarse division of colonies into two types: “settler” and “non-settler.” Best practice in persistence papers, then, is to de-compress history on both dimensions. First, good studies consider mediating channels at intermediate points in time. Dell (2010), for example, traces the impacts of the Peruvian *mita* system of forced labour on household consumption and child stunting in the early 2000s through several intermediate mechanisms, including the presence of *haciendas* in 1689, rural tributary population in *haciendas* in 1845, literacy in 1876, schooling in 1940, rural population in *haciendas* in 1940, land inequality in 1994, and schooling in 2001. Second, good studies show multiple, often continuous, measures of the primary historical variable of interest. Nunn and Wantchekon (2011) find a link between historical slave exports and mistrust in present-day Africa using a continuous measure of slave exports (slaves per unit area), and show this result survives several

functional forms (linear, logarithmic) and normalizations (total, per unit area, per capita).

Conley and Kelly (2025) argue that persistence studies are particularly prone to having standard errors (measures of the imprecision of an estimate) that are too small, because of spatial correlation in the error term. Because many studies use spatial units of observation such as villages, and because unobserved variables that matter for the outcomes of interest are often correlated over space, observations should not be assumed to be independent. Firstly, we note that this criticism is not limited in scope to persistence studies but is equally an issue for any study that uses spatial data. Secondly, there are several tools for dealing with this concern, including controlling for confounders that absorb the spatial correlation (Voth, 2021), standard errors that allow for spatial dependence (Colella et al., 2019; Conley, 1999), splines in latitude and longitude (Kelly, Mokyr and Ó Gráda, 2023), and randomization inference with noise that mimics the spatial distribution of the main historical variable of interest (Conley and Kelly, 2025). Michalopoulos and Papaioannou (2013), for example, report Conley (1999) standard errors allowing for spatial dependence up to 2,000 kilometers in their study of the present-day effects of precolonial states on luminosity in Africa. Müller and Watson (2024) propose a correction for autocorrelation in spatial data using a technique similar to testing for unit roots in time series data. This provides a solution to deal with criticisms of spatial correlation in cross sectional data and will be an important addition to the toolkit of economic historians of developing countries, where cross-sectional data is often the main empirical evidence.

Cioni, Federico and Vasta (2022) note that, like other studies in economic history, persistence studies must often cope with poor data quality. Jedwab, Meier zu Selhausen and Moradi (2022) have shown, for example, that the well-used Roome (1925) map of colonial missions omits more than 90% of the missions that other sources report for Ghana. Albouy (2012), similarly, notes that many estimates of settler mortality in Acemoglu, Johnson and Robinson (2001) are imputed based on nearby countries. Data availability may force researchers to use proxy measures that differ across contexts. Data quality and availability may, similarly, lead researchers to focus on a small and unrepresentative set of former colonies. Persistence studies, like all empirical studies, are improved by showing robustness to alternative sources of data. Dincecco et al. (2024), for example, connect historical conflict exposure to present-day gender norms in India, showing that results obtained using data on battles recorded in Jaques (2007) survive instead using information on wars from Brecke (1999) or battles scraped from WikiData.

Finally, the interpretation of coefficients obtained by persistence studies may be nontrivial. Bisin and Moro (2021) note that, with heterogeneous treatment effects, the treatment effect estimated from a historical natural experiment may not be representative of the average effect for the whole population – a concern faced even by randomized controlled trials when compliance is imperfect (Glennester and Takavarasha, 2014). Casey and Klemp (2021), similarly, point out that if a historical instrument z affects a historical variable x , and that historical variable has other effects on the outcome of interest beyond its impacts on contemporary values of x , these other effects violate the exclusion restriction. Correcting for this violation can lower the estimated effects of the contemporary x variable substantially. We anticipate that further developments in the field of causal inference and the greater use of structural models in future persistence studies will help clarify the treatment effects of interest and the deeper parameters that can actually be uncovered by historical work.

8. CONCLUSION

In this review, have discussed the long-run impacts of colonial interventions related to property rights and land, political institutions, infrastructure, forced labour, the slave trade, and human capital. These effects have been largely driven by mechanisms identified by Nunn (2009): multiple equilibria and path dependence, domestic institutions, culture, and knowledge and technology. We have outlined the tools common in persistence studies – largely fixed effects, regression discontinuity designs, and instrumental variables. Where these mechanisms have been absent or have been removed, colonial legacies have weakened, disappeared, or even reversed. Colonialism cannot explain everything about ex-colonies, though some persistence of precolonial factors has been with the aid of colonialism, and some non-persistence and anti-persistence of precolonial factors has been due to colonialism. We have noted major critiques of persistence, focusing on compression of history, spatial correlation, data quality, and coefficient interpretation, and identified best practices to overcome these limitations.

We close by identifying three directions for future work. First, more attention needs to be paid to non-European empires. The Mongols operated the largest land empire in history, and the Japanese colonial legacy in Asia continues to be a sore point in the region's politics. Empirical work on the persistence of these variants of empire is rare – see Mattingly (2017) for an exception. Second, given the importance of psychological and cultural traits for economic development (Henrich, 2020; Nunn, 2021), recent tools in the analysis of unstructured text data have created new opportunities to understand the long-run impacts of colonialism on these variables. Third, the focus of the recent

empirical literature has been, with rare exceptions (Cogneau et al., 2024; Dal Bó et al., 2024; Derenoncourt, 2018; Heblich, Redding and Voth, 2022), on how colonisation affected the colonised. But the impact on the coloniser remains understudied.

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