

GOOD GEOGRAPHY, GOOD INSTITUTIONS? HISTORICAL EVIDENCE FROM NINETEENTH-CENTURY BRITISH COLONIES[†]

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Abstract

This paper uses a historical natural experiment – the opening of the Suez Canal – to investigate the relationship between geography and the formation of institutions. Contrary to conventional wisdom, we posit that colonisers may in fact build non-extractive institutions in well-endowed colonies, if their ability to extract rents depends on the productivity of the non-elite native population. We test this hypothesis by examining one aspect of geography – location – using historical data on nineteenth-century British possessions. Our results indicate that while these colonies were geographically positioned to benefit from the post-Suez trade-led economic expansion, entrepôt colonies (Hong Kong and the Straits Settlements) received larger public investments, in education, for example, than resource colonies (British India and Ceylon), which points to a peculiar case of non-exploitative rent-extraction. We demonstrate, using supplementary data, that our findings are driven by commodity endowments and not other possible confounders.

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1 Introduction

What is the effect of geography on institutional formation, and ultimately, economic development? Beginning with North and Thomas (1973), scholars have argued that institutions – economic and political – are a central determinant of economic performance. That good institutions foster economic development is not controversial; however, the formation of institutions, particularly its relationship with geographical endowments, is rather complex. Conventional wisdom in the existing literature suggests that having an abundance of geographical endowments generally provides incentives for the ruling elites to build extractive institutions that hinder economic development in the long run. For instance, elites may establish institutions that deny non-elites of property and voting rights, and equal access to education, to fully exploit gains from extracting natural resources (Engerman and Sokoloff, 1997; Acemoglu, Johnson, and Robinson, 2001). To illustrate the argument, Acemoglu, Johnson, and Robinson (2002) use the Aztecs and the Incas as examples of well-endowed societies that declined after the rise of European colonisers. Calling it the “reversal of fortune”, they reason that these empires had a large population that was susceptible to labour coercion by colonisers, and that the creation and persistence of extractive institutions may explain, in part, why Central and South America are relatively poor today.

While concurring that institutions play a vital role in economic development, we believe that our existing understanding of the relationship between geography and institutions may be incomplete. As previous studies focus mainly on resource economies in which extractive policies guarantee maximal rent extraction, they invariably conclude that good geography engenders bad institutions. We propose that it can be incentive-compatible for colonizers to introduce good institutions in colonies with good geography, in situations where they are unable to extract rents unless they raise the productivity of the non-elite native population (through education, for example); in that case, geographical endowments can actually be a blessing.

Specifically, we focus on one aspect of geography – location – by examining two sets of nineteenth century British colonies – British India and Ceylon (primarily resource economies) and the Straits Settlements and Hong Kong (primarily entrepôt economies).¹ While both sets of colonies were geographically positioned to benefit from the booming East-West shipping trade in the late nineteenth century, certain types of public investments (in education, for example) grew substantially more in the Straits Settlements and Hong Kong, relative to British India and Ceylon. We

¹That location is an important aspect of geography is not a new idea, as previous work by renowned scholars have already emphasized the role of location [see Diamond (1999), and Hall and Jones (1999), for instance].

argue that these differences emerged because those types of public investments enhanced the profitability of *entrepôt* activities whereas exploitative rent-extraction would have been ineffective. We go on to show that our empirical findings are driven by the variation in commodity endowments (which distinguish resource from *entrepôt* economies) and not other possible confounding factors such as baseline social hierarchies.

This research makes two contributions. First, we document the importance of institutions in determining economic performance in the context of the late nineteenth-century global trade boom. The evidence we describe here augments the literature on the effects of institutions on economic growth (Acemoglu, Johnson, and Robinson, 2001; Acemoglu, Johnson, and Robinson, 2007; Rodrik, Subramanian, and Trebbi, 2004). In particular, our paper highlights the role of historic events – in this case, the opening of the Suez Canal in November 1869 – in determining economic development, which is consistent with a growing literature on the subject [see Nunn (2009), for a review]. Second, we use a novel natural experiment involving the opening of the Suez Canal to establish a causal relationship between geography and institutions. Our empirical results highlight (i) the possible establishment of a non-exploitative type of rent-extraction, and (ii) the importance of incentive compatibility in the formation of institutions, both of which are rarely studied in the existing literature.

The rest of this paper is organized as follows. Section 2 constitutes a discussion on our research design. Section 3 describes the data. Section 4 describes the public investments, especially highlighting their differences across resources and *entrepôt* colonies. Section 5 provides the main empirical results, while an investigation into mechanisms and the robustness checks are discussed in Sections 6 and 7 respectively. Section 8 concludes.

2 Research design

In this paper, we compare two sets of British colonies in the late nineteenth century – resource colonies (British India and Ceylon) and *entrepôt* colonies (Hong Kong and the Straits Settlements). British India and Ceylon were important to the British East India Company (EIC) for their commodities, such as coffee, cotton, silk, indigo dye, tea, and opium (Chaudhuri, 1983; Wenzlhuemer, 2008), as strong demand for these commodities, particularly from Europe, translated into

lucrative commercial opportunities.² On the other hand, Hong Kong and the Straits Settlements did not possess natural commodities that could be exploited with considerable scale, but were desired for their entrepôt trading potential.³ Hong Kong is strategically located on China's south coast which is vital for protecting the trade route to China, while the Straits Settlements are situated along the Straits of Malacca, a natural choke point along the shortest East-West shipping route.

Our empirical goal is to identify the impact of geography – in this case, location – on institutional change. To this end, one cannot simply compare institutions across colonies with different levels of geographical endowment, as some other unobserved factors which are associated with geography may also influence institutional change. A more convincing strategy might be to make use of exogenous variation in geographical endowment, so that institutional differences over time can be attributed to variation in geography. However, geographical endowments, such as natural resources, climate, and location, tend to be fixed over time, which makes it extremely difficult for one to employ this method.

To overcome these empirical challenges, we rely on a novel research design that utilises the variation in the *realisation* of geographical endowments, rather than variation in the geographical endowments themselves. Specifically, we make use of plausibly exogenous timing in the opening of the Suez Canal, which realises the (latent) geographical advantage of colonies engaging in trade such as British India and the Straits Settlements.⁴ The Suez Canal is a man-made waterway that connects the Mediterranean Sea to the Red Sea, opened in November 1869 after 10 years of con-

²For example, under EIC rule, British India grew into one of the largest exporter of cotton in the nineteenth century. In fact, the commercialisation of agriculture was so intense that food production declined to the extent that there was mass impoverishment, destitution of farmers, and even famines (Sarkar, 1989). Correspondingly, coffee plantations in Ceylon provided the EIC with soaring revenues (Wenzlhuemer, 2008, p.31).

³To be more accurate, the Straits Settlements' hinterland, Malaya, did have a large tin mining industry since the 1820s; however, its tin-producing states were under the control of their respective Sultans until the Pangkor Treaty of 1874 paved the way for British involvement in the Malaya states. Also, large-scale rubber tapping did occur but it only started in the early 1900s. Singapore was also a producer of pepper and gambier, albeit at a very small scale.

⁴The Suez Canal also hastened the rise of steamships. While steam navigation had been adopted since the early nineteenth century, its diffusion into long-distance travel was halted by a dependence on coal which decreased profitability as coal took up valuable cargo space. The opening of the canal effectively made steamships more feasible (relative to sail ships) because of the reduced transit distance. At the same time, sail ships were unable to adapt to the canal due to prohibitive towing costs and the westerly winds of the Mediterranean Sea (Fletcher, 1958). In truth, it is the combination of steam navigation and the Suez Canal that drove global trade rather than the canal itself.

struction by the Suez Canal Company.⁵ At first there was little international interest in the project, and the British government even opposed the construction on the grounds of the forced slavery of thousands of laborers. Soon after its completion, however, it became clear that the canal would have had a massive impact on the East-West seaborne trade as the shipping distance between the East and the West was dramatically cut. While vessels from Europe once relied on multiple gateways to the East, they could not avoid rounding the Cape of Good Hope and making the gruelling journey across the Indian Ocean; seen in that light, the Suez Canal enabled European vessels to cut across the African continent, which substantially reduced transit times.⁶

The opening of the Suez Canal benefitted both sets of British colonies, albeit for different reasons. The canal brought British India and Ceylon much closer to western Europe and vastly increased their commodity exports (Fletcher, 1958). For Hong Kong and the Straits Settlements, the transit time advantage conferred by the canal, though rather substantial, is less impressive; instead, it is their locational advantage that accounted for an incredible surge in trade flows (Bogaars, 1955; Huff, 2012). Since British India and Ceylon were major exporters of commodities such as coffee, cotton, tea, and opium, while Hong Kong and the Straits Settlements were still functioning primarily as a network of *entrepôt* outposts, the surge in trade created different incentives for institution-building by the British, and this serves as the main building block of our analyses.

While the post-Suez trade-led growth in British India and Ceylon gave the Crown further incentives to extract rents from commodity exports, a similar exploitative strategy would not have worked in Hong Kong and the Straits Settlements. Instead, due to the absence of extractable resources in the *entrepôt* colonies, the British capitalised on them in a different way. They ultimately created “better” institutions, for example, through the provision of education to meet the growing demand for English-speaking clerks in government offices and trading houses, or through public works projects that improved sanitation and infrastructure.

To be precise, our natural experimental approach compares resource with *entrepôt* colonies, before and after the opening of the Suez Canal. Our intent is to demonstrate that, while the Suez Canal generated and diverted East-West shipping traffic, thus boosting trade flows for all

⁵The company was set up by a French diplomat, Ferdinand de Lesseps, who obtained permission to build the canal from Sa’id Pasha, the Khedive of Egypt and Sudan in 1854.

⁶For example, the distance from London to Bombay was reduced from 10,667 to 6,274 nautical miles – a reduction of 41.2 percent. Similarly, the transit between London and Singapore decreased from 11,740 to 8,362 nautical miles – a reduction of 28.8 percent (Rabino, 1887).

of these British colonies, the patterns of institution building took different turns. In British India and Ceylon, there were minimal increments in public investments despite the surge in commodities export, while for Hong Kong and the Straits Settlements similar forms of public investments increased rapidly.

3 Data

We compile historical data on the colonies primarily from the colonial Blue Books, annual reports and statistical abstracts (see Appendix for a full list of primary data sources).⁷ From these sources, we extract education, public works, and judicial expenditures from the government accounts to construct measures of institutions.⁸ Additional demographic, education, and trade data were also gathered from other published sources.⁹ Demographic data are quite conventional – we are mostly interested in each colony’s population size and ethno-religious composition, which we use to normalise government expenditures and also to construct group diversity indices. We also use imports and exports to construct trade flows, and to estimate the commodity endowments of each colony. Most of our data are unique in that they have never been compiled on this scale, to our knowledge, and certainly not for the purpose of examining comparative institutional change.

Our set of resource colonies comprises British India and Ceylon. British India was established in 1612 by the EIC. British Ceylon (present-day Sri Lanka), on the other hand, was conquered by the EIC following the Second Kandyan War in 1815, though parts of Ceylon had already been occupied since the sixteenth century by the Portuguese and Dutch. We consider five key provinces in British India – Bombay, Bengal, Madras, Punjab, and the Northwest Provinces. Bombay and

⁷The Blue Books date back to a request from the Common Select Committee in 1817 for returns of offices in the crown colonies, and represent a collection of annual statistics including population, imports and exports, revenues and taxes, and so on. The governor of each crown colony was obligated to complete the Blue Books, as well as the accompanying annual reports, which were essentially summaries of the key components of the Blue Books. Often, statistical abstracts that depict these data in tabular form were also published.

⁸While other types of expenditures, in healthcare, for example, may be of interest, they were not always reported in all colonies, so we could not use them in this paper.

⁹The other sources are: Hamilton (1828), Newbold (1839), Holloway (1842), Montgomery Martin (1843), Punjab Board of Administration (1854), Mahmood (1895), Makepeace, Brooke, and Braddell (1921), and Wong (2003). Annual data were not always available for the period 1850-1900. On average, five non-contiguous population data were missing per colony: these have been interpolated assuming linear population growth. Data gaps in expenditures were filled in on the basis of the mean share of component expenditure over total expenditure in the previous five years. On average, there were seven missing observations per colony in education expenditure, three missing observations per colony in public works expenditure, and 15 missing observations per colony in judicial expenditure. Linear interpolation has been used to fill missing trade figures (less than five percent of our sample).

Bengal were expanded from respective presidencies to become provinces after the Anglo-Maratha Wars in 1818. Madras was established after the Anglo-Mysore Wars in 1799. Punjab was created after the Anglo-Sikh Wars in 1849, and the Northwest Provinces were established as a Lieutenant-Governorship in 1836.¹⁰ We disregard the princely (or native) states that were not directly governed by the British. The data for British India are mainly derived from statistical abstracts covering the period 1840-1911, and from the House of Commons Parliamentary Papers. The data for Ceylon are obtained from the Ceylon Blue Books and the *Statistical Tables relating to Colonial and other Possessions of United Kingdom, 1856-1900* (henceforth Statistical Tables).

With regards to entrepôt colonies, we look at Hong Kong and the Straits Settlements. Hong Kong became a British colony in 1841 following the First Opium War, while the Straits Settlements were established by the EIC in 1826.¹¹ Within the Straits Settlements, we examine Malacca, Penang (including Province Wellesley), and Singapore. Malacca was originally founded by Parameswara in 1402, only to be conquered by the Portuguese in 1511 and then the Dutch in 1641. It was finally ceded by the Dutch to the British, in exchange for Bencoolen, under the Treaty of London in 1824. Penang, on the other hand, was ceded to the EIC by the Sultan of Kedah in 1786, in exchange for military protection from the Siamese and Burmese armies, and had been a British outpost since. Singapore, whose origins date back to the thirteenth century, was founded as a British colony by Raffles in 1819. George Town, Penang, was initially the capital of the Straits Settlements but in 1836 it was superceded by Singapore.¹² Thanks to the growing East-West shipping trade, the settlements quickly gained prominence and were transferred from the India Office to that of the

¹⁰While there are significant changes in the geographical boundaries of these provinces, particularly for Bengal, the data are reported at a sufficiently fine level for us to create a relatively stable set of boundaries. In our data, Bengal excludes Assam, Orissa, and other adjacent native or princely states. Bombay includes Sind but excludes Berar, Hyderabad, Mysore, and other adjacent native or princely states. The Northwest Provinces include Oudh for the later half of the nineteenth century. Refer to Map 1 depicting the British India provinces.

¹¹The island of Labuan later joined the Straits Settlements in 1906, but we ignore it here because its entry postdates the period of our study. The location of the Straits Settlements can be found in Map 2.

¹²This event itself deserves attention because it demonstrates the rapid success of Singapore (founded only 17 years prior to its ascension to becoming capital) and the EIC's recognition of its advantageous position at the foot of the Straits of Malacca (Emerson, 1964, p.92).

Secretary of State for the Colonies in London in 1867.¹³ The status and composition of the Straits Settlements remained unchanged right up to World War II. Due to the lack of digitised data for the Straits Settlements, we created a digital data set from the Straits Settlements Blue Books, held at the archives at the National Library of Singapore, and annual reports obtained from a 12-volume book series edited by Jarman (1998). These sources cover the period 1826-1941. Hong Kong's data are from Hong Kong Blue Books and the Statistical Tables. As aggregate trade values were not available, we have reconstructed them based on tonnage and bilateral trade values.¹⁴

The currency of choice differs across colonies and time, so the data are reported in different currencies (British pound, Indian rupees, Spanish dollars). For our regression analyses, we convert all currencies to the British pound using rates reported in the Blue Books and annual reports, or when missing, using the currency exchange rates in Denzel (2010). Finally, we deflate our figures (with the base year being 1862) separately for each colony. For British India, we use the price indices from Singh (1965).¹⁵ For the Straits Settlements, we create price indices from a weighted average of rice and textiles world prices (Blattman, Hwang, and Williamson, 2007), covering the period 1840-1900.¹⁶ For Ceylon and Hong Kong, we construct a similar index using a weighted average of textiles world prices, and domestic wheat prices (for Ceylon) or a food price index (for

¹³One complication that arises from our data collection is the evolution of reporting requirements of the Straits Settlements during the period of our study. Although the Straits Settlements were formed in 1826, no annual review was produced until 1856 when annual reports were submitted to the government of India. From 1867 onwards, the Straits Settlements became a crown colony and were thus subject to the Blue Book reporting standards. That being said, the statistics we use in this study – such as population, imports and exports – are typically comparable across different reporting formats.

¹⁴Bilateral imports, exports and tonnage were first summed up for all Hong Kong's major trading partners (accounting for around 75 percent of the total tonnage). Then, assuming a fixed trade-to-tonnage ratio, we scaled up imports, exports, and trade flows to match total tonnage; this assumption relies on the fact that the composition of traded goods was equal across major and non-major trading partners. Hong Kong's main trade partners with available bilateral trade flows (tonnage and value) were the UK (1850-1900), China (1863-1900), Japan (1889-1900), the Straits Settlements (1868-1900), India (1868-1900), the US (1889-1900) and Ceylon (1856-1900). All tonnage data are from the Statistical Tables. Bilateral trade data are from: Tom (1964) (UK); Endacott (1964) (China); Naikaku Tokeikyoku (1887), (Japan); Hitchcock (1990) (US); Mitchell (2003) (India); Statistical Tables (Straits Settlements and Ceylon).

¹⁵Singh's price series runs from 1857 onwards. To construct a series over the period 1850-1900, we assume, following Twomey (1983), that prices are constant between 1850-1857.

¹⁶A similar approach was used by Broadberry and Gupta (2012) who constructed a deflator for India using the prices of grain and cloth.

Hong Kong).¹⁷

4.1 Public investments in education

The [East India] Company was a trading concern and its main object was to promote commerce and make profit. It was unwilling to incur any expense unless it was absolutely necessary, and consequently did not show any interest in educational matters.

– Sinha (1964, p.41)

It was to the advantage of the [Straits Settlements] government, both directly and indirectly, to encourage the teaching of English in schools [...] English speaking clerks were always in great demand, whether in the government offices or in the commercial houses.

– Cooke (1966, p.371), on government-funded English schools in the Straits Settlements

Colonial interests in the colonies were very much profit-driven, hence public investments were kept at a minimum, as articulated by Sinha (1964, p.41). However, certain types of public expenditures may be required to enhance the profitability in particular colonies; Cooke (1966, p.371), for instance, documents that the provision of (English) education benefitted the EIC through supplying a clerical workforce that was in great demand. In this section, we outline the evolution of public investments in education, and how the Suez Canal shaped incentives for higher education expenditures in the entrepôt colonies.

Across the colonies in our sample, schooling was historically designed for a small elite, and the British continued to show a lack of interest in public schooling even after the onset of colonialism. Both in territories initially ruled by the EIC (British India and the Strait Settlements) as well and those directly administered by the Crown (Ceylon and Hong Kong), investments in education remained low and represented a very small percentage of the colonial budget. During the pre-Suez years, for instance, the share of education spending over total government expenditure remained well below 2 percent on average.

That the British initially paid little attention to education is well-documented. In British India and the Straits Settlements, for example, the EIC was more concerned with consolidating power, rather than with improving literacy [Nurullah and Naik (1951, p.83); Wyndham (1933, p.199); Mills (1942, pp.333-372); Wicks (1980, p.164)]. Similarly, in Ceylon and Hong Kong, the colonial authorities did not prioritise schooling and left most of the educational activities in the hands

¹⁷Ceylon's wheat prices are obtained from the Statistical Tables while Hong Kong's food price index is retrieved from the Hong Kong Economic History database at <http://www.hkimr.org/content-id20>.

of Christian missionaries (Coperehewa, 2011; Evans, 1998; Pennycook, 1998).¹⁸ The incentives to promote mass education were meagre across the colonies, and as a consequence, expenditure on education remained minimal, both in absolute and relative terms [Nurullah and Naik (1951, pp.80-82); Jayaweera (1969, p.89); Wyndham (1933)].

By ideologically adhering to what was then called the “filtering down theory” – which considered it necessary to provide schooling to an elite who, in turn, would generate positive spillover effects to the masses – the Crown could not find the ideological commitment to establish a uniform and comprehensive nationwide system of schooling (Whitehead, 2005, p.320), and instead aimed to educate a selected group of natives who could work in its administrative offices [Chamberlain (1899, pp.68-69); Chaudhary (2009, p.272); Punci (2001, p.366)]. Parallel to this was the favouring of English over vernacular languages as the medium of instruction – as advocated by the Colebrooke Commission (1832), and later echoed by the infamous Macaulay Minute of 1835 – which led to the decline of indigenous vernacular schools.¹⁹

The Crown’s attitude towards education funding began to change after the opening of the Suez Canal. As described in the previous sections, Suez brought about tremendous growth opportunities across the colonies in our sample. For example, imports and exports grew, on average, two percent per year in Bengal, Bombay, and Madras, and 2.6 per cent per year in Ceylon during 1869-1900. Similarly, trade flows more than tripled between the pre- and post-Suez periods, with the most pronounced growth achieved in Singapore and Hong Kong (Figure 2).²⁰

While Suez-led trade had a positive impact on colonial revenue across the colonies, it did not everywhere translate into an increase in education expenditures. In the resource colonies, educating the locals would mean losing a subjugated labour force, so it was important for the colonial

¹⁸See Chaudhary (2009) for an illustration of the Indian schooling system during the Raj; De Silva (1969, pp.463-479), for an overview of the education system in Ceylon; Evans (1998) and Evans (2006) for Hong Kong; Loh (1969) for the Straits Settlements.

¹⁹This was the most controversial issue regarding education provision in the early nineteenth century, with the Orientalists advocating the use of vernacular languages while the Anglicists argued that the best policy was to favour the English medium and to create a small educated class [see Chamberlain (1899, pp.38-39), Whitehead (2005, p.319), Coperehewa (2011), and Brutt-Griffler (2002)].

²⁰The economic stimulus given by Suez was later sustained by a general reduction in the cost of oceanic freight rates and the emergence of new export markets (Chaudhuri, 1983, p.807). Other important advancements in telecommunications, such as the formation of the International Telegraphic Union (1868) and the International Postal Union (1874), which led to the spread of international cable telegraph and postal operations, further strengthened the economic importance of entrepôt colonies that were positioned at the crossroads of the busiest East-West sea-routes.

government to maintain the socioeconomic stratification (Brutt-Griffler, 2002, p.215). As such, the Crown continued to pursue a policy of disengagement from education in British India by minimising direct involvement in the funding of government schools – following the guidelines of the Report of the Indian Education Commission (1882-3) – and committing limited funds to education, especially in primary schooling [Chaudhary (2009); Nurullah and Naik (1951, pp.322, 337, 359-360)].²¹ Parallel developments characterised Ceylon’s education policies post-Suez. There, the lack of financial provision by the Colonial Office inhibited the expansion of the school system, and various colonial reports highlight the low teaching standards and inadequate provision of education [see for example, Rajaindran (1969, p.442)].²²

On the other hand, the Suez-led trade growth was associated with much higher education spending in the entrepôt colonies. Specifically, the share of education spending over total expenditure increased more than fourfold in Singapore, almost tripled in Hong Kong, and more than doubled in Penang and Malacca between 1868 and 1885; education expenditures in per capita terms grew around fivefold on average in all regions before and after Suez (see Figure 1 and Table 1).²³ In the Straits Settlements, the first significant improvement in the colonial attitude towards schooling was the creation of the posts of Inspector of Schools and Director of Schools in 1872. This was a clear signal that education was now regarded of sufficient importance to justify the appointment of an official to supervise it, and in the words of an official report, “to place it on a more

²¹Between 1869 and 1900, per capita expenditure on education remained below £0.005 for all provinces, with Northwest at the lower end, and an average per capita expenditure of only £0.001 (see Figure 1). Investments in human capital in British India in this period were not only far below developed countries, but also lower than other British colonies and possessions and countries of the poor periphery (Davis and Huttenback, 1986). The overall picture of Indian education during British rule appears even bleaker when we look at literacy levels at the turn of the century, which remained unchanged to those in the early 1800s, at an average of only six percent (Chaudhary, 2009).

²²Moreover, Ceylon’s education system suffered from the coffee crisis of 1879, and the related financial depression that lasted until 1887 (Wenzlhuemer, 2008, p.62). The reduction in government revenue translated into a decrease in grants-in-aid and further government withdrawal from school management (Somapala, 1969, p.451).

²³However, the growth in government expenditures on education could not be sustained indefinitely (see Figure 1, for example). The decline, beginning in the mid-1880s, is associated with declining revenues from opium farm licensing, and expenditure substitution towards other items, particularly on military infrastructure and staffing. In 1885, due to the fear of an Anglo-Russian war over Afghanistan, the Straits Settlements petitioned the Colonial Office to provide more support for their defence and recommended that the War Office should supply guns and equipment. Increased military expenditure was achieved at the expenses of investments in education and infrastructure (Turnbull, 1977, p.123).

systematic footing" (Cooke, 1966, p.390).²⁴ In Hong Kong, the late 1860s to early 1870s coincided with a time of increased interest in education by the colonial authorities. This attitude manifested *inter alia* in a vigorous determination to promote the use of English over Cantonese, by increasing the balance of hours taught in aided schools in favour of the former (Sweeting and Vickers, 2007, p.15).

It is important to highlight that in the *entrepôt* colonies, the schools that benefitted most from the additional post-Suez funding were, unsurprisingly, those using the English medium.²⁵ These were indeed able to best meet the particular needs of the British administration, namely having English speaking clerks both in government offices and in commercial warehouses [Cooke (1966, p.371); Pennycook (1998)]. Rapid economic development created a parallel demand for English education, animated by the considerable gap in the wage earning capacity of an English and a vernacular educated boy. Since the supply of clerical jobs remained higher than demand well into the interwar period, acquiring a sufficient knowledge of arithmetic and English represented a guarantee for higher remunerated employment.²⁶

4.2 Other public investments

Would the patterns we observe in education expenditure exist also in other types of public investments? Here, we explore two other types of government expenditures – public works and judiciary – on which we have data.

In resource colonies, investments in public works were relatively subdued, and were mostly

²⁴Since the appointment of Mr Allan Skinner to the post of Inspector, schools were inspected more regularly and the reporting process became more detailed.

²⁵Following the same practice as in the rest of the Empire, colonial support to education was institutionalised under the framework of the so called grants-in-aid. This funding scheme, based on a system of subsidies allocated conditional on schools levying student fees and being inspected by government officers, ultimately favoured schools that introduced the English language in the curriculum. Thus, all colonies gradually saw the creation of dual education systems: the ill-funded vernacular schools, which targeted a limited section of the rural population; and the fee-levying, better-equipped English schools, located in the main urban centres and reserved for children from affluent families (Punchi, 2001; Brutt-Griffler, 2002; Watson, 2012; Evans, 2006).

²⁶That being said, in the Straits Settlements, such possibility of occupational mobility was realised particularly by the Chinese and Indians, but not by the vast majority of the Malays, who continued their traditional jobs of farming and fishing. In fact, most of the schools were concentrated in economically expanding cities and not in the countryside, where the majority of the Malay population lived. This further strained the economic divide between urban and rural areas, aggravating income inequalities along ethnic lines.

directed towards irrigation and roads.²⁷ In British India, for example, canals and anicuts were constructed to improve the fertility of the land – which increased agricultural productivity, and in turn, fiscal revenues via greater rates of taxation – and to reduce dependency from monsoonal rain, providing famine relief (Whitcombe, 1983, p.678). Similarly, irrigation projects in Ceylon were aimed at increasing output per acre, specifically in the plantation sector, which in turn enhanced fiscal revenues. Road networks, on the other hand, were developed mostly to assist agricultural commercialisation. For instance, in Ceylon, they were concentrated in the Kandyan highlands with coffee plantations, while in British India, they were developed in those regions most integrated with global markets. While one might expect the Suez-led trade boom to compound incentives for the colonial government to improve irrigation and roads, from Table 1 we see that post-Suez investments in public works were in fact no higher than before. This could be driven by the limited success of the irrigation schemes – as attested by various administrative reports to the Colonial Office [see, for example, CO 54/646, quoted in Wenzlhuemer (2008, p.148)] – and the fact that a large portion of road infrastructure projects was actually financed by the private sector (Davis and Huttenback (1986, p.130).

In the entrepôt colonies, investments in public works already were relatively high in the pre-Suez period, thanks to several transportation infrastructure projects;²⁸ yet, infrastructure investment increased considerably after the opening of the Suez Canal. Specifically, government expenditure on public works more than doubled in per capita terms between the pre- and post-Suez period (Table 1). Indeed, apart from constructions in roads, considerable effort was undertaken to improve and enlarge the entrepôts' wharves, where new docks and facilities were built to keep pace with rising trade volumes and the increasing number and size of steamers in the post-Suez period.²⁹ Additionally, in Hong Kong as well as the Straits Settlements, a public works depart-

²⁷Investments in public works exclude expenditures on railways because they were not always financed by the government. When railway construction began in the 1850s, British joint-stock companies paid for the initial outlay with guaranteed returns. In the 1870s, new railways were built by the government. Starting in 1880, private enterprises were again mobilised to help finance the railways with contracts that guaranteed returns on investment (Davis and Huttenback, 1986, p.132).

²⁸The first roads were constructed in Penang, Singapore, and Hong Kong, mostly using convict labour from India and Chinese contract labour, extending considerably the existing limited transport network. Some degree of transport development also took place in Malacca and Province Wellesley but at a smaller scale.

²⁹In Singapore, the number of steamers rose from 99 (60,654 tons) in March-August 1869 (before the opening of the Suez Canal) to 185 (164,756 tons) during the same period in 1872 (Wright and Reid, 1912, p.332). See Chiu (1973, pp.30-31) for an illustration of the development of Hong Kong's harbour after the opening of the Suez Canal.

ment was established to manage new infrastructure projects aimed at improving sanitation and general public health, such as the construction of hospitals, and the upgrading of waterworks and sewage networks in the 1880s.³⁰

Moving on to judicial expenditures – namely the portion of the budget dedicated to maintaining law and order, from the establishment of a police force to managing courts and tribunals – we note again that these were relatively low in resource colonies as compared with those in entrepôt colonies. The colonial government was well aware of the inadequate funding and managing of judicial matters, as attested, for example, in one of the Crown’s report on the judicial system: “the judicial administration [of British India] is in a less satisfactory condition than most of the other departments” (British Government, 1852, p.10). Even among the entrepôt colonies, the British did not appear to have adequately dealt with law enforcement. In Singapore, for instance, the judicial administration was neglected from the beginning of British rule, facing considerable problems such as jails packed with men awaiting trial and cases remaining unheard for long periods of time (Turnbull, 1977).

The ineffectiveness in law enforcement continued throughout the pre- and post-Suez years in both Hong Kong and the Straits Settlements, leading to the consolidation of parallel systems of justice outside colonial control.³¹ These comprised private, self-funded associations administering law and order, whose functioning was often facilitated by the colonial authorities. For example, the colonial government in Hong Kong depended on an informal Chinese police force whose members were used as arbiters in disputes and detective works (Chan, 2011). The increasing use of these parallel policing units, accompanied by pressing demands from the Colonial Office to finance local and imperial military defense from the 1880s (Emerson, 1964; Turnbull, 1977; Chan, 2011), meant that investments in judiciary did not have to keep up with the Suez-led growth in demographics, as we can see in Table 1: if anything, the judicial expenditures in the entrepôt colonies fell by 15.3 percent in the post-Suez period.

5 Main empirical results

We first present some summary statistics on trade flows and per capita government expenditures in the period 1850-1900 (Table 1). Trade in the post-Suez period climbed steeply both in resource as well as entrepôt colonies. In resource colonies, trade flows increased by an incredible 76.7 per-

³⁰Emphasis was also given to the provision of water supply, gas and electricity [Wright and Reid (1912, p.231); Chiu (1973)].

³¹See Chan (2011) for a description of the *kaifong* associations in Hong Kong. See Turnbull (1977) on the Straits Settlements.

cent (equivalent to a difference of roughly seven million British pounds annually). In the entrepôt colonies, it was even more spectacular: trade flows more than tripled as it increased by 262 percent (equivalent to a difference of roughly 20 million British pounds annually). There is no doubt that the post-Suez years represent a golden period of trade growth in all of these colonies. With regards to public investments, per capita government expenditure took different turns across the colonies. In resource colonies, per capita government expenditures seemed to have dipped slightly (although the change is statistically indistinguishable from zero); expenditures on education and judiciary increased by 69 and 68 percent respectively; expenditures on public works did not significantly increase. On the other hand, per capita government expenditures in entrepôt colonies went up substantially by 73.5 percent; per capita expenditure on education increased more than fourfold (from 0.0078 to 0.0396 British pounds) and that on public works increased by 48 percent (from 0.1224 to 0.3035 British pounds); judicial expenditures exhibited no significant change.

Next, we move on to our regression analyses examining more closely the effect of the opening of the Suez Canal. While Table 1 and Figures 1-2 gave us a glimpse of what to expect, we now formally quantify our empirical results using the following regression:

$$y_{it} = \beta_1(PostSuez_t \times Entrepôt_t) + \alpha_i + \gamma_t + \theta Year_t + \delta(PostSuez_t \times Year_t) + \varepsilon_{it} \quad (1)$$

In equation (1), our panel observations are denoted by subscripts i for each colony, and t in each year. $PostSuez_t$ is an indicator for post-Suez years, and $Entrepôt_t$ is an indicator for entrepôt colonies. We include colony and year fixed effects, α_i and γ_t respectively, and also account for pre- and post-Suez trend terms. We report standard errors that are clustered at the colony level. In this case, β_1 represents the Suez effect that is specific to entrepôt colonies on outcome y_{it} – trade flows or per capita government expenditure. In other words, it represents the impact of the opening of the Suez Canal on the entrepôt colonies (relative to the resource colonies) provided that changes in y_{it} for both sets of colonies are equal in the absence of Suez.

Our results on trade flows are shown in Table 2. Notice that while the Suez effect on trade flows that is specific to entrepôt colonies is substantial, it is not statistically different from zero [column (1), Table 2]. Similarly, while the coefficients on imports and exports are positive, we find no statistically-significant effect [columns (2)-(3)]. These results imply that the Suez effects on trade flows, imports, and exports, were no higher for entrepôt colonies; that is, both sets of colonies benefitted equally from the Suez-led trade boom.

Next, we look at the impact on per capita government expenditure in Table 3. The Suez effect

on per capita expenditure on education that is specific to entrepôt colonies is statistically significant and economically substantial: a coefficient of between 0.017 to 0.032 on the interaction term implies that the Suez effect on per capita government expenditure on education is between one to two-and-a-half times the pre-Suez average [columns (1)-(2), Table 3]. This effect is over and above permanent colony characteristics and year-specific factors, after having accounted for possible differential pre- and post-Suez year trends.

Notice that, in column (2), we also include trade flows as controls, and this is our preferred specification going forward for two reasons. First, trade flows that vary at the colony-year level are a proxy for corresponding changes in government revenues which may in turn impact government investments. Second, trade flows account for possible changes in the terms of trade which may differentially influence government expenditures across the two sets of colonies in this period (for example, a deterioration in commodity prices may have disproportionately impacted resource colonies more than it did entrepôt colonies). The empirical results in Table 3 suggest that the above concerns are non-trivial – the omission of trade flows as controls may give rise to over-estimates of the Suez effects in the order of up to 88 percent [for example, by comparing 0.017 in column (2) to 0.032 in column (1)].

In public works we find a rather similar story. Again, the increase in public works expenditure is significantly higher for entrepôt colonies: a coefficient of between 0.136 to 0.197 on the interaction term implies that the Suez effect on per capita government expenditure on public works is between one and two times the pre-Suez average [columns (3)-(4), Table 3]. On the other hand, the entrepôt-specific Suez effect on per capita government expenditure on judiciary is either not statistically different from zero or negative only at the 10 percent level [columns (5)-(6), Table 3]. The entrepôt-specific Suez effect on per capita total government expenditure is between 37.6 to 82.4 percent of the pre-Suez average [columns (7)-(8), Table 3].

Overall, we find that while the Suez Canal benefitted both sets of colonies equally in terms of trade, corresponding increases in per capita government expenditures – on education and public works – were substantially larger in entrepôt colonies. There is some evidence which suggests that the colonial governments in entrepôt colonies may be substituting away from judicial towards education and public works investments, but there the results are slightly weaker. Importantly, we find an economically substantial entrepôt-specific Suez effect on per capita total government expenditures, which implies that public investments in the entrepôt colonies increased overall post-Suez. Our empirical findings supports the conjecture that the increments in public investments

were driven by the unlocking of locational advantages conferred by the Suez Canal.

6 Commodity endowments versus other potential confounders

What is the mechanism through which locational advantages affect public investments? In what follows, we show that our result depends crucially on the extractability of existing resources rather than other potentially confounding channels. Because we have a small sample of colonies, our analyses are subject to criticisms relating to certain colony-specific features that might be driving our results. We go on to explain two such competing mechanism and attempt to show that they are empirically less important than the extractability of existing resources. For conciseness, we focus solely on education expenditures hereafter.

First, as argued by Acemoglu, Johnson, and Robinson (2001), colonization strategies may be influenced by the feasibility of settlements. For example, where disease environments were unfavorable to settlement, the early settlers (soldiers, bishops, sailors) faced high mortality rates which not only reduces the incentives for new settlers to arrive, but also made the establishment of extractive institutions more likely. While there are no reasons to expect that the British were more likely to settle in Hong Kong and the Straits Settlements than in British India and Ceylon (due to disease environment, for example), or indeed to expect that any such differences in settlement patterns were altered by the opening of the Suez Canal, we are able to look into these possibilities by using European population shares based on data from the earliest censuses of each colony [see subsequent analyses in equation (2)].

A second concern is with regards to latent social organizational characteristics that might influence how the colonial government conducted its public investments. For example, it is well documented that the colonial government took advantage of the Hindu social hierarchy in British India by providing education predominantly to upper caste (the Brahmins). Some argue that it was exactly due to such pyramidal social structure that impeded the improvement of Indian education institutions (Whitehead, 2005, pp.234-235).³² Such arguments would feature centrally in the institutional literature, claiming that pre-colonial systems with high economic and/or political inequality had adverse impacts on schooling investment, banking and other institutions, with persistent repercussions (Engerman and Sokoloff, 1997; Acemoglu, Johnson, and Robin-

³²Of course, existing social systems can also be torn down, as was the case in Bengal, where the Muslim ruling class was dismantled and replaced with Hindu elites, in which case the role of existing social hierarchy is less clear.

son, 2002; Banerjee and Iyer, 2005; Easterly, 2007).³³

The pre-colonial social organization story, though compelling, may not be so relevant in the context of our comparative study, since there is no clear evidence on domestic institutions being more unequal in our resource colonies relative to *entrepôt* colonies. For example, while the Brahmins traditionally retained the highest economic and political status in India, the societal structure of the Malayan sultanates was also (possibly even more) hierarchical. Indeed we find more institutional similarities than differences between them: taxation systems were regressive, suffrage was not universal, and individual property rights were not secured. Moreover, if anything, the pre-colonial education system was likely to have broader coverage and accessibility in India, where elite religious school coexisted with numerous vernacular schools, while in the Straits only the former existed.

Due to data scarcity, we are unable to compute any comparable inequality measure to test our arguments. Instead, we rely on the notion of socio-political inequality by considering baseline social hierarchies. Based on data from the earliest censuses of each colony, we construct ethno-religious fractionalisation indices and ruling ethnic group shares for each colony (see Figure 3).³⁴ The fractionalisation index is a well-established measure of ethnic diversity which measures the probability that two randomly selected individuals are of different ethnicity. It ranges between zero (perfect homogeneity) and one (complete heterogeneity). Most of our colonies are quite diverse, as evident in Figure 3, except for Madras and Hong Kong. On the other hand, there is substantial variation in the elite ethno-religious group share, ranging from four percent (Brahmin in Madras) to 93 percent (Chinese in Hong Kong). The most striking feature amongst all our colonies is that none of them fits the profile of an Engerman-Sokoloff type – steep social hierarchy with a homogenous mass population – except for Hong Kong, which is located at the lower right end of the figure, but which as we know exhibits high (not low) public investments. Therefore, we

³³One prominent example in this literature is the exploitation of pre-colonial social organisations by the Spanish conquistadores, which proved detrimental to the emerging institutional structures that perpetuated an unequal distribution of wealth, human capital and political and economic opportunities (Engerman and Sokoloff, 1997). Similarly, extractive states like the Belgian Congo, with a steep social hierarchy, made rent-seeking institutions more profitable for the colonisers (Acemoglu, Johnson, and Robinson, 2001; Acemoglu, Johnson, and Robinson, 2002).

³⁴The censuses are: Singapore (1821), Penang (1828), Malacca (1826), British India provinces (1871), Ceylon (1863) and Hong Kong (1871). We weigh each observation by its population size in the 1820s. The ethno-religious groups for British India are: Brahmin, Buddhist and Jain, Christian, Hindu (non-Brahmin), Mahomedan, Sikh, and Other. For the Straits Settlements, they are: Chinese, European, Indian, Malay, and Other. For Ceylon, they are: European, Malabar, Singhalese, and Other. For Hong Kong, they are: Chinese, Indian, and European.

think it is unlikely that our results are confounded by baseline social hierarchies; moreover, the impact (if any) should be greater in the post-Suez period for this to confound our estimates.

To show, with some quantitative rigor, that the main driver of our Suez effect stems from differences in commodity endowments, not feasibility of settlements or baseline social hierarchies, we perform a pseudo-decomposition exercise by breaking down the Suez effects into the three possible channels. Commodity endowments are constructed from the export values of cash-crops – coconut, cotton, coffee, indigo, nutmeg, opium, raw silk, sugar, tea and tobacco.³⁵ European population shares, which measure the feasibility of settlements, are based on data from the earliest censuses of each colony. Finally, expression of social hierarchies of the Engerman-Sokoloff type is possibly non-linear in ethno-religious fractionalisation indices and ruling ethnic group shares, so we take the first principal component of the two (explaining most of the variation in the components) as a measure of social hierarchies. In practice, we run the following regression:

$$y_{it} = \beta_2(PostSuez_t \times European_i) + \beta_3(PostSuez_t \times Hierarchy_i) + \beta_4(PostSuez_t \times Endowment_i) + \alpha_i + \gamma_t + \theta Year_t + \delta(PostSuez_t \times Year_t) + w_{it} \quad (2)$$

Equation (2) is equivalent to running a horserace between the three leading contenders for why we find Suez effects that are specific to entrepôt colonies. Our results, in Table 4, show that neither European settlements nor social hierarchies has a statistically-significant effect on post-Suez per capita expenditure on education. On the other hand, the post-Suez effect of commodity endowments is negative and statistically significant when trade controls are included [columns (2), Table 4], which implies that colonies with larger commodity endowments have smaller per capita expenditures on education; this is consistent with our conjecture that the Suez effects are operating mainly through tendencies to exploit labour in post-Suez British India and Ceylon (high commodity endowments) but not in post-Suez Hong Kong and the Straits Settlements (low commodity endowments) since it is not possible to exploit labour without the presence of scale economies in the latter.

³⁵Most of these were produced and exported in British India, while in Straits Settlements only coconut, nutmeg, and sugar were produced and exported (by Penang and Malacca). Data on commodity endowments are based on 1868 – the year before the Suez Canal was opened – with the exception of Punjab and the North-West Provinces for which the earliest estimates are available in 1890. Data were obtained from the Straits Settlements Blue Books; from the Statistical Tables, for Bengal, Bombay and Madras; from Hunter (1900), for cotton and tobacco in Punjab; from the House of Commons Parliamentary Papers, for sugar in Punjab and the Northwest Provinces, and for opium in Punjab and the Northwest Provinces.

7 Robustness tests

While our study focuses on the period during which the opening of the Suez Canal boosted global shipping trade, there were other key events surrounding 1869 that may have also impacted the colonies. Specifically, although these colonies were under the control of the EIC at first, in 1874 the company was dissolved following tensions with religious and cultural groups in British India.³⁶ While the dissolution of the company is arguably unrelated to the Suez Canal, its timing was interconnected with major administrative changes that took place during this period. To be clear, the issue here is not the dissolution per se, since the EIC had already lost its power following the Indian Rebellion in 1857 and the subsequent nationalisation of the company under the Government of India Act in 1858, which precedes the opening of the Suez Canal by more than 10 years; rather, we are concerned about the policies implemented by British Crown after becoming the direct ruler of both colonies. For example, when compared with the profit-driven EIC, the Crown undertook greater responsibility for education (Nurullah and Naik, 1951).³⁷ It created the Indian Education Commission in 1882, which led to the formation of school boards, a more systematic way of funding schools, and encouraged the schooling of groups with below average literacy such as Muslims, lower castes and women, among other things [Chishti (2001); Chaudhary (2009, p.276)].

The decline of the EIC had similarly affected the fate of the Straits Settlements, which became a crown colony just two years prior to the opening of the Suez Canal. The reasons behind this change in administration signals that the British had already recognised the Straits Settlements' strategic role in controlling the East-West shipping trade. Whether this recognition had materialised in anticipation of the Suez Canal is unclear; however, given that trade in the Straits Settlements "was sluggish all through the 1860s" (Bogaars, 1955), we believe that the British would not have predicted the scale at which the Suez Canal was going to deliver trade to the region post-1869. More importantly, while the Straits Settlements did become a crown colony just before the opening of the Suez Canal, the other entrepôt colony – Hong Kong – had been a crown colony since 1841. Yet, it is clear, from Figure 1 for example, that the surge in public investments in Hong Kong only started in the post-Suez period, and thus must be unrelated to its crown status.

For these reasons, we need a more definitive test to examine whether our earlier findings are indeed due to the opening of the Suez in 1869 or are actually confounded by the aforementioned

³⁶The EIC was already nationalised in 1858, and its fate was finally sealed under the East India Stock Dividend Redemption Act in 1873.

³⁷For example, Nurullah and Naik (1951, p.81) said that the EIC "was influenced more by financial than philanthropic motives and resisted all attempts to increase obligations having a tendency to cut down the dividends".

events over the period 1858-1867. To this end, we construct an indicator variable ($EICDecline_t$) that covers the period starting from 1858 (the start of the EIC decline) until 1867 (when the Straits Settlements were made a crown colony). We consider the following regression:

$$y_{it} = \beta_5(PostSuez_t \times Entrep\hat{o}t_i) + \beta_6(EICDecline_t \times Entrep\hat{o}t_i) + \alpha_i + \gamma_t + \theta Year_t + \delta(PostSuez_t \times Year_t) + v_{it} \quad (3)$$

The results of our robustness tests are reported in columns (3)-(4) of Table 4. The results are quite stunning: while the magnitude of the Suez effects remain robust to our earlier findings in Table 3, the EIC decline's effects are in fact statistically indistinguishable from zero. These results give us confidence that much of what we found earlier can be attributed to the opening of the Suez Canal and are not confounded by other significant events that took place in the preceding years during the EIC's decline.

8 Conclusions

The nineteenth-century global trade boom generated swift and unprecedented changes for the international economy. The opening of the Suez Canal in November 1869 further magnified these globalisation forces through its immediate and dramatic influence on world trade. In particular, British possessions in British India, Ceylon, Hong Kong, and the Straits Settlements were geographically positioned to benefit from the Suez-led trade expansion; yet, there were heterogeneous consequences for institutional formation.

We find that public investments grew substantially more in the entrepôt-driven Hong Kong and the Straits Settlements, relative to resource-driven British India and Ceylon, because those investments, in education, for example, enhanced the profitability of entrepôt activities whereas exploitative rent-extraction would have been ineffective.³⁸ We show that our results are driven by the variation in commodity endowments, and are robust to possible confounding factors, specifically, feasibility of settlements (Acemoglu, Johnson, and Robinson, 2001), pre-existing colony-specific social structures (Engerman and Sokoloff, 1997), and the transfer of power from the EIC

³⁸It is important to clarify that our results do not imply that the opening of the Suez Canal necessarily brought about strong colonial institutions. Rather, simply from a comparative perspective, better institutions were created in entrepôt colonies. For example, despite enjoying comparatively higher spending on education, the schooling system in the Straits Settlements was far from perfect. First, education subsidies were almost exclusively targeted towards schools using the English medium of instruction. Second, teaching standards were low and the curriculum was not based on a holistic approach, since it mainly emphasised skills – basic arithmetics and English – that were critical for clerical employment in trading houses.

to the Crown in the decade before the opening of the Suez Canal.

Our paper adds to the literature that bridges economic history and development on several fronts. First, it highlights the importance of historical events as determinants of economic development by exploring the impact of geography on institutional formation.³⁹ In particular, we demonstrate that the opening of the Suez Canal led to the divergence in the development of institutions across nineteenth-century British colonies. Second, we show that having favourable geography – in this case, location – may in fact be a blessing, which fine-tunes the conventional view that good geography inevitably favours the creation of extractive institutions. The novelty of our natural experimental design allows us to account for possible colony- and time-specific confounding determinants, so that we can be more confident in establishing the causal effect of geography – here, the *realisation* of a geographic advantage – on institutions. Moreover, by exploiting heterogeneity across colonies of a single coloniser, we are able to isolate the Suez effects from potentially confounding influences related to colonial identity.⁴⁰

While this study looks at one unique episode in nineteenth-century economic history, it offers important insights today for countries that are caught in a resource trap with weak institutions. In particular, this research unlocks the potential for policy intervention by showing that, contrary to the prevailing view, good institutions can also arise from well-endowed economies when incentives are properly aligned.

³⁹Though our empirical focus is institutional change, not economic development, we note with interest that our results are also somewhat consistent with the findings of Feyrer and Sacerdote (2009): that post-Enlightenment years of colonialism (i.e. post-1700) are associated with larger increases in modern income than earlier colonial years. In particular, resource colonies were founded relatively early, although not always before the Age of Enlightenment – the presidencies of Madras (1640), Bombay (1687), and Bengal (1690) first, Ceylon (1815), Northwest Provinces (1836) and Punjab (1849) later – and received lower public investments. On the other hand, entrepôt colonies were formed relatively late – Penang (1786), Singapore (1819), Malacca (1824), and Hong Kong (1841) – and received higher public investments.

⁴⁰Colonial identity has important effects on investments, for example, through differences between British common law and French, German, or Scandinavian civil law (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997). Like us, a few other papers have limited themselves to a single coloniser in order to locate the source of difference between colonies more easily (Berger, 2008; Huillery, 2009; Iyer, 2010).

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Appendix: Primary Data Sources

Blue Books and Statistical Abstracts:

Statistical Abstracts relating to British India (1840-1900). Her Majesty's Stationary Office, London. Accessed at <http://dsal.uchicago.edu/statistics>

Statistical Tables relating to Colonial and other Possessions of United Kingdom (1856-1900). Commands and papers; Accounts and Papers. Accessed at <http://parlipapers.chadwyck.com/marketing/index.jsp>

Jarman, R. (1998): "Annual Reports of the Straits Settlements 1855-1941," Cambridge University Press.

Ceylon Blue Books (1821-1900). Colonial Secretary's Office, Ceylon

Straits Settlements Blue Books (1850-1938). Government Printing Office, Singapore.

Hong Kong Blue Books (1842-1900). Hong Kong.

House of Commons Parliamentary Papers:

East India (opium) (1890-91). *Return of an Article on Opium by Dr. Watt. Reporter on Economic Products with the Government of India, Recently Written by him, and Intended to Be Published in the Sixth Volume of the Dictionary of Economic Products of India.* House of Commons Papers; Accounts and Papers, LIX.439 (384). Accessed at <http://parlipapers.chadwyck.com/marketing/index.jsp>

East India (sugar) (1899). *Countervailing duties in India. Correspondence and act.* Command Papers, Accounts and Papers, LXVI Pt.I.561 (C.9287). Accessed at <http://parlipapers.chadwyck.com/marketing/index.jsp>

India Office Records and Private Papers:

Bengal (1848-1900). Education Department: Report on Public Instruction in Bengal.

Bombay (1850-1900). Education Department: Report on Public Instruction in the Bombay Presidency.

Madras (1854-1900). Education Department: Report on Public Instruction in the Madras Presidency.

Punjab (1860-1900). Education Department: Report on Public Instruction in Punjab.

Table 1 - Summary Statistics

	Pre-1869	Post-1869	Difference
<i>Trade flows:</i>			
Resource colonies	8654.62 [9840.27]	15289.06 [15454.04]	6634.44 [1584.99]
Entrepôt colonies	7799.75 [6105.46]	28235.96 [32270.66]	20436.21 [3745.53]
<i>Per capita government expenditure on education:</i>			
Resource colonies	0.0029 [0.0018]	0.0048 [0.0052]	0.0020 [0.0005]
Entrepôt colonies	0.0078 [0.0040]	0.0396 [0.0362]	0.0318 [0.0045]
<i>Per capita government expenditure on public works</i>			
Resource colonies	0.0342 [0.0274]	0.0357 [0.0380]	0.0015 [0.0040]
Entrepôt colonies	0.1224 [0.1307]	0.3035 [0.2920]	0.1811 [0.0381]
<i>Per capita government expenditure on judiciary</i>			
Resource colonies	0.0099 [0.0153]	0.0165 [0.0205]	0.0067 [0.0022]
Entrepôt colonies	0.2012 [0.1166]	0.1639 [0.2293]	-0.0374 [0.0303]
<i>Per capita total government expenditure</i>			
Resource colonies	0.2597 [0.1776]	0.2290 [0.1940]	-0.0307 [0.0220]
Entrepôt colonies	0.9536 [0.5739]	1.6549 [1.1717]	0.7013 [0.1543]

Standard errors in parentheses. This sample comprises annual observations in the period 1850-1900. Resource colonies refer to British India and Ceylon; entrepôt colonies refer to Hong Kong and the three Straits Settlements. Trade flows are reported in thousands of British pounds. Per capita government expenditures are reported in British pounds. All values are adjusted for inflation (base year = 1862).

Table 2 - Trade

Dependent variable:	Trade flows (1)	Imports (2)	Exports (3)
Post-Suez × Entrepôt colonies	14476.52 [10468.00]	7761.73 [4424.10]	6714.79 [6202.87]
Colony fixed effects	Y	Y	Y
Year fixed effects	Y	Y	Y
Pre-Suez and Post-Suez trends	Y	Y	Y
Mean of dependent variable	15763.56	7135.99	8627.56
Number of observations	506	506	506
R-squared	0.63	0.65	0.61

Standard errors in parentheses, clustered at the colony level. * significant at 10%; ** significant at 5%; *** significant at 1%. This sample comprises annual observations in the period 1850-1900. Entrepôt colonies is an indicator for Hong Kong and the Straits Settlements. Post-Suez is an indicator for years post-1869. Trade flows, imports, and exports are reported in thousands of British pounds, adjusted for inflation (base year = 1862).

Table 3 - Government Expenditure

Dependent variable:	Per capita expenditure on education		Per capita expenditure on public works		Per capita expenditure on judiciary		Per capita total expenditure	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-Suez × Entrepôt colonies	0.032** [0.0013]	0.017*** [0.005]	0.197*** [0.024]	0.136*** [0.037]	-0.025 [0.076]	-0.087* [0.040]	0.786** [0.308]	0.358** [0.154]
Colony fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Pre-Suez and Post-Suez trends	Y	Y	Y	Y	Y	Y	Y	Y
Trade flows	N	Y	N	Y	N	Y	N	Y
Mean of dependent variable	0.013	0.013	0.114	0.114	0.076	0.076	0.689	0.689
Number of observations	495	495	495	495	495	495	495	495
R-squared	0.58	0.83	0.51	0.57	0.73	0.84	0.72	0.87

Standard errors in parentheses, clustered at the colony level. * significant at 10%; ** significant at 5%; *** significant at 1%. This sample comprises annual observations in the period 1850-1900. Entrepôt colonies is an indicator for Hong Kong and the Straits Settlements. Post-Suez is an indicator for years post-1869. Per capita government expenditures are reported in British pounds, adjusted for inflation (base year = 1862).

Table 4 - Mechanisms and Robustness Tests

Dependent variable:	Per capita expenditure on education			
	(1)	(2)	(3)	(4)
Post-Suez × European share	0.909 [0.253]	0.066 [0.062]		
Post-Suez × Social hierarchy	0.004 [0.006]	0.002 [0.002]		
Post-Suez × Commodity endowments	-0.010 [0.008]	-0.013*** [0.003]		
Post-Suez × Entrepôt colonies			0.036** [0.014]	0.018*** [0.005]
EIC Decline × Entrepôt colonies			0.007 [0.004]	0.002 [0.002]
Colony fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Pre-Suez and Post-Suez trends	Y	Y	Y	Y
Trade flows	N	Y	N	Y
Mean of dependent variable	0.013	0.013	0.013	0.013
Number of observations	495	495	495	495
R-squared	0.50	0.84	0.58	0.83

Standard errors in parentheses, clustered at the colony level. * significant at 10%; ** significant at 5%; *** significant at 1%. This sample comprises annual observations in the period 1850-1900. Post-Suez is an indicator for years post-1869. European share is based on data from each colony's earliest census. Social hierarchy is the first principal component of colony-specific ethno-religious fractionalisation index and ruling ethnic group share, based on data from each colony's earliest census. Commodity endowments measure the value of colony-specific commodities in 1868, including: coconut, cotton, coffee, indigo, nutmeg, opium, raw silk, sugar, tea, and tobacco, reported in tens of millions of British pounds, adjusted for inflation (base year = 1862). Entrepôt colonies is an indicator for Hong Kong and the Straits Settlements. Post-Suez is an indicator for years post-1869. EIC Decline is an indicator for the years 1858-1867. Per capita government expenditures are reported in British pounds, adjusted for inflation (base year = 1862).

Figure 1: Per capita government expenditure on education

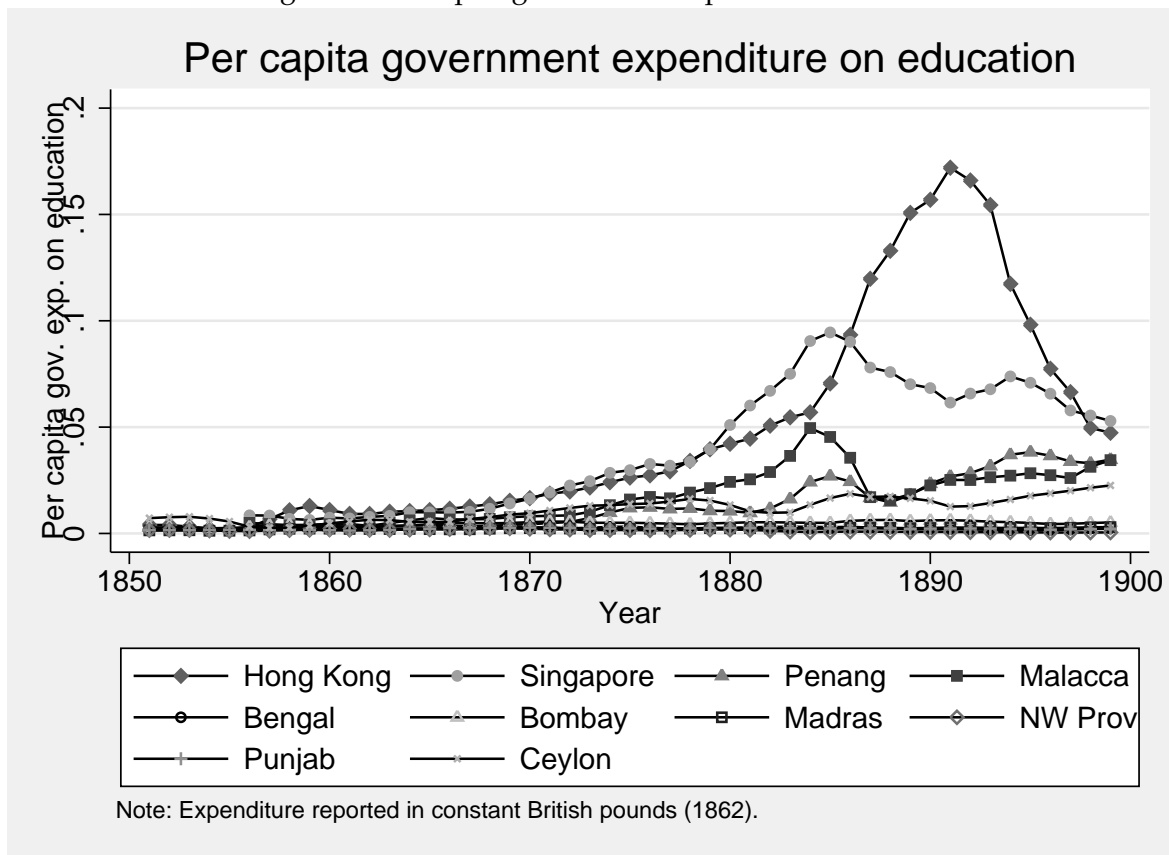


Figure 2: Maritime trade flows

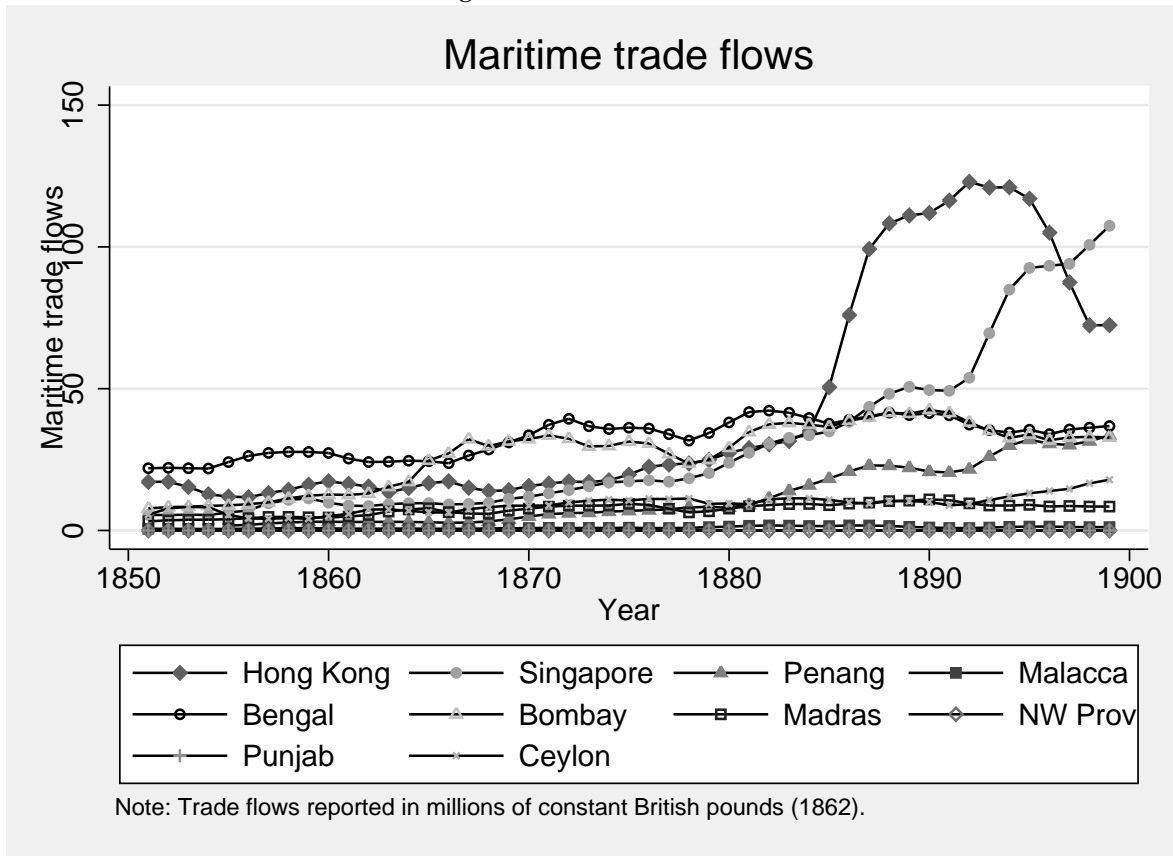
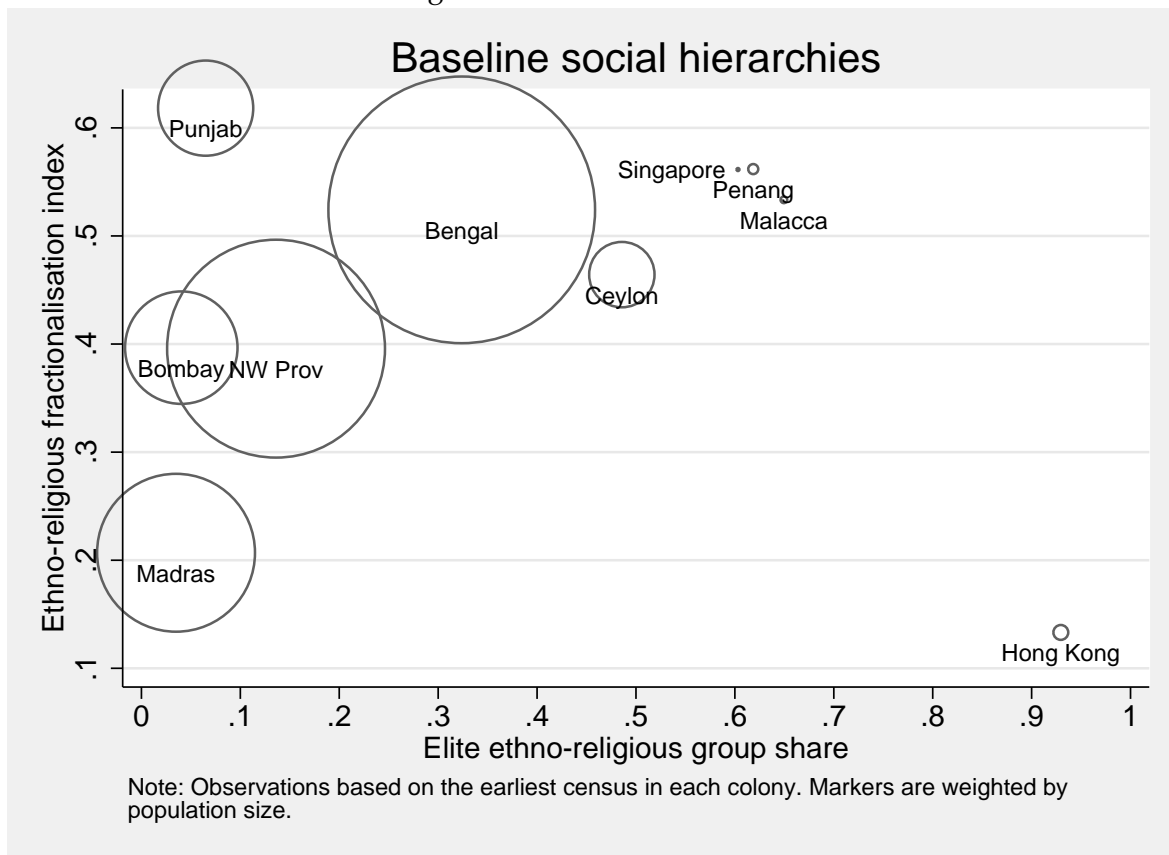
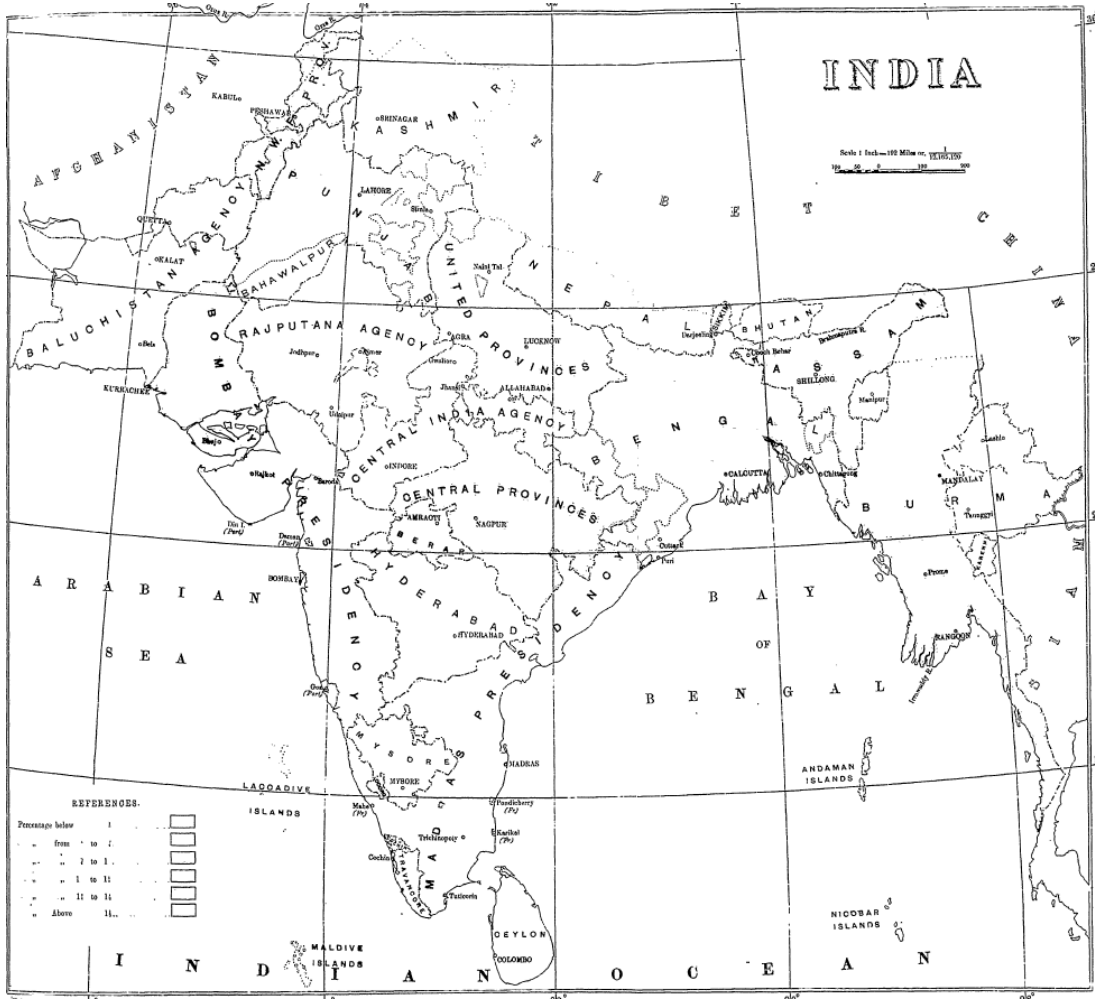


Figure 3: Baseline social hierarchies



Map 1: British India and Ceylon



Source: Progress of Education in India 1897/8-1901/2, Vol. II.

Map 2: Straits Settlements



Source: Chelliah 1940