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TWO ISLANDS, ONE COMMODITY:
CUBA, JAVA, AND THE GLOBAL SUGAR TRADE (1790-1930)

Sugar had, by the eighteenth century, become a global commodity. It originated in East Asia and plantations in the Americas fed the growing taste for its use in Europe as its consumption became increasingly popular (Mintz 1985). The 1791 Revolution in Saint Domingue (Haiti) and the 1807 British abolition of the slave trade prompted shifts in the epicentres of sugar, the most important of these arguably being to Cuba and Java. These two fertile islands saw the burgeoning development of sugar-plantation systems with major inputs of foreign capital and forced labor: Cuba with slavery in place until 1886 and Java with its Cultivation System (1830-1870) which forced the population to spend part of their time and land growing cash crops for the colonial government. In the process the two islands each, respectively, became central to the very much truncated Spanish and Dutch colonial empires left after the Napoleonic wars and the Latin American wars of liberation; and by the mid-nineteenth century for Cuba, and by the late nineteenth century for Java, they had been catapulted to global sugar pre-eminence.

The positioning of the two islands in the global commodity market was not new. Both Cuba and Java were located in regions that had been absorbed into the global economy from the earliest days of modern European history: following the landing of Columbus in Cuba in 1492, and the Portuguese conquest of Malacca, on the Malay Peninsula, in 1512. It was in the nineteenth century, however, that the economies of Cuba and Java became overwhelmingly integrated into, and dependent on, the world market with its booms and depressions, and increasingly reliant on sugar exports at the expense of other important crops, such as tobacco and coffee.

Both Java and Cuba are relatively large islands, with soils and climate well suited for growing a number of export commodity crops. Three in particular figured prominently in the history of both islands: coffee, tobacco, and sugar cane (Table 1). However, the export-crop economy of both Cuba and Java became, through the nineteenth century, increasingly dominated by sugar. Though most of Java is tropical, its sugar belt was located in the

Eastern Salient, which was in many respects similar to subtropical Cuba with a dry and a wet season and fertile soil.

Table 1. Production of Coffee, Tobacco and Sugar in Java and Cuba, 1750-1900 (metric tons)

	Coffee		Tobacco		Sugar	
	Java*	Cuba†	Java**	Cuba††	Java***	Cuba†††
1750	963	0	0	1,141	3,680	4,969
1800	7,316	625	0	2,396	3,700	28,761
1850	69,144	6,220	574	3,619	102,000	294,952
1900	42,752	2,105	30,200	17,858	744,000	309,195

* 1800, estimated early 1800s average (Bulbeck *et al.* 1998).

† export figures, five-year averages. High point of 23,130 reached in 1830-34. 1900, using figures from 1890-94 (García 2008).

** 1800 & 1850 (Korthals-Altes 1991:158, Mansvelt 1939:33).

†† earliest production figures from 1761 (Archivo Nacional de Cuba, Real Consulado y Junta de Fomento, 209/9454, No. 10, with thanks to Charlotte Cosner) (Sarmiento Ramírez 2004:68, Stubbs 1989).

*** Data for 1750, average for 1750s; 1800, using data from 1797 (Bulbeck *et al.* 1998).

††† 1750 and 1800, export figures. Before 1895-98 war, 1,110,991 was reached (1894) (Moreno 1978:v.3).

Nevertheless, by the final decades of the century European beet sugar was causing a collapse in world sugar prices. While production in Java continued to grow steadily – thanks to the fact that it was able to access the growing Japanese, Indian, and Chinese markets – Cuba's industry suffered collapse, accentuated by the impact of the island's three wars of independence (1868-78, 1879-80, and 1895-98). Nevertheless, the early years of the twentieth century again brought rapid growth, such that by 1920 only 8 percent of the value of Cuba's exports came from anything else (Santamaría 2001:399). With their highly vertically integrated industries, the two islands were the two largest cane-sugar exporters in the world, between them supplying more than half of the available cane sugar on the world market by 1870 – a pre-eminence that was maintained until the 1930s, when the sugar industry of both went into decline (see Figures 1 and 2).

Figure 1. Sugar-cane production (million tons), Cuba and Java, and share of world sugar cane¹

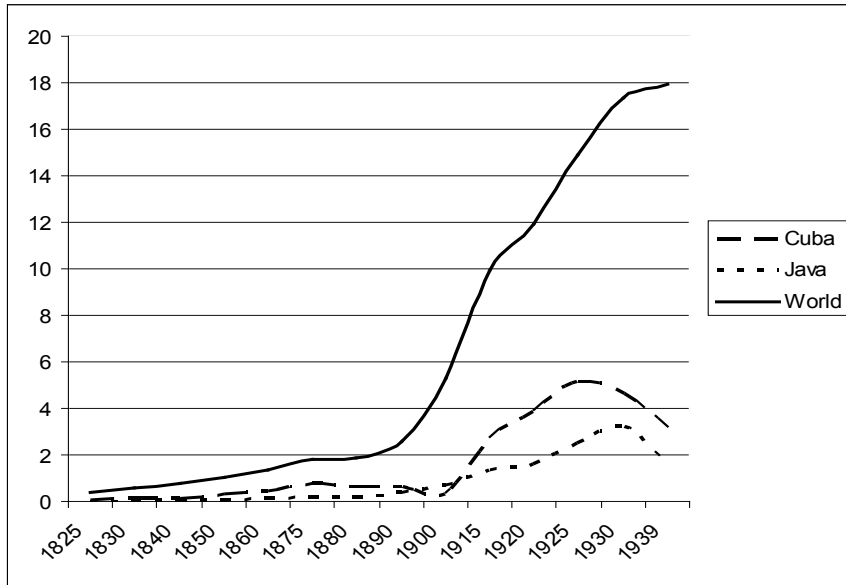
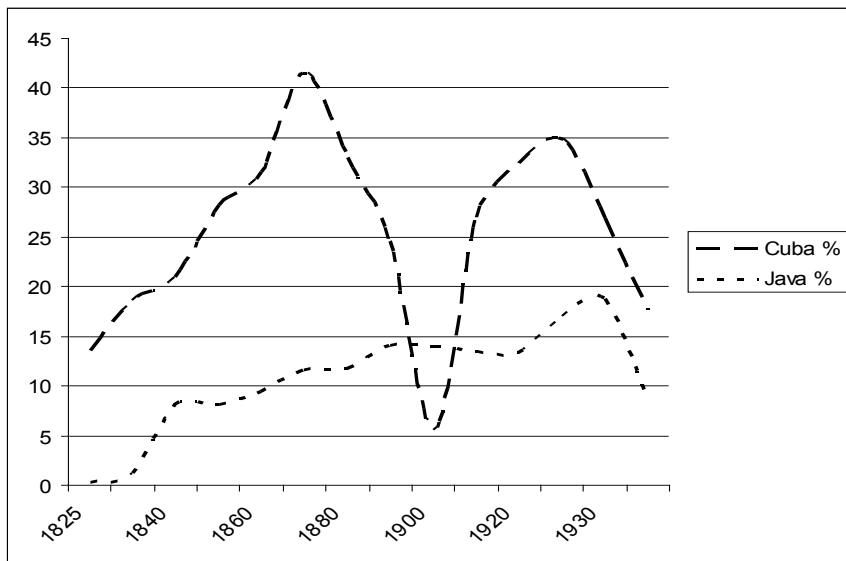


Figure 2. Cuba and Java share of world sugar cane²



1. Sources: Galloway 1989:212, Moreno Fraginals 1978, Santamaría 2001.
 2. Sources: Galloway 1989:212, Moreno Fraginals 1978, Santamaría 2001.

There has been an abundance of studies on Cuba and Java each in their own right, but none systematically examines their parallel trajectories. Situated as they are in opposite hemispheres, Cuba has always been studied in the context of Latin American and Caribbean Studies and Java in that of Asian Studies. As a result, they have been analyzed as part of two entirely different worlds; and two distinct imperial blocks (the Spanish and Dutch). Yet the question arises as to how sugar came to dominate the agriculture, industry, and trade of these two islands; and how these two islands in particular, in two different colonial systems and parts of the world, should rise to sugar pre-eminence in the way they did and when they did. Are there connections and similarities between the two that help explain this phenomenon?

The article seeks to analyze the conditions that led Java and Cuba to become the prime cane-sugar exporters of the nineteenth and early twentieth centuries. It starts by suggesting that in both Cuba and Java, the initiative for developing the sugar industry originated in the close link that connected their dominant elites not just to their respective imperial networks, but importantly to transnational, transimperial trade and capital. Of particular importance was the way in which this stimulated technological and scientific innovation in both, catapulting the sugar industry of the two islands to global prominence. This was enabled not only through the introduction of the latest advances in machinery and method, but also the immigration of skilled technical workers from Europe and North America. New sugar frontiers were opened on both islands that offered room for expansion at a time of rapidly growing demand for sugar in Europe, which could not be met by the smaller, long-established plantation islands that suffered from environmental degradation and an absence of available space. But for this to occur, radical changes needed to be made to the system of land ownership and use. At the same time, on both fertile islands the sugar industries each had their own way of finding a solution for mobilizing and ensuring sufficient labor without jeopardizing the colonial order. This question eventually came to dominate the political system through which social control could be ensured, particularly because Cuba and Java came to be ever more closely tied to global capital and trade; and both islands became dominated by sugar while at the same time coming to dominate global sugar production.

LOCAL PLANTOCRACY, TRANSNATIONAL NETWORKS, AND THE RISE OF CUBAN AND JAVANESE SUGAR

Since the sixteenth century, commodity crops played a key role in the European colonization of Asia and the Americas. European demand for sugar increasingly outstripped the limited cultivation of cane in the Mediterranean and Atlantic islands, and so was introduced early on as a colonial plantation

crop. Cuba had significant strategic importance for the Spanish empire due to its geographical location, with Havana in particular operating as a key Atlantic port city, first for Spain's bullion armadas, and by the eighteenth century for tobacco trade. Although sugar cane was cultivated on the island in only small, relatively insignificant quantities, it began to play an important role in the local economy.

Java likewise acquired an early strategic value for the Dutch empire, ever since Batavia, present-day Jakarta, was founded in 1619 to act as the hub for Dutch East India Company (Verenigde Oost-Indische Compagnie, VOC) operations. After the VOC had lost Taiwan with its sugar plantations to the Chinese in 1662 and its attempts to turn Mauritius into a flourishing sugar island had failed, it concentrated its sugar production on Java where it imposed a monopoly on this crop. The center of gravity was around Batavia where VOC officials owned private lands, which they rented out to Chinese millers, who produced under a VOC monopoly. In the course of the eighteenth century sugar production was spreading along the north coast of Java. Sugar was an important commodity for the VOC's intra-Asian trade, mostly taken as ballast since it was only under exceptional circumstances profitable as a primary commodity. In the second half of the eighteenth century most of the VOC sugar was sold in Surat (India), and somewhat less was sold in Malabar (India) and Japan (Reesse 1908:89, 168, 182-83). Java was a sugar exporter of some consequence but its prospects for further expansion were bleak. By the end of the eighteenth century sugar production around Batavia had reached its ecological limits. The soil was exhausted, forests providing wood for fuel had disappeared, and there was a shortage of buffalo to grind and transport cane (Teisseire 1785). After the French Revolution and the revolution in Saint Domingue sugar prices rose and the colonial authorities in Batavia considered various plans to reinvigorate sugar production on Java (Leidemeijer 1997). Around 1800 there were various investigations into how the sugar production around Batavia could be revived through the application of West Indies furnaces and mills. Private planters were encouraged by the VOC to solve the problem of a lack of fuel by importing the sugar-boiling equipment that was in use at that time in Mauritius and the West Indies. Moreover, British and French planters came to Java shortly after 1800 to introduce West Indies equipment, and a steam-driven mill was brought to Java by a British-Danish house accompanied by eight British technicians (Bosma 2005:24).

Sugar cane originated in Asia, and did not reach the Americas until Spanish conquest in the sixteenth century, with the first sample brought from the Canary Islands by Christopher Columbus to the island of Hispaniola in 1493 (Deerr 1949:v.1). Despite being well suited to the Caribbean climate, the cultivation of sugar cane spread slowly in Cuba. However, although it remained small-scale, it began to develop as an important local economic activity, in particular around Havana, Bayamo, and Santiago de Cuba, stimu-

lating the influx of African slaves (Aimes 1907, Le Riverend 1974:72). By the mid-seventeenth century, small plantations were being established throughout the island wherever there was some human settlement – though sugar manufacturing remained rather primitive and overshadowed by the region’s leading sugar-producing colonies (Barbados, Jamaica, Guadeloupe, and above all Saint Domingue). By 1778, Cuba continued to export less than ten thousand tons a year, compared to the 163,403 tons exported by the neighboring French colony of Saint Domingue.³

The early Cuban sugar industry, although small in scale and producing largely for local consumption, also supplemented the supply in Spain (where the demand was increasingly hard to meet through the ailing Mediterranean sugar industry) and found an outlet in the regional contraband trade. As a result it contributed to the gradual accumulation of wealth by Cuban landowners. As the eighteenth century proceeded, sugar became a more dynamic alternative to the hitherto dominant cattle-ranching activities of much of this creole elite. Although slowed in their ambitions by the strict restrictions on the clearing of forestland, this sugar-related plantocracy had, by the late eighteenth century, become highly influential and self-confident (Funes 2008, García Rodríguez 2007). As a result they were well placed to capitalize quickly upon the revolution in Saint Domingue in 1791, which removed from the world market what was the epoch’s leading sugar producer, thereby providing an opportunity for expansion elsewhere. Cuba, with its extensive tracts of unexploited land, offered considerable scope to absorb much of this demand, at a time when many of the smaller Caribbean islands – which had dominated sugar production since the seventeenth century – were already experiencing soil exhaustion due to earlier over-cultivation of cane (Galloway 1989).

It was primarily through the initiative of these creole planters that this expansion took place – though the wealth-generation possibilities also brought the arrival of new settlers. Most of these came from Spain itself, encouraged by the increasingly evident prospects offered by the island’s growing export agriculture – be it coffee, tobacco, or sugar; and this further enabled Cuban planters to exploit their familial, cultural, and political ties to the imperial metropole. This they did very effectively. While elsewhere in Hispanic America local elites (themselves also mainly descendants of Spanish settlers) were organizing to seize independence for their newly forming nations, in Cuba an effective compromise was brokered between the imperial state (keen not to lose this strategically and fiscally important colony) and the local oligarchy (keen to exploit the economic benefits that they were reaping). It was this that contributed to the persistence of slavery on the island until the 1880s – if not with official blessing in the face of

3. Benitez 1977:136-38, Black 2002:60, Ely 2001:47-86, Le Riverend 1974:72, 161, Moreno Fragnals 1978:34-35, Watts 1987:301.

attempts by the British to enforce the anti-slave trade treaty signed by Spain in 1817, then by concertedly turning a blind eye – with the sugar industry in particular dependent upon captive labor.

But migrant planters and merchants from throughout the North Atlantic area also arrived, tying Cuba to transnational, transimperial commercial networks (Ely 2001). Following the Haitian Revolution many of the French colonists displaced from that neighboring island established themselves in Cuba, bringing with them their expertise in the sugar and coffee industries, commercial connections, and capital (Portuondo 1996). When Britain was in the process of abolishing slavery in the 1830s, British West Indian planters came to the island accompanied by the slaves they would otherwise have been forced to set free (Curry-Machado 2004). From Europe and North America, merchants brought with them innovative trading methods and links with banking capital, which along with the advanced technology that began to be imported, led to a modernization of the Cuban economy despite its continuing dependence upon slavery (Curry-Machado 2009). However, while this could be seen as the start of a process that would gradually lead to the replacement of Spanish colonial overlords with a more economy-driven form of foreign domination, the initial period of expanding sugar production may be seen more as a collaboration between these new actors, and the local planting elite whose ranks many of them joined.

From the 1790s, institutions dedicated to the promotion of the island's agriculture, industry, and progress (such as the *Sociedad Económica de la Habana*) were founded, with official sponsorship but led by prominent representatives of the colonial plantocracy. While turning their attention to a wide range of modernizing activities, there was from the start a clear bias in favor of sugar interests. This continued to intensify through the early nineteenth century, as abolition of the slave trade by the British in 1807 followed by emancipation in Britain's sugar-producing colonies in the 1830s gave Cuba – where slave labor continued to increase – an additional market advantage facilitating development of its sugar industry (although the social and political contradictions that this fostered would increasingly take their toll).

The Cuban plantocracy's links to Spain continued to be an important factor in favoring the growth of the island's sugar industry, by gradually allowing liberalization of Cuba's economic relations and ensuring a level of social and political control that slowed and weakened the development of independence and Afro-Cuban struggles. However, the Spanish state contributed little to actual infrastructural, agricultural, and industrial development. Instead, the Cuban plantocracy were obliged to seek sources of capital investment elsewhere; and they were particularly proactive and successful in doing this. Partly through their own contacts established through foreign travel and European-based kinship and business networks, but also through the presence of a number of key diasporic merchants of non-Spanish origin, they were able

to develop their industry and trade through transnational financial and commercial networks. This relative freedom from imperial bounds did much to enable the rapid growth of the island's sugar industry (Curry-Machado 2011).

The Dutch likewise found there to be a considerable incentive to increase the amount of land planted with cane. In the first decades of the nineteenth century attempts were made to revive the Chinese-dominated sugar plantations in West Java. In addition British merchant houses that had bought large estates on Java imported West Indies equipment. However, this combination of mainly Chinese and British sugar business did not produce the desired increase in sugar output, which was an important reason for Governor-General Johannes van den Bosch (1830-1834) to introduce his Cultivation System (1830-1870) (Knight 1980). Though under the Cultivation System the colonial government took care of the supplies of cane to the manufacturers who were obliged to sell their sugar to the semi-governmental Netherlands Trading Society, the input of private entrepreneurs, the majority of whom were either Chinese, British, French, or German, was essential (Bosma 2007). This was reinforced by the presence and key involvement of migrants from elsewhere in Europe and North America backed up by British and North American investors and local Chinese capital.

TECHNOLOGICAL AND SCIENTIFIC INNOVATION

Both Spain and the Netherlands were late industrializers, significantly behind in the spread of steam-based technology in the early nineteenth century. As a result, neither was capable of equipping the emerging sugar industries with the necessary technology, leading both Cuba and Java to become heavily reliant on British, French, and (in the case of the former) North American engineering. This was facilitated by the same transnational networks that were channeling investment in, and trade out.

In Cuba, prominent creoles with fortunes largely accumulated from sugar went out of their way to facilitate the introduction of the latest advances in steam technology and sugar-milling machinery from the foundries of the United States, Britain, and France. These sugar planters became students of milling and refining technology, eagerly learning from all these developments and exploring how to apply them to their own industry, traveling extensively to ensure that they remained on the cutting edge. As a result of their initiatives, during the mid-nineteenth century the application of steam in Cuba's sugar mills became generalized (Bergad 1990:90, Martínez-Fernández 1994:98), with 70 percent using steam engines by 1860 from just 20 percent in 1846 (Marrero 1973-86:159). The advances that were introduced in all aspects of sugar production enabled the improvement in quality for which Cuban sugar became renowned (Curry-Machado 2011, Dye 1998, Moreno 1978); and

increased sugar production led to, and was itself the result of, the development of an extensive rail network (Zanetti & García 1987), as well as steamship routes. Rather than being initiated by the unequal exchange of imperial imposition, it emerged from “the equal interchange between Cuban planters and foreign machine manufacturers, in a process that sidelined Spanish imperial control over the island” (Curry-Machado 2009:40). However, as the nineteenth century progressed the balance gradually tipped in favor of the foreign manufacturers (as advances in machinery continued apace) and the bankers and merchants who facilitated the necessary capital investment, and thereby obtained increasing control of the island’s sugar industry and trade. By the twentieth century this had resulted in the island falling under the sway of North American interests in particular. Nevertheless, during the early to mid-nineteenth century the free engagement of the Cuban plantocracy with transnational trading networks and the cutting edge of industrial advances gave to Cuba’s sugar industry a commercial and technological dynamism that owed little if anything to the Spanish state.

The sugar industry in Java was also able to position itself within the global technological vanguard, and just as Cuba led the Western hemisphere in its introduction of steam technology to sugar mills, so too did Java within Asia by the mid-nineteenth century. Although railways were slower to develop (not until the 1870s), steam was quickly introduced to sugar manufacture. By 1860, most of Java’s sugar factories employed steam engines for at least part of their processes.

In both Java and Cuba, this technological advancement was made possible not only through the introduction of machinery, but also the presence of skilled migrants from the key industrial centers of Europe and North America. The number of mostly non-Dutch technicians and engineers for the sugar factories has been estimated at 36 for 1820-29, 78 for 1830-39, 115 for 1840-49, and 204 for 1850-59 (Bosma 2005:26). In Cuba, there were more than six hundred by the early 1850s, and in excess of eight hundred in the 1860s. Although this was a relatively small group, their strategic positioning at the heart of the industry that was driving both islands’ development, and their contribution to its technological advancement, gave them a significance that belied their numbers (Curry-Machado 2011:67). Though both the Spanish and Dutch metropolitan governments were anxious to preserve these colonies as loyal parts of their empires, they were flexible enough to allow foreign technological skills and capital to contribute to the emerging sugar industries; and such technicians, merchants, and planters made up an important share of the foreign residents of Cuba and Java (Bosma 2005:9-11, Curry-Machado 2011:69).

The mid-nineteenth century was a time of growing markets and secular declining prices, and Cuba and Java were able to increase their share in world exports, whereas other Caribbean and Asian producers lost their markets. Capital goes to places where it can be made most profitable and both in

Cuba and Java capital found abundant investment opportunities in railways and factory installations. Technological development in the Java and Cuba sugar industry was incremental and went by fits and starts, but the overall picture is one of rapidly increasing capital intensity of the sugar industry from the early decades of the nineteenth century onward.

Not only did the introduction of technological advances play an important part in the development of the Cuban and Javanese sugar industries. As the nineteenth century progressed, advances aimed at improving agriculture were made in scientific investigation. In 1862, the Cuban scientist Álvaro Reynoso published a key text that argued for the need to introduce scientific principles into the cultivation of sugar cane. His system recommended improved tilling, fertilization, and irrigation, along with annual planting at measured intervals (Reynoso 1862). His ideas were largely ignored in Cuba until several decades later, but his book was quickly translated into Dutch and proved highly influential in the development of Java's sugar industry. The need to maximize soil productivity due to the limit on the land available to expand into, led to the early introduction in Java of more scientific agricultural methods – in particular with regards to cane strains, irrigation, fertilization, and the treatment of crop pests. This was facilitated by the active role that the Dutch state (in contrast with the Spanish) played in the promotion of the Java industry, bringing official sponsorship of scientific research and its application. The role of the government was taken over by the Java sugar factories themselves, once they established and funded three Experimental Stations in the 1880s.

Rather more tentative attempts were made to place Cuban agriculture on a more scientific footing during the late nineteenth century. Organizations such as the *Círculo de Hacendados*, and the publication of scientific agricultural treatises, handbooks, and journals, sought to instil the principles of fertilization, irrigation, and rational use of land. These were further promoted by the establishment of scientific agronomic stations (Fernández 2005). However, the continuing availability of underutilized land restricted the adoption of many scientific advances, since it continued to be easier for most planters to simply exhaust their soil and move on, or in the early twentieth century for large tracts of land to be brought under the sway of sugar corporations who saw more urgency in maximizing immediate profits than in rationalizing the agricultural method. In the long term this has led to extensive soil exhaustion throughout the island, and the incursion and generalized spread of opportunistic invading plants.

CHANGING LAND OWNERSHIP AND USE

For the sugar industry to expand in both Cuba and Java, it was not only necessary to improve the speed and capacity of production, and the quality of cultivation. Sugar factories required cane to grind, and mechanisms had to be found

to enable an extension of plantations. This was complicated in both islands, though for different reasons; but in both, solutions were found and enacted that directly contributed to the growing dominance of this single commodity.

Land occupation in colonial Cuba was, until the nineteenth century, based upon the division of the land into circular *haciendas*, mainly devoted to livestock ranching, with considerable restrictions placed upon the clearing of forests and therefore crop cultivation. Although formally all land continued ultimately to remain the property of the Spanish crown, effective ownership over the *haciendas* was granted to prominent settlers. In some parts of the island (in particular in the proximity of Havana) the larger estates became gradually subdivided into a range of different kinds of smaller farms – in particular as inroads were made into the crown-protected forests: *vegas*, cultivating the tobacco that was the island's principal commodity crop in the eighteenth century; livestock-rearing *potreros*; and *sitos de labor*, along with smaller *estancias*, on which food crops were cultivated. There were also the *ingenios*, larger plots devoted primarily to sugar-cane cultivation and grinding. Over much of the island, though, shared inheritance over the generations, marriage alliances, and the sale of land rights resulted in many *haciendas* being communally controlled by several landowners, who were often in conflict; while the tendency for *haciendas* to effectively overlap resulted in considerable imprecision in the establishment of boundaries. This had a serious effect on the possibility of effectively cultivating the land, and in many parts of Cuba this only became possible following the gradual and piecemeal process of breaking up the old *haciendas*, and setting formal boundaries (Funes 2008, García Rodríguez 2007, Le Riverend 1974). While by the mid-nineteenth century, most of the land in the western part of the island had been freed in this way, the process took longer in the central region, and in the east much land was still not demarcated until the early twentieth century, which the North American-owned sugar trusts were able to exploit to their advantage in the establishment of control over extensive territorial expanses (Zanetti *et al.* 1977).

Far from eroding the creole elite's control over land, the earlier break-up of the old *haciendas* in fact consolidated it by enabling them to enclose the most fertile tracts, and provided them with the means to establish the burgeoning sugar plantations of the nineteenth century. In those areas where this was achieved in the early and mid-nineteenth century, it enabled them to establish their landowning rights prior to the influx of powerful foreign interests by the early twentieth century. At the same time, it weakened the position of poorer peasant farmers, who for generations had occupied land – either on *haciendas* or in the crown-owned *realengos* that existed in the gaps between these and along the riverbanks. The formalization of land ownership in the nineteenth century resulted in many of these peasant farmers' – lacking the means and influence to assert their ancestral claims – becoming displaced. In the eighteenth century this process had already resulted in the smallholding tobacco

farmers of Havana being pushed westwards toward Pinar del Río to make way for the ambitions of sugar planters jealous of the fertile, cleared lands occupied by tobacco *vegas*. As the sugar frontiers spread during the nineteenth century (east from Havana into Matanzas and beyond; west from Trinidad to Cienfuegos; within the central region, around Sagua la Grande, San Juan de los Remedios, and Sancti-Spiritus; and spilling over from Santiago de Cuba in the east into the district of Guantánamo), this process increased. Although during the initial expansion smallholdings producing food or other commodities burgeoned alongside the sugar plantations that were driving the rearrangement of land control and enabling the clearing of forests, from the 1880s the establishment of sugar centrals resulted in most farmland in sugar-producing regions succumbing to cane (Curry-Machado 2010).

In Java, the sugar factories' room for expansion was created via another mechanism.⁴ The sugar industry was immersed in irrigated rice (*sawah*) agriculture, where cultivators were forced to grow sugar on assigned plots; while the limited availability of appropriate land made it necessary to develop from an early date the agricultural science that would maximize production from the irrigated land in which the industry had immersed itself. The central idea of what became known as the "Cultivation System" was that each household had to perform 66 days of compulsory work per year for a household to grow cash crops for the world market.⁵

From 1870 onward, the sugar factories were allowed to lease land directly from the Javanese peasantry, which reinforced the power of wealthy Javanese farmers over the poorer villagers. The expansion of the sugar factories was thus facilitated on the expansion of *sawah* agriculture, which in turn was a direct consequence of rapid demographic growth. Whereas the Cultivation System initially had relied on the indigenous nobility – allowing them to share in its profits – the sugar sector could increasingly count on the support of the wealthier rural strata, the village elites, to mobilize labor and land. These large farmers quite often acted as "absentees" using the advance payments of the sugar industry to rent it out to debt-ridden, petty, and marginal cultivators, becoming the major creditors in the village. In this respect the report of the Sugar Enquiry Committee (1921:172) spoke of the "*inlandsche capitalist*" (native capitalist) (Knight 1992:76).

4. In the Netherlands Indies Europeans, Chinese, and foreign Orientals were not allowed to own land, but with the enactment of the Agrarian Law of 1870 plantations could obtain large tracts of land under long-term lease (75 years). However, this was not of direct relevance to the sugar industry, which had inserted itself in *sawah* agriculture, with the tremendous advantage that through alternation with rice the exhaustion of sugar lands could be prevented.

5. Exempted from the Cultivation System were the semi-independent Principalities (the Regencies of Surakarta and Yogyakarta). Here extensive plantation agriculture was developed by creole planters who leased their lands from the *apanageholders* of courts.

Hence a consequence of the burgeoning plantation complexes in Cuba and Java was that in spite of their completely different points of departure in terms of land ownership, more and more land ended up in the hands or under the control of fewer people. In both islands, agrarian societies that they were, control over the land was a key to political power. With much of the best land claimed by those who drove the plantation economy, and with expansion of sugar production tying Java and Cuba ever more firmly into commodity dependency, this resulted in the marginalization of smaller farmers cultivating food crops, or else their absorption into the plantation complex.

This resulted in the development of the food-security problems that both countries continue to suffer from. However, conflicts between cash-crop and food production were of a different character in the two islands. In densely populated Java, food production by the peasantry was considered to be so essential that it was allowed to curb the expansion of the plantation economy in terms of its demand for land. Meanwhile, as the nineteenth century progressed Cuba was increasingly unable to meet its food needs even though the plantation economy increased the demand for foods and led to the large-scale cultivation of some staple food crops.

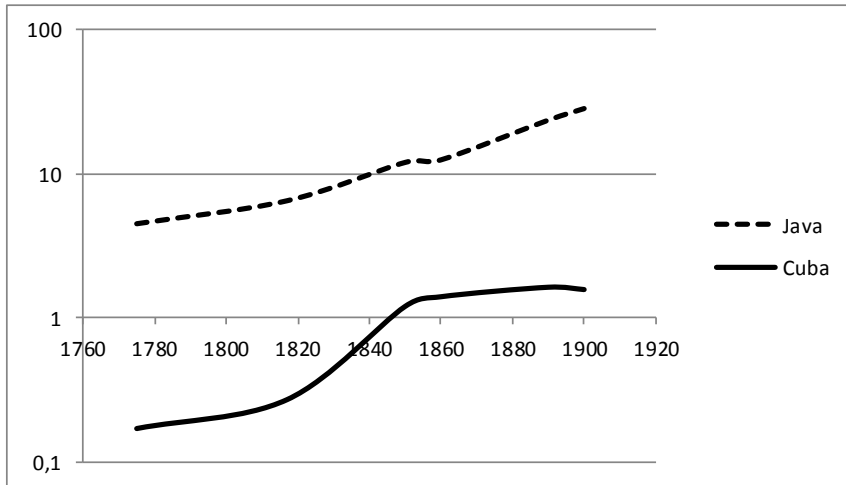
There was a tendency to abandon other crops in favor of the more lucrative sugar cane (Moreno 1978:v.1, 96); and by the early nineteenth century it was clear that the island was not self-sufficient in many staples. Food commodities were imported from early on: in particular beans (a central part of the Spanish diet) and rice (which became a Cuban staple during the nineteenth century). The general lack of subsistence crops was something remarked upon by Alexander von Humboldt (1856), following his visit to the island; and attempts at introducing some form of crop rotation, either by alternating harvests or interspersing cane with food crops such as corn, were opposed by leading planters, who believed that "it prejudices the increase and duration of the cane, since this first fruit and the grass that occupied the land in the period between the harvest of one crop and the sowing of the other wastes part of the earth's fertility" (O'Farrill 1793:122). The number of food-cultivating farms grew during the nineteenth century, yet they were incapable of fully meeting the food needs of the island's growing population, and the tendency for smallholdings to fall under the sway of the sugar plantation system increased in the aftermath of catastrophic hurricanes in the 1840s, absence of rural banking and credit facilities, and three devastating independence wars between 1868 to 1898, in which the rural poor were the worst hit, losing land, crops, and livelihood (Iglesias 2005:23). The expanding sugar estates were quick to capitalize upon this, to consolidate their hold over large tracts of land by the early twentieth century.

LABOR EXPLOITATION

If from the early decades of the nineteenth century Java and Cuba belonged to the technologically and agriculturally most advanced tropical cash-crop producers and were enabled in this through the willingness of their elites to change the rules governing land ownership and use, much of their industrial and commercial success was the result of a ruthless approach to labor mobilization and control. In an age of spreading liberalism, they both appeared to go against the tide in terms of labor relations: with *corvée* labor in Java, and slave and indentured labor in Cuba until the late-nineteenth century. The two islands both demonstrated that, far from being incommensurable with forced labor, advanced modes of production could flourish despite the apparent incongruity of the relations of production employed (Bergad 1989; Bosma & Knight 2004:9). Even as their reliance upon forced labor waned, and they moved to the use of wage labor, the “unfree” labor regime culture – of which highly effective use had been made by the sugar industry in particular, albeit with the concomitant social and political problems that it entailed – was maintained, and continued to contribute greatly both to sugar cane plantations increasingly dominating each island, and their produce dominating global trade.

Despite the apparent geographical similarities between Cuba and Java, demographically the two islands were very different. In the late eighteenth century Cuba was still very thinly populated, with the island’s total population standing at 170,000, whereas Java at that time counted 4.5 million inhabitants; and the population density of Java remained approximately ten times higher than that of Cuba throughout the nineteenth and twentieth centuries (see Figure 3). This led to a crucial distinction between the two islands: in Cuba, a surplus of land enabled expanding cultivation, but a shortage of labor limited the capability to exploit this; while in Java, the opposite was true. Thus while in Cuba it was necessary to secure the immigration of laborers and tie these to the sugar plantations in sufficient numbers to fill the needs of the industry – with labor shortage being a continual problem – in Java, the problem was how to extract labor from the indigenous population.

As the British West Indian colonies began to move toward emancipation, in Cuba the growing sugar industry continued to generate a demand for labor, of which there was a chronic shortage in the island (Guerra 1970, Knight 1970, Moreno 1978). As a result of this, far from seeing a reduction in the slave trade following the signing of the Treaty for the Suppression of the Slave Trade by Spain and Britain in 1817, the period saw an extension of slave-trading practices. In the fifty years following the Treaty, 573,200 slaves arrived, either surviving the brutal transatlantic crossing or traded within the region – at times even kidnapped from islands where they had already been declared free (Curry-Machado 2004, Eltis 1987).

Figure 3. Population growth in Java and Cuba, 1780-1900 (log scale)⁶

Slavery pervaded every aspect of nineteenth-century Cuban society. However, it was above all in the sugar industry that slaves were concentrated, with almost half of the 368,000 slaves in the island in 1862 living on sugar plantations. As the century progressed sugar mills grew in capacity, and with that the number of laborers tied to the estate, which would often become self-contained communities on which physical control was an ever-present reality needed to keep order where almost four-fifths of the inhabitants were enslaved. By the mid-nineteenth century, it was becoming increasingly hard and expensive to fill labor demands with slaves, and an attempt was made to supplement them with indentured laborers, primarily from China though also native Americans, in particular from the Yucatecan peninsula in Mexico – living in conditions that, while limited to a fixed contractual period, verged on that of the slaves. But a combination of pressures, including the emancipation of many slaves during the first war of independence (1868-78), brought slavery to a phased-out end by 1886. At the same time, the process of centralization led to a much reduced number of functioning sugar mills, with many other estates devoting themselves entirely to the cultivation of cane to feed these increasingly massive central factories. Whereas before, each plantation had its own fixed body of laborers, with the introduction of “free” labor to the sugar industry most work became seasonal. In the late-nineteenth and into the twentieth century, during every sugar harvest armies of cane cutters – sometimes itinerant laborers moving from job to job, at others peasant farmers supplementing their income –

6. Sources: Boomgaard 1989:166, Ricklefs 1986:30 and *Report on the Census of Cuba 1899* by J.P. Sanger, Henry Gannet & Walter F. Willcox, 1900.

would be temporarily employed (with sugar factories and cane farms competing for their labor), alongside the smaller numbers with permanent positions in the mills or tending to the crops. As the Cuban sugar industry rapidly expanded in the early twentieth century, it again became particularly urgent for cheap labor to be acquired: and large numbers of seasonal laborers were recruited from elsewhere in the Caribbean, in particular neighboring Jamaica and Haiti (Giovannetti 2001, Guerra 1970).

While Cuba imported 780,000 slaves between 1790 and 1868, the Dutch colonizers brought about 700,000-800,000 households (about 35-40 percent of the households of Java under direct government rule) under the sway of the forced Cultivation System.⁷ The burden put on the population by the Cultivation System in practice varied widely according to region and crop. Resistance was widespread, hunger and deprivation occurred in a number of Residencies (administrative departments) of Java and corporal punishment to enforce the system was widely reported. In regions where the burdens were unbearable, extensive migration occurred. In the course of the 1850s, forced labor was gradually replaced by wage labor in the sugar sector, and by smallholder and plantation growing in the tobacco sector, but in the cultivation of coffee – a crucial source of direct income for the colonial government – forced labor lingered on during the entire nineteenth century. All in all the Cultivation System in combination with demographic growth created a massive semi-proletarian rural workforce that was dependent upon by-employment to make ends meet (Bosma 2011, Elson 1986, Knight 1988).

Thus the plantation sector in both Java and Cuba underwent an important, though different, evolution in labor relations from the middle of the nineteenth century. The technological developments and investments in infrastructure in the early nineteenth century allowed Cuba to open up new fertile areas for sugar production and in the short term made slave labor “more efficient in terms of the income produced by each slave” (Bergad 1989:97). In Java an opposite tendency was seen, precisely because the colonial government successfully created a semi-proletarianized workforce, a process that was further engendered by rapid demographic growth. Moreover, since sugar cultivation was inserted into irrigated rice cultivation, a balance had to be struck between cash crop and food production. There was a premium on

7. The share of the households involved in the Cultivation System declined over time, but 35-40 percent is reasonable estimate for the 1840s (Fasseur 1992:17). Java in 1850 had a population of about 12,500,000 and the average size of a household was 4.7. Not all parts of Java were under the sway of the Cultivation System however. The semi-autonomous Principalities (i.e. the Residencies of Surakarta and Yogyakarta) as well as private-owned land were exempted. The population of the Principalities, Batavia, and Buitenzorg and other private domains must have been about 3 million, which means that there were 2.0 million households available for the Cultivation System.

an efficient use of land, which was done by applying more and more labor to the cultivation of cane. Clearly this could be done easily under a regime of forced labor, where the price of labor was set by the colonial government; but it also continued under the more liberal labor market in the aftermath of the Cultivation System.

The labor-land ratio in the Cuba and Java sugar industry began to diverge in the 1840s and only became more pronounced over the years. Table 2 demonstrates the intensity of the Java industry compared to the Cuba, with substantially higher sugar yields per hectare but requiring a much larger workforce to achieve. The vast majority of this labor force was compulsory though wage labor was rapidly advancing. Meanwhile, the Cuban labor force in the sugar mills (*ingenios*) worked throughout the year to plant the cane, to maintain the buildings and equipment, and then to harvest the crop. Cuba only needed a fraction of the labor Java needed in the field, because its soils were fertile enough to allow the cane to stay for many years, and when the soil did become exhausted there were still many unexploited areas on the island that planters could move their operations to. Although three ratoons (new cuts from the same cane plant) were considered to be the optimum, usually many more ratoons were taken. This partly explains why the average plantation sugar worker in Cuba produced 2.5 times the amount of sugar as a worker in Java in the mid-nineteenth century (Moreno 1976:175, 1986:88-90, 190).⁸ But while the output per working day was much lower in Java the yield per hectare was almost twice as high as in Cuba, and this discrepancy continued to widen over the years. By the 1920s, Cuba was producing less than half the yield per hectare of the Javanese cane fields; but while Java's sugar factories were employing 10 percent of the adult male and 3.6 percent of the adult female population of Java around 1920,⁹ Cuba's sugar industry continued to have to achieve its production with a considerably smaller workforce.

8. According to the census report of 1899 the number of ratoons varied from 5 to 15 (*Report on the Census of Cuba 1899* by Sanger, Gannet & Willcox 1900:524).

9. According to the census of 1920 there were 9,435,919 men of 15 years and older and 10,876,338 women of 15 years and older on Java in that year. According to Levert (1934) about 55 percent of the labor force was male, 32 percent female, and the remaining 14 percent young adult. Dividing the 14 percent equally over male and female, one gets 610,000 male and 390,000 female workers employed for 100 days per year doing field work plus 400,000 males working as cane cutters and employed in the factories. For census data see *Nederlandsch-Indië Volkstelling 1920* Vol. II and Levert 1934:126.

Table 2. Land-labor ratio in Java and Cuban sugar plantations¹⁰

	Sugar workers		Cane land (hectares)		Workers per hectare		Sugar yield (tons per hectare)	
	1860	1925	1860	1925	1860	1925	1860	1925
Java	320,000	1,400,000	30,000	180,000	10.67	7.78	3	13
Cuba	219,715	320,000	277,715	866,288	0.79	0.37	1.85	6

With the ongoing shortage of labor in Cuba, intensified by the continuing growth of the sugar industry, much of the cane cutting had to be done by immigrant workers, in particular from Haiti, Jamaica, and other Caribbean islands, as well as poor rural Spanish immigrants. Although nominally free, these laborers (in particular the blacks) were often forced to work in conditions of threatened and actual violence that did not fall far short of those suffered by the slaves of the nineteenth century. They were also at the mercy of market instability – in high demand in times of economic strength, but in periods of economic crisis (such as that of 1920-22) finding themselves without work and means of support.

The sugar industry had an interest in stabilizing the labor force around the factory. This was achieved by employing skilled and supervising workers on a permanent basis, and weakening as much as possible the bargaining power of the armies of cane cutters. In Java, sugar factories had faced some problems getting sufficient labor in the 1860s and 1870s, but since the agricultural crisis of the 1880s labor had become abundant. Until 1920 nominal coolie wages (i.e. the wage laborers who were doing the fieldwork) remained practically stagnant and in decline in real terms. When some labor shortages emerged in East Java in the 1920s, immigrant labor could be attracted from other parts of Java and Madura. Mechanization of the heavy groundwork involved was pursued at some factories in East Java. This was not an option that would have made a difference for Cuba. Its plantation economy had already been short of labor before the abolition of slavery in 1886, but thereafter the shortage became even greater. The sugar industry was growing so fast that it needed more hands: between 1902 and 1930 about 800,000 immigrants arrived from Spain, while from 1917 onward the number of Spanish laborers declined and increasing numbers of West Indians and Haitians had to be allowed in (Carr 1998, De la Fuente 1997:33, McLeod 1998).

10. Sources: Ayala 1999:123, 125; Ayala 1995:106, Leidelmeijer 1997:329; Levert 1934:126, 217; Morbotter 1860:21; Moreno 1986:88-89, 190; Moreno 1976:175; Prinsen Geerligs 1924-31:147; *Nederlandsch-Indië Volkstelling 1920* Vol. II and *Report on the Census of Cuba 1899* by J.P. Sanger, Henry Gannet & Walter F. Willcox, 1900, p. 524.

In both cases the preservation of racialized colonial order complicated the labor issues. In early-nineteenth century Java, the colonial government decided against any large landownership by Europeans and white creoles for fear the island might be lost in the same way as Latin America had to be relinquished by the Spanish (Ottow1937:238). Since the colonial government had explicitly rejected a *hacienda* economy in Java, other means to re-channel the existing labor force toward the emerging sugar industry force was necessary; and it was precisely for this reason that the Cultivation System was established. In the absence of a large existing population, particularly the expansion of sugar production in Cuba required the influx of workers – and most of these were forcibly abstracted from Africa as slaves. An estimated 780,000 slaves were brought to Cuba between 1790 and 1867, despite the outlawing of the slave trade by the British after 1807. Throughout the nineteenth and early twentieth centuries Cuban whites were concerned about becoming a minority;¹¹ and this led to the intensification of racial fears on the part of the white creole elite in particular – very conscious of the proximity of the black republic of Haiti. Although this resulted in a series of schemes during the nineteenth century to encourage white (or at least non-black) immigration, Cuba nevertheless remained dependent upon the continuing influx of African slaves in the nineteenth century, and of Caribbean migrant labor in the early twentieth, to meet their labor needs.

That the sugar industry in Cuba could survive in the context of a permanent shortage of labor was thanks to the island's fertility and the possibility of expanding into previously under-exploited land, which enabled the plantations to economize drastically on their agricultural work. This was not possible to the same degree for tobacco and coffee cultivation. Yet the burgeoning sugar sector created a growing demand during the harvest: since cane mowers were not available in colonial times, cane cutting was laborious and arduous. In contrast with the sugar industry in Cuba, in Java female and child labor were massively employed from the beginning of the Cultivation System, and the colonial government in Java could afford to experiment with a variety of labor-intensive crops and to apply immense amounts of labor on the cultivation of coffee in spite of the diminishing returns on land because of exhaustion of the soil. However, it would be misleading to suggest that an unlimited supply of labor existed in Java. During the heyday of the Java sugar industry in the 1920s, labor shortages emerged, particularly in East Java. As a result, the

11. In fact, they never formed less than 40 percent of the population (in the early 1840s), and generally outnumbered the non-white population throughout most of the history. By 1862, 60 percent of the population was white (600,000 Cubans, 116,000 Spanish, and 45,000 assorted foreigners) (Toledo 1864). In comparison, Java – whose population of 12.5 million in 1850 was about ten times that of Cuba – had a radically different racial composition, with only 23,000 creoles and Europeans.

Javanese industry invested in machinery that could do the groundwork, such as digging the Reynoso trenches.¹² Only with the introduction of wage labor in the Java sugar industry, as well as coffee and tobacco, did female and child labor become visible in the statistics. Much more work needs to be done studying and comparing the composition of the labor forces of the Cuba and Java plantation economies – and this needs to be done for the nineteenth century in particular, when the conditions were shaped that would give these islands their unique position in global commodity production.

TWO ISLANDS, ONE CROP, AND A GLOBAL MARKET

The sugar industries of Java and Cuba dealt with the issues of labor mobilization and control in their own distinctive ways, but within the parameters of preserving white domination for which they relied on an increasingly capital intensive mode of production as well as increasing control of a relatively small number of sugar factories over an ever-expanding area under cane. In Cuba, the abundant availability of land meant that planters felt able to overexploit their soil, since they could move on to new terrain when needed: scarcity of labor resulted in an extensive use of land. However, this unused land was by no means immediately available. Remote and inaccessible with little pre-existing agriculture away from the few population centers, it not only increased the demand for manual labor to clear it (thereby stimulating the need to maintain an influx of captive workers), it also stimulated technological development, particularly in the form of steam-driven railways and boats, in order both to reach and equip the mills, and then to transport the produce to the principal ports. At the same time, it required a change in land-ownership forms to facilitate the formation of plantations and further advances of the sugar industry. For Java the system of forced crop deliveries under the Cultivation System was gradually replaced by wage labor and by direct contracting between factories and holders of *sawah* land. The colonial government, however, set limits on the acreage of land that could be set under cane in order to safeguard the production of sufficient food crops. There was a premium on raising the output per acre, which made botany the key science for the Java sugar industry. Whereas labor-saving methods were employed in haulage and also the ploughing of the land, ratooning was taboo

12. The Reynoso system consisted of digging furrows to a depth of two feet, piling up the soil in between the trenches. The cane cuttings were planted in the furrows, which were then filled with soil again when the growth of the cane had progressed. This method ensured a deeper rooting of the cane, which enhanced its growth, and made it less vulnerable to strong winds.

in Java and hundreds of thousands of female and child laborers took care of the planting of and tending to the cane.

Although Java and Cuba display a number of topographical similarities, since they are located in opposite hemispheres little thought was previously given to the interconnections between them, or the comparison of the historical trajectories that launched both to the forefront of global sugar production in the nineteenth century. Studies into what factors contributed to their rise to prominence so far are wanting in global perspective. Sugar was already being cultivated in both islands before they rose to global prominence, but on a relatively small, undeveloped scale, overshadowed by the principal sugar producers of the eighteenth century. However, the revolution in Saint Domingue in 1791 quickly revealed how interconnected the world economy had already become: while it might have been predicted that neighboring Cuba would benefit from this, the Dutch were also quick to grasp the opportunity to push Java into the forefront of industrialized sugar production. Although the initiative in the former appeared to come from local forces, and in the latter from metropolitan forces, what was key in both was the presence of a dynamic bourgeoisie with close links to transnational, even transimperial, commercial networks willing to take the necessary steps to advance their respective sugar industries in terms of land cultivated, scale of production, and the introduction of the latest technological and scientific advances. The transfer of crops brought great wealth and power to creole planters' families in Cuba and Java and their entrepreneurship modernized sugar production through the introduction of advanced technology, such as vacuum pans and centrifuges, resulting in an extensive infrastructure to support commodity production. However, while this began through local initiative, the need to make the increasingly large investments required for such technology resulted in the islands' commodity agriculture falling under the control of metropolitan capital by the twentieth century, though with the continuing involvement and complicity of local elites.

In the process, both islands underwent significant changes in how land was controlled and cultivated and at the same time experienced substantial demographic change, as the sugar industry demanded ever greater mobilization of and control over labor. Here there does seem to have been a significant difference between Cuba and Java, which contributed to the specific development of each: put simply, Cuba had a shortage of labor coupled with a surplus of land; Java a surplus of labor concomitant with a growing shortage of land. However, it can be seen that far from separating their paths, this apparent dichotomy was possibly the two interconnected sides of a single dynamic. It was a dynamic that was brought about by a unique combination of global capital and technology flows and the right local political conditions for massive appropriation of land and control over the labor supplies. This eventually led to cane becoming the dominant crop on both islands, and to them dominating its global supply for such a protracted period.

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