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# SLAVERY AND DEVELOPMENT IN NINETEENTH CENTURY BRAZIL<sup>1</sup>

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Abstract:

This article brings new evidence on the legacy of slavery in nineteenth-century Brazil to bear on the history of economic development. Its conclusions contribute to the debate raised by the new history of capitalism about the critical role played by slavery in the industrialization of the United States. We argue that the new history of capitalism lacks a comparative perspective. Brazil imported more slaves than any other country in the world and slavery lasted longer and was more widespread there than in the United States South. Rather than promoting economic growth and development, the evidence shows that slavery held back industrialization in Brazil. We also discuss the role of slavery in agricultural productivity and show that, as in the United States, the use of violence does not explain increases in the productivity of cotton plantations.

*Keywords:* Slavery, Brazil, comparative history, new history of capitalism

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## *Introduction*

Understanding the legacy of slavery requires comparative history. In Brazil, the prevalence of this institution in a multitude of economic activities and throughout the entire territory means that counterfactual scenarios about what Brazilian society would have looked like without this institution are difficult to evaluate. Some scholarship maintains that slavery was harmful to Brazilian development, while recent interpretations argue that the United States' overall economic development cannot be separated from its slave roots. The latter hypothesis, most prominently advanced by the new history of capitalism, stimulates analogous questions for other slave regions in the Americas. Among the arguments presented by this literature, we focus on two that are especially relevant to the Brazilian case: the relationship between slavery and industrialization, and the role of violence as a determining factor in increasing agricultural productivity.

The United States is an essential point of comparison for the economic history of Brazil in the nineteenth century.<sup>2</sup> Most studies, however, have compared Brazil with the northern United States, which had an advanced economic structure. One of the first historians to compare slave regions in Brazil and the United States stressed that the “salient features of the [US] South’s economic structure” were similar to those of Brazil.<sup>3</sup> These salient features included a plantation system based on slave labor, a limited degree of industrialization, low urbanization, and deficient investment in human capital.

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<sup>2</sup> Furtado, *Formação Econômica*; Bergad, *Comparative Histories*; Marquese and Salles, *Escravidão e Capitalismo*.

<sup>3</sup> Graham, “Slavery,” 622.

The comparison between Brazil and the US South becomes even more relevant when we remember an important concept in the new history of capitalism literature: the changes in the slave regime after the industrial revolution, a period known as “second slavery.”<sup>4</sup> As a response to market expansion and modernization, slavery intensified and expanded in the Americas, specifically in the US South, Brazil, and Cuba.<sup>5</sup> The new history of capitalism claims that slavery made the United States rich, but it is for the most part silent about what effects slavery had in the rest of the Americas. The idea that slavery transformed societies in their entirety requires an explanation of why this institution had such diverse effects in different countries.

We argue that the case of Brazil, where the slave economy was more intensive and more central than in the United States, shows that the institution of slavery was neither necessary nor sufficient for promoting economic development.<sup>6</sup> We provide systematic quantitative evidence pointing to the fact that, on the contrary, slavery slowed the transition to an advanced industrial economy. Brazilian slavery had all the characteristics highlighted by the new history of capitalism as being indispensable for modern economic growth. These consisted of transatlantic trade links between merchants and slave traders, the use of slaves in the production of commodities such as cotton, and apparent connections between the slave economy and industrialization.<sup>7</sup> Yet, in Brazil—as in the United States—the parts of the country where slavery

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<sup>4</sup> Marquese, “Estados Unidos.”

<sup>5</sup> Blackburn, “Segunda Escravidão.”

<sup>6</sup> Slaves composed one-third of the Brazilian population in 1822, when the country became independent from Portugal: Corrêa do Lago, “Da Escravidão.” Slavery was widespread and more pervasive than in the US antebellum South, supplying labor in many sorts of environments besides large cash crop plantations. The average ratio of slaves to masters was about five to one, and urban slaves worked in a variety of activities such as construction, retailing, and housekeeping: Luna and Klein, *Slavery*. In the countryside, sometimes masters labored shoulder-to-shoulder with a handful of slaves in small plots of land dedicated to food crops.

<sup>7</sup> On the use of slavery in producing cotton, see Pereira, “Poor Man’s Crop?”

was less pervasive performed better economically. There is no evidence that this difference was due to profits originating from the areas where slavery was more intensive.<sup>8</sup>

We also show that the increase in cotton production that occurred in Brazil in response to the US Civil War was not tied to an increase in the use of violence. While planters in Brazil knew about agricultural developments in the US South, including the “innovations in torture” that Edward Baptist argues were determinant there, these were not the driving force behind the cotton export boom during the 1860s in Brazil.<sup>9</sup> In fact, rapid export growth took place both in provinces where cotton was grown by slaves and in those where free workers were prevalent. The Northeast of Brazil, where most cotton production took place, offers evidence that attempts to increase the productivity of cotton production after the early 1830s revolved around new technologies, such as different cotton seeds and ginning machines to process short-staple cotton.

The rest of this article is organized as follows. We first provide historical background, including a comparison of the importance of the slave-based economy in Brazil vis-à-vis the United States. We then discuss how the cotton industry interacted with slave labor in Brazil. Finally, we investigate the links between Brazilian industrialization and slavery.

### *Historical Background*

The Brazilian economy stagnated during the nineteenth century, lagging behind that of the rich world.<sup>10</sup> Between 1820 and 1900, per capita GDP in the United States increased from three times

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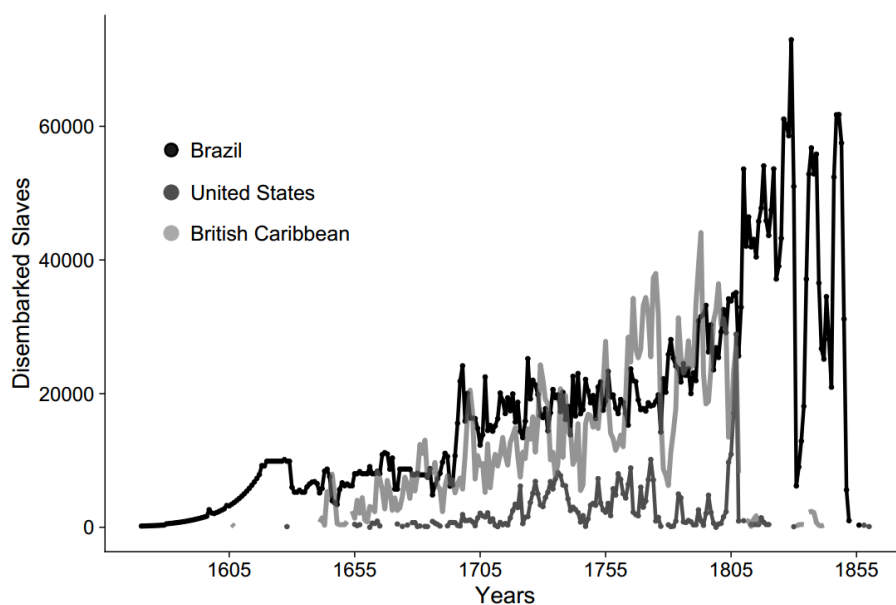
<sup>8</sup> Arguing otherwise would require finding a unique missing link between slavery and development in Brazil, which has not been hypothesized or discussed in the historiography or discovered in the empirical literature.

<sup>9</sup> Baptist, *Half Has Never Been Told*.

<sup>10</sup> The overall stagnation of the Brazilian economy masks substantial differences among regions of the country during this period. While per capita income in the sugar-growing Northeast is estimated to have fallen by 30 percent between 1822 and 1913, for example, the Southeast grew

to nine times that of Brazil.<sup>11</sup> Brazil only started to grow persistently by the turn of the century, following the 1888 emancipation of slaves. Its most dynamic regions, the South and Southeast, received the bulk of more than four million European migrants who entered the country in the age of mass migration from the 1880s to the 1930s.<sup>12</sup> Most significantly, the state of São Paulo subsidized Italian immigration to replace slave labor in coffee groves and became the country's industrial center.<sup>13</sup>

Figure 1: Number of disembarked slaves in Brazil, the British Caribbean, and the United States.



Source: Eltis, "Trans-Atlantic Slave Trade."

rapidly thanks to the coffee boom: in 1822, sugar represented 49 percent of Brazil's exports and coffee 19 percent; by 1913, cotton and sugar combined were only 3 percent of Brazil's exports, while coffee accounted for 60 percent. See Leff, "Economic Development."

<sup>11</sup> See Bolt and van Zanden, "Maddison," who in turn rely on Prados de la Escosura, "Lost Decades?" and Sutch, "National Income."

<sup>12</sup> Holloway, *Immigrants*, 40.

<sup>13</sup> Suzigan, *Indústria Brasileira*. Henceforth, we refer to states using only the term that came into use with the declaration of the Republic in 1889. Before that, states were known as provinces. The city of Rio de Janeiro was known as *Município Neutro* in the monarchic period and as *Distrito Federal* thereafter. For convenience, we refer to it as the Federal District throughout.

Prior to abolition in 1888, slavery was a pronounced and pervasive feature of Brazil's economy. More African captives arrived on Brazilian shores than anywhere else in the Americas. From the sixteenth to the nineteenth century, 4.9 million Africans landed in what was a Portuguese colony in the Americas until 1808, an independent joint kingdom with Portugal from 1808 to 1822, and then the Brazilian Empire from 1822 until the Republic was proclaimed in 1889, the year after emancipation. The total number of Africans transported to Brazil corresponds to 46 percent of all the enslaved arrivals in the New World and double the number who arrived in the whole of the British Caribbean. In comparison, the slave trade to the United States was much smaller: only 388,746 slaves disembarked there (see Figure 1).<sup>14</sup>

Figure 2: Map of Brazil in 1872, with provinces mentioned in this paper marked in grey.



Source: IBGE, “Evolução da Divisão.”

<sup>14</sup> Eltis, “Trans-Atlantic Slave Trade.” For the importance of the intra-Caribbean slave trade for the US South, see O’Malley, *Final Passages*.

The Brazilian slave trade started in the northeast of the country during the 1560s. Africans were put to work in the first large-scale sugar plantations of the Americas, most of which were located around Recife and Salvador, the capitals of Pernambuco and Bahia (see Figure 2). The annual number of disembarked slaves in those Northeastern ports increased steadily from the sixteenth century and fluctuated around eight thousand individuals imported per year until the slave trade finally ended in 1850.

Brazil's Southeast caught up as a major destination for slaves in the eighteenth century, during the gold rush in Minas Gerais and other regions. Most Africans entered that region through Rio de Janeiro, which became the largest slave port in the world (see Figure 3). Striking gold gave rise to what social scientists call economic and political resource curses. These had important consequences for the future development of both Brazil and Portugal.<sup>15</sup> Despite the gradual depletion of gold reserves, slaves continued arriving in the Southeast, reaching an astonishing 25,000 per year on average between 1801 and 1850.<sup>16</sup> A large share of the captives who arrived during the nineteenth century was forced to work in the booming coffee sector, which began in the hinterland of Rio de Janeiro state and subsequently expanded across the plains of São Paulo. The coffee plantations in Rio depended more on slave labor than those in São Paulo, which also employed European migrants, especially from the 1880s on.<sup>17</sup> An inter-regional slave market grew following the end of the trade with Africa in 1850, after which

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<sup>15</sup> Abad and Palma, "Fruits of El Dorado."

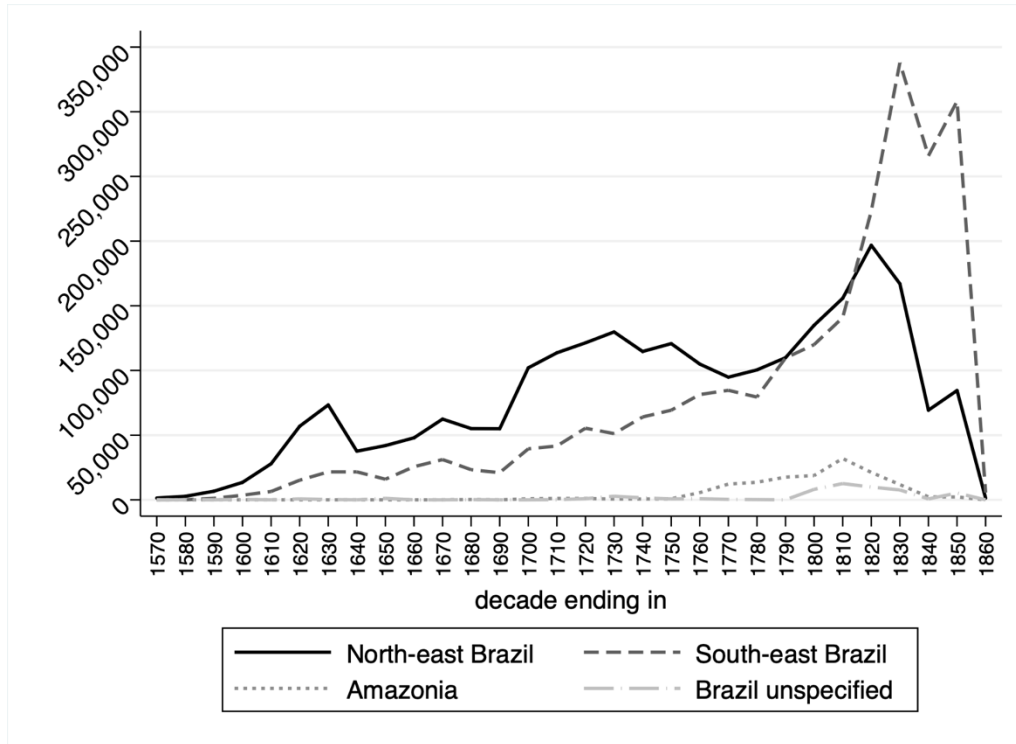
<sup>16</sup> Eltis, "Trans-Atlantic Slave Trade."

<sup>17</sup> Stein, *Vassouras*; Luna and Klein, *História Econômica*, 43-46.



enslaved people were moved in large numbers from the declining Northeast to the booming Southeast.<sup>18</sup>

Figure 3: Disembarked slaves in Brazil by regions.



Source: Eltis, “Trans-Atlantic Slave Trade.”

Traditional Brazilian historiography stresses the division of colonial society along the lines of slavery, claiming that the exploitation of a multitude of enslaved laborers at the hands of a few export-crop plantation owners shaped the country’s economic development.<sup>19</sup> A similar interpretation of the Brazilian past appears in more recent and influential work that depicts Brazil through the lenses of other slave-based societies, specifically the US antebellum South and Jamaica.<sup>20</sup>

<sup>18</sup> Luna and Klein, *Slavery*.

<sup>19</sup> Prado Jr, *História Econômica*; Furtado, *Formação Econômica*.

<sup>20</sup> Engerman and Sokoloff, “Factor Endowments.”

More recent research based on archival sources shows a different and more complex reality. According to the first Brazilian census of 1872, on average slaveholding ranged between five and eight individuals per owner, depending on the region, and nowhere did the average surpass ten. Half of masters owned fewer than five slaves, and these small groups were numerous enough to include one-fourth of the total captive population. Slavery was so widespread that between 20 and 30 percent of all households had at least one slave.<sup>21</sup> The predominance of small slave ownership appears in the work of historians who study specific periods and regions. For instance, between 1730 and 1750 in the outskirts of the city of Rio de Janeiro, no less than 97 percent of masters had up to three slaves, while only 2 percent had more than 20. This case is telling, as it includes both urban and rural households, the latter of which were mostly in the sugar industry.<sup>22</sup>

Large plantations did exist, especially on the northeastern coast, but they were not the norm. In the states of Bahia and Sergipe, only 29 percent of slaves were part of groups of more than 20 individuals.<sup>23</sup> Ownership was considerably more concentrated in the sugar sector around Salvador's bay, but even there masters on average owned less than ten slaves. Slaves cropped the sugar cane for processing in considerably larger farms, each of which typically used 60 slaves.<sup>24</sup> Even this number, though sizable by Brazilian standards, is considerably lower than the two hundred slaves who typically worked on each sugar plantation in Jamaica.<sup>25</sup> The average size of slaveholdings (*plantéis*) increased during the coffee boom, but the ratio of slaves to masters was

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<sup>21</sup> Luna and Klein, *Slavery*, 155.

<sup>22</sup> Fragoso, "Efigênia Angola," 262.

<sup>23</sup> Marcondes, "Desigualdades Regionais."

<sup>24</sup> Schwartz, *Sugar Plantations*, 428-46.

<sup>25</sup> Higman, *Slave Population*, 14.

still much lower than in the Caribbean: in 1850, coffee groves in São Paulo had on average 20 slaves.<sup>26</sup>

During much of the nineteenth century, most slaves were not employed in the exporting sector along the northeastern and southeastern coasts. They were often transported around the country for sale, forming a national market that reached deep into the countryside. Enslaved people also went with their masters when they moved to the hinterland to explore the expanding frontier.<sup>27</sup> All sectors depended on slaves. They made up half the sailors in the domestic maritime industry and were also put to work in foreign trade, including in the slave trade itself. Slaves were the backbone of the jerk beef processing industry in the southern state of Rio Grande do Sul.<sup>28</sup> They also worked in whale fishing and processing, mainly in Santa Catarina, Bahia, and Rio de Janeiro.<sup>29</sup> In Minas Gerais, in which the largest slave population in the country was concentrated, most captives produced goods for domestic consumption, such as foods and textiles. Proportionally more slaves labored in the exporting sector in the sugar and cotton state of Pernambuco; yet, even there, about one-third worked for the domestic market.<sup>30</sup>

Labor specialization adds another layer of complexity to Brazilian slavery. The existence of skilled slaves is reflected in prices, which varied not only depending on gender, age, and physical health, but also on expertise.<sup>31</sup> The human capital of slaves is well documented in Minas Gerais, where up to 30 percent of the captives who worked in construction and textile manufacturing were specialized laborers such as carpenters or overseers.<sup>32</sup>

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<sup>26</sup> Luna and Klein, *Slavery*, 111.

<sup>27</sup> Luna and Klein, *Slavery*, 148.

<sup>28</sup> Cardoso, *Capitalismo e Escravidão*; Monasterio, “FHC errou”; Pereira, “Uruguay or Coffee?”.

<sup>29</sup> Ellis, *A Baleia*, 100.

<sup>30</sup> Versiani and Vergolin, “Posse de Escravos.”

<sup>31</sup> Lima, “Escravos artesãos”; Marcondes and Motta, “Duas fontes documentais.”

<sup>32</sup> Luna and Klein, *Slavery*, 75, 114-19.

Most slaves lived and worked in the countryside, but a significant share was urban: in the 1870s, they composed 15 percent of the population in cities larger than twenty thousand inhabitants, which corresponded to 8 percent of the total slave population.<sup>33</sup> Urban slaves worked as home servants, builders, cooks, and street vendors. Some could perform jobs or services independently of their masters and hence have a source of income, even if they were forced to pay a share of it to their owner. This labor system allowed some captives to save enough money to buy their freedom or to take out a loan to do so. Urban slaves were more independent than those working in the rural sector, but even there some managed to grow crops on small plots of land, from which they could earn a personal income.<sup>34</sup>

Figures for the early 1800s are imprecise, but the data suggests that the Brazilian slave population was about 1 million in a country with just over 3.5 million people.<sup>35</sup> Thus Brazil had the largest concentration of slaves in the Americas. The ratio of the enslaved to the free population was much higher in Brazil than in the antebellum United States. In absolute terms, however, the demographic balance changed during the nineteenth century, as the United States' slave population grew to almost 4 million up until the eve of the Civil War, while natural growth was negative in Brazil.<sup>36</sup> In addition to poor living conditions caused by low income per capita, Brazil's slave population did not grow naturally because of the slave trade and manumission. As mentioned, a larger number of Africans reached Brazil than the United States, both absolutely and in proportion to population, and most of them were men of prime age. The slave trade created a strong gender imbalance that prevented births from rising above mortality. By contrast,

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<sup>33</sup> Luna and Klein, *Slavery*, 118.

<sup>34</sup> Guimarães, "Economia Autônoma."

<sup>35</sup> Pereira, "Poor Man's Crop?," 626.

<sup>36</sup> United States, *Historical Statistics*, 14.

in regions disconnected from the slave trade where all enslaved people were Brazilian-born and there was not much gender imbalance, there was positive natural growth.<sup>37</sup>

One question is why the slave trade was so large. The slave traders who operated in Brazil were either born in Brazil or Portuguese-born who lived in Brazil.<sup>38</sup> No less than 85 percent of the slave ships departing from Angola sailed directly to Brazil rather than via Portugal.<sup>39</sup> Combined, ships under Brazilian and Portuguese flags transported 51 percent of all captives who survived the voyage across the ocean during the entire Atlantic slave trade period.<sup>40</sup> This giant trading sector played a crucial role in the Brazilian economy: slave traders offered financial services in a country with few banks. They attracted savings by selling shares in convoys and provided credit to slave buyers. It is noteworthy that a domestic banking sector only expanded in Brazil in the 1850s, just after the official end of the transatlantic trade.<sup>41</sup>

Additionally, the slave population shrank because many were able to gain freedom. Some did so through self-purchase or government programs designed to buy people out of slavery in the decades that preceded emancipation; furthermore, children of free men and slaves were not automatically free but had a good chance of becoming so.<sup>42</sup> As a result, most Brazilians were

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<sup>37</sup> Luna and Cano, “Economia Escravista.”

<sup>38</sup> Klein, “Structure.”

<sup>39</sup> Alencastro, *O Trato dos Viventes*.

<sup>40</sup> Eltis, “Trans-Atlantic Slave Trade.”

<sup>41</sup> Similarly, in the European context some scholars argue that slavery was a key factor that made Britain rich: Williams, *Capitalism and Slavery*; Pomeranz, *Great Divergence*. If so, the same logic should have applied to Portugal. This country engaged earlier and more intensively with slavery and intercontinental trade than other European powers, and its economy relied on slave labor and trafficking to a greater extent, reaching a peak in the mid-eighteenth century: Costa, Palma, and Reis, “Great Escape?” And yet, Portugal diverged from the Western European core, in particular from the mid-eighteenth century until the twentieth century: Palma and Reis, “Convergence to Divergence.”

<sup>42</sup> The pattern of higher manumission in Brazil compared to the United States may be directly related to the fact that slaves operated in a much broader range of professions and activities in Brazil. Many of the professions and tasks carried out by slaves in Brazil—which Fenoaltea, in

free but not white: according to the 1872 census, 4.2 million non-white free people, 1.5 million slaves, and 3.8 million whites lived in the country.<sup>43</sup> Not only was slavery more prevalent in Brazil than in the United States; it was also a more fluid institution that allowed the enslaved to gain freedom on a larger scale. However, though they were free, former slaves were still at the bottom of society, suffering from persecution and racism. As in the US South, landowners and other local oligarchs actively limited the outside options of former slaves in order to keep extracting cheap labor from them, often through the use of vagrancy laws.<sup>44</sup> Additionally, poor whites saw free Afro-Brazilians as competitors for jobs, and elites pushed for racial whitening through immigration from Europe.<sup>45</sup> Often, former slaves performed the same jobs that slaves did, with the benefit of some mobility across the country and without the obligation to pay rents to their masters. The stark division between whites and the rest of the population may have generated prejudice against manual labor, with which slaves and their emancipated descendants were associated.<sup>46</sup>

Matters only started to change in the era of free immigration, from the 1880s to the 1930s, when over four million people moved from Europe to Brazil. Yet, migrants seldom coexisted with slaves during the decade or so during which mass European immigration coincided with slavery. Italian workers protested against a few initiatives that placed them

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“Slavery,” would describe as care-intensive rather than effort-intensive—eluded the classic mode of supervision of plantation agriculture and were thus amenable to different principal-agent relations, supervision styles, and rates of manumission.

<sup>43</sup> Luna and Klein, *Slavery*, 274.

<sup>44</sup> Huggins, *Slavery to Vagrancy*; Luna and Klein, *Slavery*; Bucciferro, “Racial Inequality.”

<sup>45</sup> da Costa, *Brazilian Empire*; Machado, “Slave Rebels”; Slenes, “Brazil”; Graham, *Patronage*. The state promoted European immigration to increase the share of whites in the country, but there have never been laws explicitly against interracial marriage. Brazil was always different from the US South in that there was never an official apartheid.

<sup>46</sup> Schwartz, “Manumission of Slaves”; Soares, “Os Escravos”; Algranti, “Os Ofícios Urbanos.”

shoulder-to-shoulder with enslaved laborers in coffee groves, and European governments threatened to block immigration to Brazil in response.<sup>47</sup> In fact, the rise of a free and well-functioning labor market was at odds with large-scale slavery, which, being so widespread in Brazil, kept the country in pre-industrial times until emancipation.<sup>48</sup> In some areas particularly dependent on slaves, such as the Paraíba Valley in the state of Rio de Janeiro, a pronounced legacy of slavery in economic development persisted after 1888. While coffee farmers in São Paulo anticipated emancipation and replaced slaves with migrants, their counterparts in Rio retained most of their slaves, who accounted for nearly half of their owners' capital.<sup>49</sup> As a consequence, the end of slavery drove these farms out of business, and the region entered economic stagnation. Migrants did go to the city of Rio, where they joined a booming labor market in the growing industrial and service sectors, but they seldom moved to the hinterland of the state of Rio.

### *Cotton and Slavery in Brazil*

Cotton production in the nineteenth-century United States is a central theme in scholarship on the history of capitalism. Baptist argues that a common feature of plantations on the southwestern frontier was the “pushing system,” an “innovation in violence” shared by most enslavers.<sup>50</sup> We discuss the Brazilian case, which provides a comparative perspective on this and other central claims made in the literature of the new history of capitalism, especially with regard to the use of

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<sup>47</sup> Luna and Klein, *Slavery*, 146.

<sup>48</sup> Luna and Klein, *Slavery*, 144.

<sup>49</sup> Luna and Klein, *Slavery*, 113.

<sup>50</sup> Baptist, *Half Has Never Been Told*, 121: “the new pushing system: a system that extracted more work by using oppressively direct supervision combined with torture ratcheted up to far higher levels than [...] experienced before.”

violence as an essential factor in increasing productivity on cotton plantations. Brazil is a relevant comparison because its cotton regions shared several characteristics with the North American case highlighted by Baptist.

Cotton production in Brazil began during the second half of the eighteenth century, after Portugal sought to promote agricultural production, initially of rice, in Maranhão. In a location where the population was smaller than in other parts of the northeast, the government promoted the transfer of a large number of slaves, creating a region with only a few farmers who owned small amounts of land and used little slave labor. During the early nineteenth century, 55 percent of the population in Maranhão was enslaved, while this number was around 30 percent in Pernambuco, a region that also became an important cotton exporter.<sup>51</sup>

The fact that a relatively low proportion of the population in Maranhão was free explains the absence of a phenomenon that occurred in other northeastern provinces during the first cotton boom (1780-1820): higher cotton prices led small farmers, who previously made a living from growing cassava, to abandon that crop and start planting cotton.<sup>52</sup> Despite attempts by the Portuguese government to prohibit small farmers from planting cotton—which caused an increase in the price of cassava, an important food source at the time—cotton production in many northeast provinces employed some free workers, even if most of the labor used was enslaved.

Cotton production increased because the mechanization of British textile production during the late eighteenth century made it very profitable in Brazil. The use of the water frame and the spinning mule required a longer and more resistant fiber than that provided by the cotton of the East and West Indies.<sup>53</sup> Northeast Brazil produced these long-staple varieties and, with this

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<sup>51</sup> Pereira, “Poor Man’s Crop?”

<sup>52</sup> Palacios, *Campesinato*.

<sup>53</sup> Pereira, “Cotton Trade.”



initial advantage, the region supplied 40 percent of the cotton imported to Liverpool in the 1790s.<sup>54</sup> The US South still had a small market share because exports of short-staple cotton, which had ideal growing conditions there, were still constrained by the existing ginning technology.<sup>55</sup>

After the 1820s, however, exports from Brazil stagnated, and the country became the only major international cotton producer whose exports to Britain decreased during a period of strong demand growth. Part of the reason was increasing productivity in the United States. According to Alan Olmstead and Paul Rhode, in the US South the “average daily cotton picking rate increased about fourfold between 1801 and 1862.”<sup>56</sup> However, as Egypt and South Asia managed to increase their cotton exports during the nineteenth century, the rise of “King Cotton” in the United States cannot explain Brazil’s decline on its own. The geographical conditions of Brazil’s cotton regions were different from those in Egypt and South Asia and allowed Brazilian growers to plant seeds like those used in the United States, such as the short-staple variety Upland, also known as *Gossypium hirsutum*). Nonetheless, cotton production in Brazil stagnated because saw-ginned cotton was not profitable in the northeast due to large export tariffs aimed at maximizing revenue from long-staple cotton.<sup>57</sup>

Planters in Maranhão, the largest cotton-exporting province in Brazil until the late 1840s, were aware of the developments that were taking place in the United States and tried to use imported cotton seeds and Whitney’s saw-gin in the early 1830s.<sup>58</sup> As mentioned, export taxes limited its profitability, but scholars have generally assumed that one of the main reasons for low

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<sup>54</sup> Krichtal, “Liverpool and the Raw Cotton Trade.”

<sup>55</sup> Lakwete, *Inventing the Cotton Gin*.

<sup>56</sup> Olmstead and Rhode, “Biological Innovation,” 1123.

<sup>57</sup> Pereira, “Taxation.”

<sup>58</sup> Mesquita, “Vida e Morte,” 113.

productivity was a lack of workers due to increasing demand for slave labor in the southern coffee plantations.<sup>59</sup> Up until 1840, however, there are no records of slave sales from Maranhão to southern provinces. Moreover, slaves made up a similar share of the population as in the new cotton areas in the United States, such as Alabama, Mississippi, and Louisiana.<sup>60</sup> As we demonstrate below, the increase in production during the 1860s also shows that the supply of labor was not a limiting factor for the increase in production in the northeast.

Before 1850, therefore, northeastern Brazil had the conditions that Baptist argues were instrumental in the increase in cotton productivity in the western part of the US antebellum South. Through the transatlantic slave trade, Brazil had access to cheaper slaves than the United States did. Because slaves were easily accessible, treatment of them would certainly have been no less malignant than in the US South. It is well established in the literature that, unlike in the United States, in Brazil the slave population working on plantations did not have a natural growth rate.<sup>61</sup> Since Brazil had access to slaves at lower prices from the transatlantic trade, one would expect that Baptist's "pushing system" would have also been adopted in cotton plantation regions that used slave labor, such as Maranhão. Yet it was not.

Plantation owners did not use slaves on cotton plantations because they could physically punish them and, according to Baptist's argument, increase productivity. Slavery was more profitable because free labor was scarce. As Suresh Naidu has recently argued for the US labor market, despite being more expensive than free labor, slaves had lower marginal costs on large plantations, which were more common in areas with low population density. The cost of labor was high both in the North and the South, "but relatively scalable and location-independent in

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<sup>59</sup> Canabrava, *O Desenvolvimento*; Stein, *Brazilian Cotton*; Barbosa, "Cotton."

<sup>60</sup> Pereira, "Poor Man's Crop?"

<sup>61</sup> Bergad, *Comparative Histories*, 43; Engerman, "40 Years."

the latter, while contingent on homesteads and towns in the former.”<sup>62</sup> The relationship between labor scarcity and coercion helps us understand why cotton production was more dependent on slaves in the first half of the nineteenth century and why some regions, like Maranhão, had a larger proportion of slaves than others.

With the stagnation in cotton exports after the 1820s, small-scale production was not profitable and free workers went back to producing cassava and other small crops. These workers, however, were fully able to resume cotton cultivation if cotton prices went up. Additionally, with a larger free population and the end of the slave trade in 1850 increasing the price of bonded labor, the presence of small farmers growing cotton in some regions during the 1860s is unsurprising. The low proportion of slaves in some of the regions that managed to rapidly increase cotton production after the US Civil War started, therefore, makes the hypothesis of violence an improbable explanation for increasing production.

In the context of the US South, recent criticisms of Baptist’s work have clearly laid out the limits of using violence as a major explanatory factor in production increases on cotton plantations: if more efficient “systems of torture” or management were the cause of increased productivity in picking cotton, why were there no increases in the productivity of other crops also tended by slaves?<sup>63</sup> One possibility, based on a suggestion by Baptist, was that the pushing system “could make their captives raise more acres of cotton than they could harvest between the time the bolls opened and the time one had to begin planting again.”<sup>64</sup> Thus, the new cotton varieties, which were easier to pick, complemented the use of violence to increase productivity. Again, Brazil offers some conditions that can help us evaluate Baptist’s argument.

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<sup>62</sup> Naidu, “American Slavery,” 6.

<sup>63</sup> Murray et al. “Half Has Never Been Told,” 920.

<sup>64</sup> Baptist, *Half Has Never Been Told*, 126.

As noted, the US Civil War represented a major shock that once again made cotton a central Brazilian export. Exports of Brazilian cotton to Great Britain more than tripled right after the beginning of the Civil War, from £794,958 in 1861 to £2,028,166 in 1862.<sup>65</sup> Demand increased even more over the following years and cotton plantations rapidly expanded in many areas of Brazil. The best-known case of this expansion was in São Paulo, which did not export cotton in significant quantities prior to 1862 but exported 10,000 tons per year a decade later.<sup>66</sup> Nonetheless, as was the case prior to the US Civil War, most cotton production in Brazil took place in the northeast. Figure 4 shows cotton exports in the main Brazilian cotton regions.<sup>67</sup> As this figure illustrates, most of the expansion of cotton supply occurred after the end of the Civil War. Not only did it take time to expand production, but there was also an expectation that after the end of the war southern farmers in the United States would not be able to recover their productive capacity quickly.<sup>68</sup>

In the absence of plantation records for Brazil, it is difficult to assess how different provinces managed to increase production so substantially in such a short time. One possibility is that the expansion took place in an extensive manner, by putting new land into production and shifting workers from other crops. For São Paulo, which had the highest growth rate, this strategy would imply the use of slaves, who were widely used on coffee farms at the time. There

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<sup>65</sup> Centre for Research Libraries: Brazilian Government Documents, Ministério da Agricultura, Relatório do ano de 1862. Anexo H. Offício do Consul Brasileiro em Liverpool.

<sup>66</sup> Albuquerque, *Capital Comercial*, 38. As cotton prices rose, “many coffee planters” began to plant cotton in São Paulo in 1862, intending to abandon coffee production. It should be noted, however, that the prominence of São Paulo in this debate is due to Alice Canabrava’s research from the 1950s, which is still today one of the few detailed studies about the effects of the US Civil War in the renaissance of cotton in Brazil. See Canabrava, *O Desenvolvimento*, 100.

<sup>67</sup> Pernambuco was the largest exporter, with quantities about twice that of the others, so including it in the figure would make it harder to see the trend in the others.

<sup>68</sup> Biblioteca Nacional Digital (henceforth BND), “Aos fazendeiros—Algodão.” *Diário de S. Paulo*, 9 de agosto de 1865, 1.

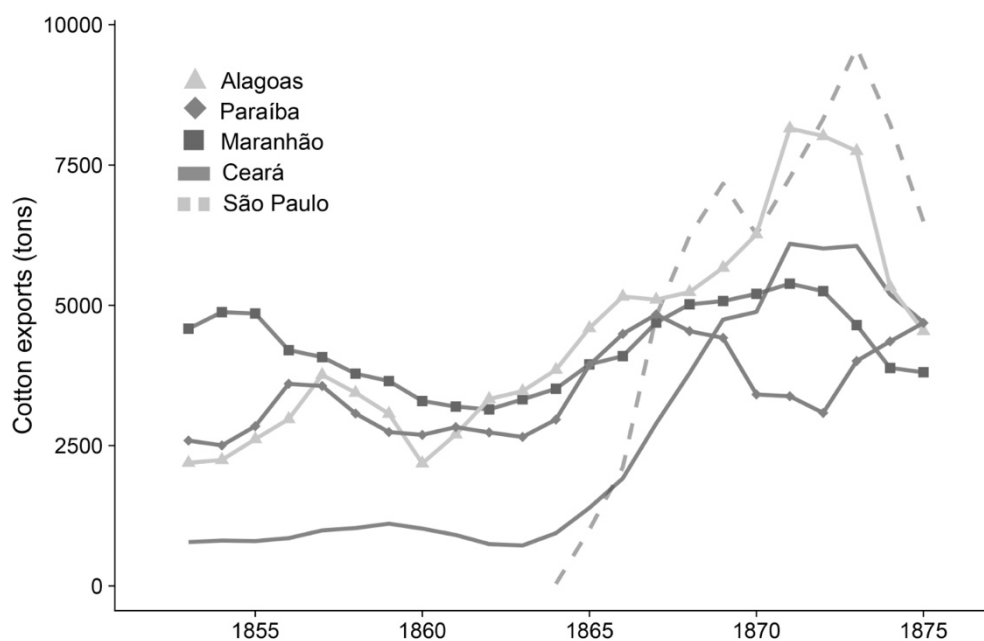
is some evidence, however, that cotton production in São Paulo used mostly free labor.<sup>69</sup>

According to newspapers, most cotton production in 1865 was concentrated around the municipality of Sorocaba, which produced approximately “100,000 arrobas of cleaned cotton” in that year.<sup>70</sup> This substantial amount was almost equivalent to the total exported by the province.

Newspapers also reported that cotton production in Sorocaba was “largely done by free arms.”<sup>71</sup>

The 1872 census suggests that the region had a lower than average proportion of slaves: while slaves made up 11 percent of the population in in São Paulo’s cotton region, the province’s average was 18.7 percent.

Figure 4: Cotton exports (tons, 3-year moving average), 1853-1876.



Sources: Northeast provinces (Branner, *Cotton*, 47), São Paulo (Canabrava, *O Desenvolvimento*, 314).

<sup>69</sup> Canabrava, *O Desenvolvimento*; Barbosa, “Cotton,” 31.

<sup>70</sup> BND, “Aos fazendeiros—Algodão.” *Diário de S. Paulo*. Other cotton regions were Campo Largo, Tatuhy, Itapetinga, Paranapanema, Botucatu, and Fachina—together with Sorocaba, they produced 300,000 arrobas (1 arroba = 14.6 kg).

<sup>71</sup> BND, “Sorocaba, 5 de setembro de 1865,” *Diário de S. Paulo*, 13 de setembro de 1865, 1.

Cotton production in the rest of the country, however, did not use only free labor. Table 1 documents production in the northeast, which represented 88 percent of cotton exports from Brazil during the cotton boom of 1863 to 1872. An interesting feature of cotton production in the region was its heterogeneity. The growth in exports occurred in provinces with a large slave presence, like Maranhão, but also in provinces where free labor was dominant, like Ceará. It happened where cotton was the main export commodity, like Paraíba, and where it was just a secondary export staple, like Bahia (see Table 1). Northeast Brazil, therefore, is a suitable place to evaluate Baptist's hypothesis about the use of violence to increase productivity because we can compare how regions using different work regimes responded to the sudden increase in international cotton prices.<sup>72</sup>

Table 1: Cotton exports in Northeast Brazil.

Provinces	Average value (1858-62)	Average value (1863-72)	Average tons (1858-62)	Average tons (1863-72)	Share slaves in population (1872)	Share cotton in exports (1863-65)
Alagoas	1,731,001	5,094,941	3,015	5,807	10.5%	87%
Bahia	211,216	2,741,695	159	3,067	12.6%	13%
Ceará	534,441	2,934,794	984	3,448	4.8%	65%
Maranhão	2,237,004	4,688,742	3,407	4,640	21.5%	87%
Paraíba	1,806,037	3,717,561	2,699	3,851	5.9%	89%
Pernambuco	1,581,939	11,373,505	1,547	12,245	10.7%	59%

Sources: Centre for Research Libraries: Relatório do Ministério da Fazenda 1863, Relatório do Ministério da Agricultura 1866. Branner, *Cotton*. Notes: Average values in monetary units (mil

<sup>72</sup> The monetary values in Table 1 and Figure 4 are hard to compare across time, but the relative amounts can be compared for each moment in time. We do not deflate the current prices because the available price indices for the period use mainly food prices from Rio de Janeiro, which are not representative of price trends of export commodities in the northeast (Brazil was a price-taker). The exchange rate with the pound sterling fluctuated around 27 mil réis per pence from 1858 to 1872, with the exception of the second half of the 1864-1870 war of the Triple Alliance against Paraguay. Instituto Brasileiro de Geografia e Estatística (henceforth IBGE), *Estatísticas Históricas*.

réis). Share cotton is the share of cotton exports in the total export value. See a footnote in the main text for an explanation of why we do not deflate the nominal values in this table.

The cases of Maranhão and Ceará present a particularly interesting contrast because, despite their geographical proximity, they were quite different in their economic structure. In the northeast throughout the nineteenth century, the share of the total population who were slaves was highest in Maranhão, while it was lowest in Ceará. In Maranhão, cotton was the main export staple from 1760 on, while in Ceará, although it “flourished during the first two decades of the nineteenth century,” cotton was mostly replaced by coffee production after the 1830s.<sup>73</sup> Therefore, when the US Civil War started, cotton production was quite low in Ceará. But, as Figure 5 shows, in the late 1860s the value of cotton exports rose to double the value of sugar, coffee, rubber, and hides combined.<sup>74</sup>

Another important difference from Maranhão and other nearby provinces was that Ceará had an unusual relationship with slavery. The province became the first in Brazil to abolish slavery in 1884, four years before the rest of the country. One of the reasons for this early abolition was the low historical presence of slaves. Agriculture in Ceará was already “almost exclusively practiced by free arms” in the early 1860s. Government reports state that free work was the norm in Ceará, unlike in other provinces, where farmers did not produce if there were not enough slaves available.<sup>75</sup> Moreover, amid the boom in cotton exports, the provincial government questioned whether the absence of a slave population really would affect the

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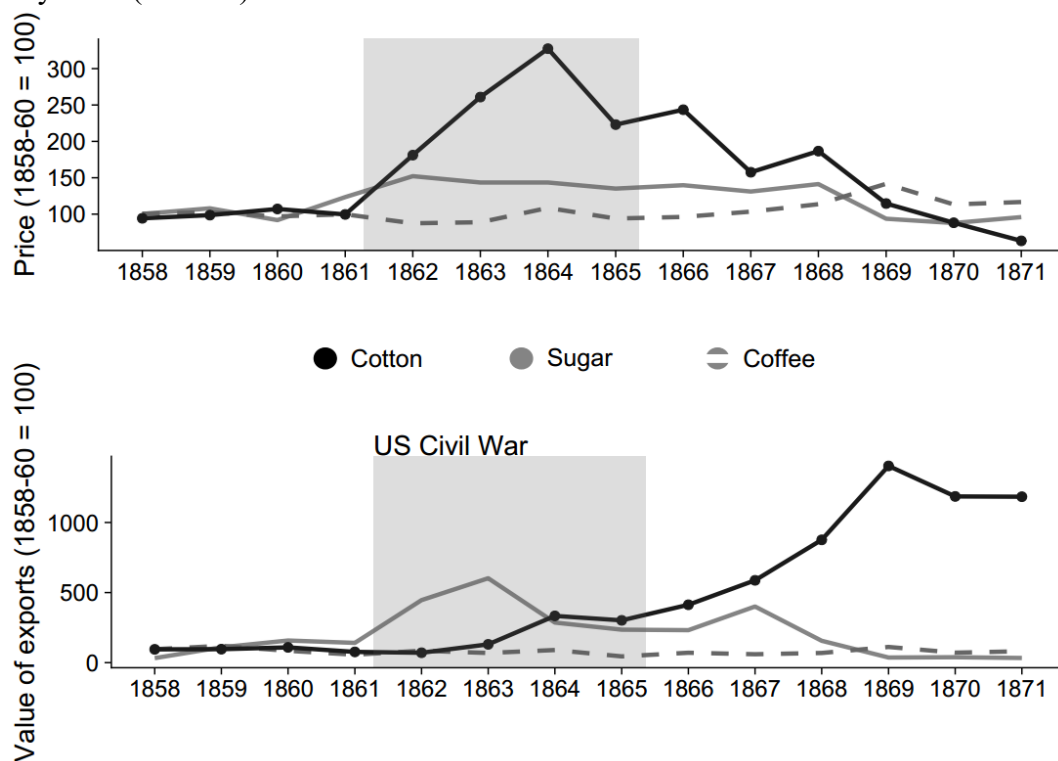
<sup>73</sup> Centre for Research Libraries: Relatório Ceará, 45. The report mentions that cotton production began to slowly recover after 1848, when the government reduced export taxes.

<sup>74</sup> Centre for Research Libraries: Relatório Ceará 1872, 20 de outubro, map n. 3.

<sup>75</sup> Centre for Research Libraries: Relatório Ceará 1º outubro, 1864, 47.

agriculture of the province in any way.<sup>76</sup> In Brazil at the time, therefore, Ceará was a recurring example of the positive impact of replacing slaves with free labor.<sup>77</sup> The province's skepticism about slavery also featured in debates in the Brazilian parliament as early as 1850: a deputy from the province presented a gradual emancipation project in the Chamber of Deputies in Rio de Janeiro.<sup>78</sup> Not surprisingly, the proposal generated consternation among his peers and was not considered for a vote.

Figure 5: Price and value of exports in Ceará for cotton, sugar, and coffee (1858-1871) in monetary units (mil réis).



Source: Centre for Research Libraries: Relatório da Província do Ceará 1862, 1872. Note: See a footnote in the main text for an explanation of why we do not deflate the nominal values in this figure.

<sup>76</sup> Centre for Research Libraries: Provincial Presidential Reports: Ceará. 1º de outubro de 1864, 58.

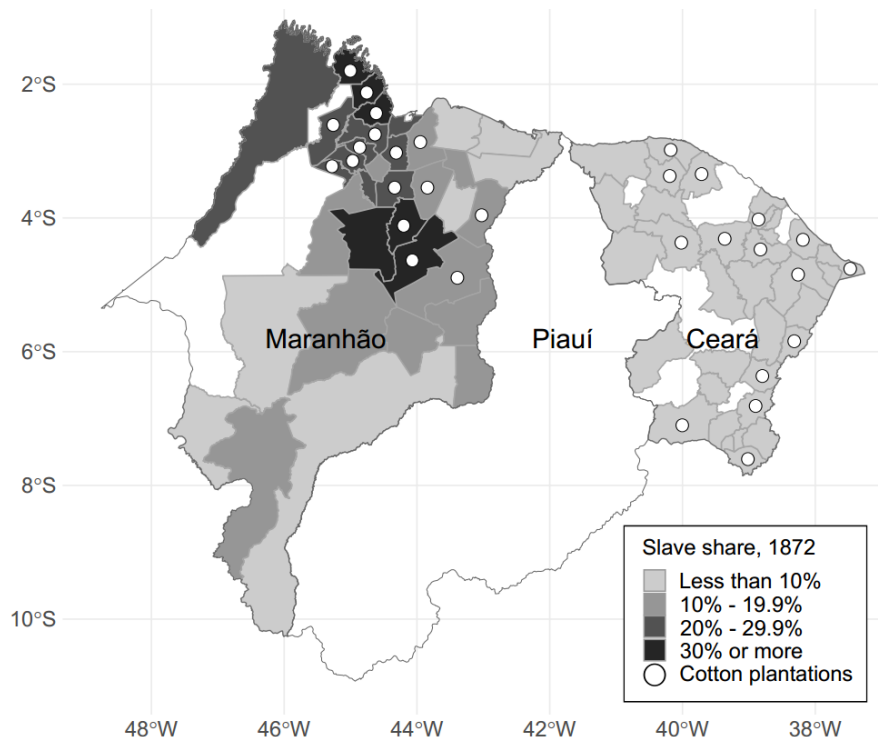
<sup>77</sup> Malheiro, *Escravidão*, 167.

<sup>78</sup> Mamigonian, *Africanos Livres*, 322.



Therefore, to assess which factors were important in the increase in cotton production during the 1860s, we propose an indirect analysis using the contrasting cases of Ceará and Maranhão. As we argued before, the increase in production may have resulted from an increase in the number of workers, an increase in the use of violence, the introduction of new seeds, or a combination of these factors. For the analysis, we collected new data for municipalities in Ceará and Maranhão during the 1860s and combined it with data on the distribution of free and enslaved workers in the census of 1872. Figure 6 shows the concentration of slaves in 1872 and the location of cotton plantations in the 1860s. The contrast between the two provinces is evident: in all municipalities in Ceará, less than 10 percent of the population was enslaved, while cotton regions in Maranhão had a share of slaves above the provincial average.

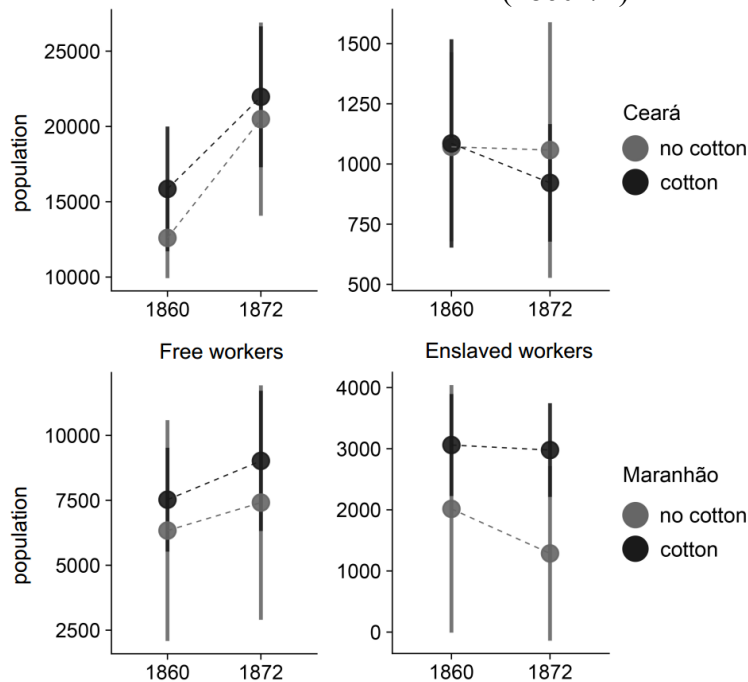
Figure 6: Share of slaves in the total population (1872) and location of cotton plantations in the early 1860s.



Sources: Brazil, *Recenseamento Geral*. Centre for Research Libraries: Relatório da Província do Maranhão, 3 julho, 1861, mapa n.6. Relatório da Província do Ceará, 1 outubro, 1862,13.

The first hypothesis that needs to be considered is whether the regions that increased their production after 1863 received more workers. If cotton regions had an influx of workers, we can assume that the growth was mostly extensive, and thus offers no new information for the debate on increased productivity in cotton production. Figure 7, which presents the average and confidence intervals for the slave and free population in Ceará and Maranhão in 1860 and 1872, shows no statistical difference in the population of cotton and non-cotton regions. Moreover, as the increase in production occurred in several provinces that used free labor on cotton plantations (see Table 1), we discard the hypothesis of violence toward slaves as the so-called ultimate cause of the increase in production. As mentioned, this conclusion echoes the criticisms that Olmstead and Rhode have made of this argument in the US case.<sup>79</sup>

Figure 7: Slaves and free workers in Ceará and Maranhão (1860-72).



Sources: Brazil, *Recenseamento Geral*; Centre for Research Libraries: Relatório da Província do Ceará 1861, Relatório da Província do Maranhão 1861. Note: 95% confidence intervals are shown.

<sup>79</sup> Olmstead and Rhode, “Cotton.”

Another piece of evidence suggesting that slaves were not essential to cotton production comes from the decline of the slave population in Maranhão during the 1860s, a period during which total production increased (see Table 2). The main cause of this reduction was not the sale of slaves to coffee plantations in the southern provinces. Statistics from the province's presidential reports—annual reports by the provincial governments to the court in Rio de Janeiro—show that, while there were 2,953 slaves exported to other provinces during the 1860s, the largest percentage of the decline in the slave population (5,056 slaves) was the result of manumission. Indeed, most manumissions (40 percent) happened in the province's capital, São Luís, which was the main port and did not have cotton plantations nearby. It is safe to assume that these manumitted slaves worked in the urban economy. However, if there was a high demand for slaves in cotton regions, we would expect that urban slaves would have been relocated to the countryside, as occurred in the southeast with coffee production. Nonetheless, the statistics show that some slaves became free in the cotton regions as well.

Historical sources do not suggest that coercive methods rapidly increased the supply of cotton, but they do mention attempts to use new methods and technologies. There is ample evidence of the introduction of seeds from the United States in several Brazilian provinces, even prior to the Civil War.<sup>80</sup> Planters in Brazil knew and had planted Upland cotton in some regions of the country since the early nineteenth century.<sup>81</sup> The provincial government in Maranhão, trying to improve agricultural productivity, performed tests with “six different varieties of

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<sup>80</sup> Branner, *Cotton*, 30.

<sup>81</sup> BND, “Das Diferentes Espécies de Algodão que Temos no Brasil”. *O Auxiliador da Indústria Nacional*, setembro de 1841, n. 9, 270.

Mexican cotton seeds” from the United States in 1860.<sup>82</sup> Figure 8 illustrates that “Mexican seeds” (Upland cotton) were widely advertised in newspapers. The goal, however, was not simply to copy US production. In the northern provinces of Rio Grande do Norte, Pernambuco, Alagoas, and Sergipe in the 1860s, commissions were set up to test which cotton species, including Upland, would further increase production in the region.<sup>83</sup> For São Paulo, Manchester’s Cotton Supply Association dispatched 120 arrobas of “high quality” seeds in 1865 to be “distributed free of charge in the province.”<sup>84</sup> Local newspapers also reported that some farmers were using new cotton ginning machines from the United States, the same ones that were displayed at the Great London Exhibition in 1862. Indeed, after the end of the US Civil War, a couple of thousand cotton planters from the confederate states moved to São Paulo to plant cotton.<sup>85</sup>

Figure 8: Example of a newspaper ad in Maranhão selling upland (Mexican) seeds.



<sup>82</sup> BND, “Maranhão.” *Diário de Pernambuco*, 22 de maio de 1860, 2.

<sup>83</sup> BND, “Exposição nacional.” *Diário de Pernambuco*, 8 de maio de 1866, 8.

<sup>84</sup> BND, “Aos Redactores do *Diário de São Paulo*.” *Diário de S. Paulo*, 11 de agosto de 1865, 1.

<sup>85</sup> Silva, *Capitalismo e Escravidão*, 33.

Source: BND, *Publicador Maranhense*, January 7, 1861.

The fact that planters in Ceará and Maranhão imported cotton seeds from the United States to improve production allows us to analyze Baptist's hypothesis that the increase in production was due to the interaction between violence and the use of new cotton varieties.<sup>86</sup> If Baptist's hypothesis is valid, we would expect to see a greater proportional increase in cotton production in Maranhão than in Ceará during the 1860s. Table 1, however, shows that this did not happen. Moreover, the possibility that supposedly free workers were actually forced to labor in a condition of near slavery during this period of rapid increase in exports can also be discarded because a considerable part of the cultivation was carried out by small farmers. Even before the increase in prices during the 1860s, newspapers in Ceará stated that every farmer, "even the poorest," was able to plant cotton in the province. This situation would have made it difficult for large plantation owners to use coercion to keep free laborers.

Several factors—such as more developed financial institutions and improved transportation—made cotton plantations in the United States more productive than Brazilian ones. The evidence presented here shows that, unlike what several new historians of capitalism claim, coercion was not the determining factor in increasing productivity. In no way does this fact minimize the horror of slavery or fail to recognize that slave owners in Brazil treated their slaves violently. Rather, we show that in northeastern Brazil the increase in cotton production in the crucial period we study was not dependent on slave labor. Historical records show that the use of seeds and other technologies were planters' main means of increasing productivity during the nineteenth century. In the country with the largest slave trade on record and the last one to

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<sup>86</sup> Baptist, *Half Has Never Been Told*, 126; BND, "Considerações Sobre as Secas—Agricultura, Algodão, Arroz." Pedro II (Ceará), 2 January 1850, 3.

abolish slavery in the Western hemisphere, Baptist's "pushing system" is not an adequate explanation for the expansion of cotton production.

### *Slavery and Industrialization in Brazil*

The relationship between slavery and industrialization is another cornerstone of the new history of capitalism. According to this literature, slavery played a fundamental role in industrial development in a variety of ways, mainly by providing raw materials, especially cotton, and profits that could be reinvested. Further contributions to industrialization—particularly relevant in the US context—were, supposedly, the creation of markets for manufactured goods and territorial expansion. Scholars such as Gavin Wright have criticized the new history of capitalism's conclusions about industrialization and slavery in the United States on all these fronts.<sup>87</sup> Rather than returning to those criticisms, we discuss the relationship between slavery and industrialization in Brazil, and argue that there, slavery held back industrialization.

Brazil was a late industrializer. Although some manufacturing activities tied to agricultural commodities, especially sugar refinement, had already appeared in the colonial period, a modern and sizable industrial sector only emerged in the second half of the nineteenth century. Slaves were employed in manufacturing, as discussed above, but this was not their main occupation. Moreover, rapid industrialization only began in the 1890s in connection with the abolition of slavery and several other crucial and interconnected developments, such as the beginning of mass immigration from Europe, policy changes that followed the fall of the monarchy, and the spread of railways.

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<sup>87</sup> Wright, "Slavery."

An historian of capitalism who discusses the issue of slavery and industrialization in Brazil head on, albeit briefly, is Sven Beckert. In *Empire of Cotton*, he writes:

*Brazil's budding cotton entrepreneurs faced other problems as well. As capital was bound up in the production and trade in agricultural commodities produced by slave labor and in the slave trade itself, industrial enterprises often lacked access to credit. Moreover, labor recruitment remained a problem. Because of the prevalence of slavery, little wage labor was available for industrial employment, since Europeans, unwilling to compete with slave labor, preferred to migrate to other parts of the continent, such as Argentina. As a result, mills drew on a mixture of wage and slave labor. But generally, labor was concentrated in agriculture, and merchants saw "industry and agriculture... as rivals for available labor." [...] Plantation slavery's imperatives, the case of Brazil shows, could be detrimental to industrialization. Not that slave labor as such was incompatible with manufacturing—to the contrary, slaves could be employed in cotton factories. However, a society dominated by slavery was not conducive to cotton industrialization. Early industrialization depended, globally, on war capitalism, but in regions of the world in which war capitalism took its most violent edge cotton industrialization never resulted.<sup>88</sup>*

Beckert thus appears to argue that, while slavery was conducive to industrialization where it was not the dominant system of production, as in the United States, it otherwise affected economic development negatively, as it did in Brazil. We find the argument that slavery was detrimental for industrialization where it struggled and good for industrialization where it took off a form of ahistorical and post-hoc reasoning. One would want, at the very least, to have an indication of at what degree of prevalence slavery switches from aiding industrialization to harming it. With regards to Beckert's broader concept of war capitalism—as he calls the ensemble of institutions implemented by the West, in which foreign powers imposed semi-colonial exploitative institutions—there is no real evidence that Brazil was under the yoke of such a system. The country gained its independence from Portugal in 1822 (and arguably even as early as 1808 or

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<sup>88</sup> Beckert, *Empire of Cotton*, 170-71.

1815), and the only instances when Britain intervened militarily in Brazilian waters between 1830 and 1850 were to *end* the slave trade.<sup>89</sup>

Either way, slavery certainly did not turn Brazil into an industrial power like the United States. Although Brazil does not represent the ideal control for assessing a counterfactual for a more industrialized state like the United States, we can draw some conclusions regarding the impact of slavery on industrialization from the Brazilian experience.<sup>90</sup> After all, if slavery affected the trajectory of capitalism and growth, as the new history of capitalism claims, we should be able to detect these mechanisms in the country that imported most slaves.

In order to evaluate the impact of slavery systematically, however, one cannot rely on parallels between countries or regions, which compare entities that may differ too much. Instead, we look at regions and municipalities within Brazil so that many of the factors responsible for differential industrial development—e.g., national policy—can be kept constant and the role of slavery analyzed more credibly. Specifically, we bring new quantitative evidence to the table by focusing on the two key neighboring southeastern states of Rio de Janeiro and São Paulo and on the Federal District (the city of Rio de Janeiro, then Brazil’s capital and seat of the court, and a separate administrative entity).

The Federal District, Rio de Janeiro, and São Paulo were at the forefront of Brazilian industrialization. The industrial sectors in São Paulo and the Federal District developed earlier, while Rio de Janeiro exhibited a rapid growth in the number of workers in manufacturing mainly after abolition.<sup>91</sup> In fact, industrialization sped up everywhere in the 1890s. Part of the reason

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<sup>89</sup> Fausto, *Concise History*.

<sup>90</sup> As demonstrated in Graham, “Slavery,” even the far more comparable US South was more developed than Brazil in the nineteenth century according to almost any metric, including industrialization.

<sup>91</sup> Schultz, *Crise Financeira*.



was the expansionist monetary policy launched by the first republican administration (1889-1891), which included the provision of credit to the manufacturing sector and ended up causing the financial crisis known as *Encilhamento*.<sup>92</sup> The expansion of coffee groves that occurred around the same time, following the arrival of large numbers of European migrants, was particularly important for industrialization in São Paulo, whose coffee barons diversified by financing the manufacturing sector.<sup>93</sup> Investment in the *Paulista* factories intensified beginning in the first decade of the 1900s, when a governmental stockpiling program—that is, a price-manipulation program implemented via a coffee granary—sustained coffee prices. Output then grew steeply as the economic policies enacted during World War I protected the domestic industry from foreign competition. Immigration and years of heavy investment made São Paulo well positioned to take advantage of the shock caused by the war: from the mid-1910s on, the state became the main supplier of consumer goods to the rest of the country.<sup>94</sup>

Figure 9 takes stock of the manufacturing record in the two states and in the Federal District at the turn of the twentieth century and illustrates the geographical distribution and nature of manufacturing establishments in 1907.<sup>95</sup> By this date, Rio de Janeiro ranked fourth in the country both in terms of number of workers and value of production, while the state of São Paulo still ranked second after the Federal District.<sup>96</sup> As mentioned, São Paulo's industry subsequently grew more rapidly than that of its counterparts; it eventually became the country's powerhouse and overtook even the Federal District. In 1920, the state was responsible for over

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<sup>92</sup> Stein, *Brazilian Cotton*, 87; Levy, *História*, 109-12.

<sup>93</sup> Hanley, *Native Capital*, 84-113; Haber, "Introduction"; Ricci, "Economia Cafeeira."

<sup>94</sup> Luna and Klein, *História Econômica*, 294-96.

<sup>95</sup> Unfortunately, the 1907 data is not as complete as the data from the two censuses in 1872 and 1920. For this reason, we employ it for descriptive purposes, but not in the analysis below.

<sup>96</sup> Centro Industrial do Brasil, *O Brasil*.

one-third of the value of all industrial production in Brazil.<sup>97</sup> While it is neither possible nor advisable to identify a single determining factor for these developments, we argue that the earlier replacement of slaves with free labor in São Paulo played a role.

This hypothesis is most clearly supported by the contrast between the two states in the evolution of coffee production and its relation to industrialization.<sup>98</sup> Both Rio de Janeiro and São Paulo were important centers of coffee production. The Federal District was a center of coffee production in the earliest phases of the boom, but rapidly became irrelevant. Most coffee farms in Rio de Janeiro began production earlier than those in São Paulo, as early as the 1830s, and reached their maturity at the height of the slave economy. In this early phase, coffee exports were directly tied to slave imports because US and British coffee importers furnished vessels to slave traders and credit to planters.<sup>99</sup> Many plantations in Rio de Janeiro maintained their slave-based mode of production throughout the nineteenth century and were thus strongly hit by abolition.

Coffee production in São Paulo, instead, experienced two distinct phases with clear geographical delimitations. It first developed in the Paraíba Valley, on the border with Rio de Janeiro, where coffee farms were established in the mid-nineteenth century using slavery. In the late nineteenth century, the more productive and much larger *Oeste Paulista* (West São Paulo)—that is, the vast and fertile plains that stretch northwest from Campinas—took the lead in coffee production, settling mostly on virgin land.<sup>100</sup> Coffee production expanded to this area when slavery was already in decline or altogether abolished. The waning of slavery had started with the abolition of the slave trade in 1850, continued with the passing of the *Lei do Ventre Livre*

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<sup>97</sup> Instituto Brasileiro de Geografia e Estatística, *Repertório Estatístico*.

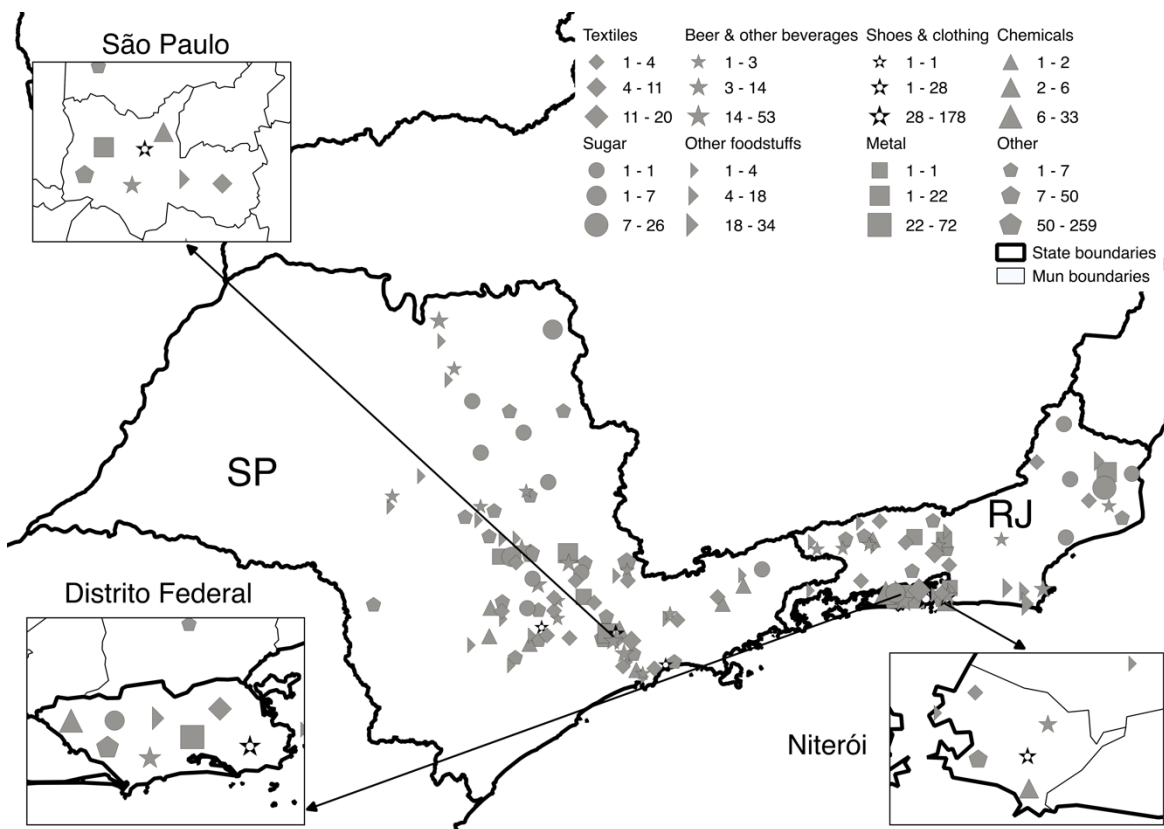
<sup>98</sup> Cano, *Raízes*.

<sup>99</sup> Absell, “Coffee.”

<sup>100</sup> Netto, *Problema*, 18-41.

(Law of the Free Womb) in 1871, and culminated in abolition in 1888.<sup>101</sup> As a result, European immigrants rather than slaves represented the main work force in West São Paulo in the 1880s and 1890s, the period in which the region became the largest producer of coffee in the world. On top of this, migrants who had initially settled in the countryside eventually moved to cities to invest and work in factories.<sup>102</sup>

Figure 9: Number of manufacturing establishments in Federal District, Rio de Janeiro and São Paulo in 1907.



Source: elaborated by the authors based on Centro Industrial do Brasil, *Brasil, Mappas Estatísticos da Indústria Fabril*. The types of production included in each category are as follows. Textiles: spinning and weaving. Beer & other beverages: beer, alcoholic beverages, and sodas; wine; syrups and liquors. Shoes & clothing: shoes; hats (different types); ties; gloves; bags and luggage; white clothes; clogs; buttons; corsets; trimmings. Chemicals: oils and resins; matches; chemical products; paint; ant-killer; rubber products; ink for writing and printing. Sugar: sugar refineries. Other foodstuffs: lard; chocolate; preserved meat and fish; sweets; ice; pasta; milled cereals; hams;

<sup>101</sup> Luna and Klein, *Slavery*. The *Lei do Ventre Livre* made a large number of slaves' children into apprentices who were automatically emancipated when they reached adulthood.

<sup>102</sup> Dean, *Industrialization*; Suzigan, *Indústria Brasileira*; Marson, "Origens dos Empresários."

butter; salt; biscuits; tomato paste; vinegar. Metal: lead & zinc; tinsplate; foundry and metalwork; pins; wire; clamps and brackets; nails. Other: marble and chalk; lime and cement; rope; artificial flowers; tobacco; shoe polish; musical instruments; jewels; transport material; combs; perfumes; soap and candles; saddles and harnesses; brooms; glass and crystal; paper and cardboard; ceramics; leather; furniture and decorations; shipbuilding; sawmill and carpentry; optical instruments; electric appliances; scales; billiards; boxes for jewels and medicines; manufacture and framing of images; molds for shoes; brochures; lamps; tiles; paper and paint; photographic equipment; bulbs. Not all establishments were reported by the publication. At least 80 further sugar refineries existed in Rio de Janeiro and 60 in São Paulo. The Federal District contained an unspecified number of other establishments producing marble and chalk, electric appliances, beer, furniture and decorations, clogs and vinegar. Some establishments could not be geolocated: 2 beer, 1 leather, 3 wood working, and 1 beverage factories in São Paulo; 1 leather, 2 salt, 1 soap and candle factories in Rio de Janeiro.

As mentioned above, the vibrant coffee industry, which heavily relied on a European work force, contributed to making São Paulo the industrial hub of Brazil. In contrast, Rio de Janeiro entered a period of stagnation, at least relative to São Paulo, around the turn of the century. This is not to say that Rio de Janeiro did not industrialize, but the pace of expansion, particularly on the extensive margin, was faster in São Paulo. As mentioned, the Federal District was a crucial industrial hub in its own right and competed for primacy with São Paulo until the early twentieth century, but its industry lacked the booming hinterland that existed in São Paulo in this phase.<sup>103</sup>

The classic narrative of the differential paths of development between and within the two states recounted so far is supported by quantitative data, as we show using censuses from before and after abolition, more precisely from 1872 and 1920.<sup>104</sup> This data allows us to complement the existing, mostly qualitative historiography. The data suggests that slavery did not contribute

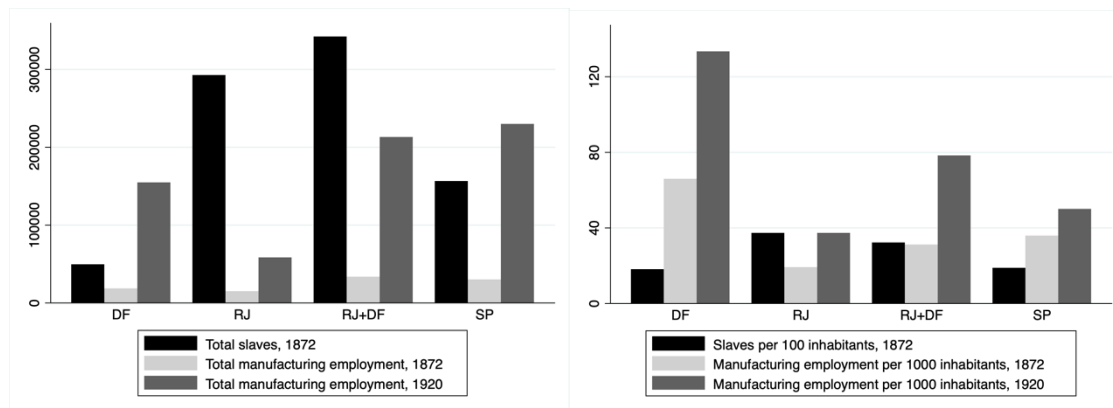
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<sup>103</sup> Centro Industrial do Brasil, *Brasil*; Fundação Getulio Vargas, *Atlas Histórico*.

<sup>104</sup> Brazil, *Recenseamento Geral*; Brazil, *Recensamento do Brasil*. These were the only two full censuses carried out in this period. Others were attempted but were either not brought to fruition or contained only limited demographic information. It should be noted that the comparability of the data between 1872 and 1920 may be imperfect due to changes in the classification of professions. However, this does not affect the results of our analysis, which is cross-sectional in nature.

to industrialization in Brazil: on the contrary, the opposite happened. This conclusion emerges most clearly when we consider that key factors in industrialization, such as the presence of a large immigrant labor force, started to make a difference only after abolition—in other words, after slavery’s hold on the economy had finally slackened.<sup>105</sup>

Figure 10: Slaves and manufacturing employment in Rio de Janeiro, São Paulo, and the Federal District.



Source: The original data comes from the 1872 and 1920 censuses, Brazil, *Recenseamento Geral*; Brazil, *Recensamento do Brasil*, see footnote 28.

Note: DF= Distrito Federal (RJ city); RJ= Rio de Janeiro; SP= São Paulo.

Before discussing the more fine-grained municipal evidence in detail, it is useful to analyze data at the state level (see Figure 10 and Table 2). As mentioned, despite the fact that São Paulo became a leader in coffee production both within Brazil and worldwide in the second half of the nineteenth century, the overlap between large-scale coffee production and slavery was geographically limited and relatively short-lived. Even during the coffee boom, slave numbers were substantially lower in São Paulo than in Rio de Janeiro, both in absolute terms—almost

<sup>105</sup> This claim is not new in the Brazilian historiography. Cardoso de Mello, in *Capitalismo Tardio*, asserts that slavery was a pre-capitalist force that prevented industrialization. This article reaches a similar conclusion, but with a different approach based on quantitative evidence rather than abstract concepts such as “late capitalism.”

300,000 slaves resided in Rio and a little more than half that number in São Paulo—and relative to population—around 19 percent of São Paulo’s population was made up of slaves, compared with over 37 percent in Rio de Janeiro (see Figure 10). The Federal District was home to nearly 50,000 additional slaves, but their incidence in the population—18 percent—was closer to that of São Paulo than to that of Rio de Janeiro. Thus, considering the Federal District and Rio de Janeiro together, the overall incidence of slavery was around 32 percent in the region.

Table 2: The Brazilian textile industry in 1907.

State	Factories	Capital (milréis)	Production (milréis)	Workers
Federal District	22	76,032,259	42,839,532	10281
São Paulo	30	54,083,690	44,990,510	9738
Rio de Janeiro	25	46,329,457	22,674,900	7140
Pernambuco	8	19,241,660	9,844,073	3700
Minas Gerais	37	17,734,372	13,647,151	4792
Bahia	13	16,258,400	10,861,650	4080
Maranhão	13	11,382,900	4,882,992	3762
Rio Grande do Sul	9	8,695,000	9,025,000	2418
Alagoas	5	5,489,887	4,134,764	2080
Sergipe	4	4,458,400	2,616,105	1288
Ceará	6	2,405,000	1,668,600	962
Paraíba	1	1,778,000	1,151,921	561
Santa Catarina	13	1,702,000	534,820	360
Piauí	1	1,069,878	986,700	289
Rio Grande do Norte	1	875,000	739,500	320
Paraná	5	675,000	150,200	171
Espirito Santo	1	160,000	362,500	50
Total	194	268,370,903	171,110,918	51,992

Source: Centro Industrial do Brasil, *Brasil*, 268.

Manufacturing employment, however, was already much higher in São Paulo than Rio de Janeiro in 1872, with the former having twice as many factory workers as the latter. Considering the Federal District and Rio de Janeiro together, they had more manufacturing workers than São

Paulo (approximately 33,000 versus 30,000), but the latter still had more workers in relation to the size of its population.

Following abolition, the state of Rio de Janeiro exhibited rapid growth in the number of workers in manufacturing, surpassing São Paulo relative to the size of its population. However, the Paulista industry had, by this stage, achieved primacy in absolute numbers, with around 230,000 manufacturing employees, nearly 17,000 more than the Federal District and Rio de Janeiro put together. These figures are a testament to both the rapid industrialization of the state and its staggering demographic expansion. In the following two decades, the state would go on to consolidate its position and become the country's undisputed manufacturing hub.

Textiles are generally considered a key sector in early industrial development and play an important role in the new history of capitalism. We therefore decided to analyze this sector separately. This industry was very small in Rio de Janeiro and the Federal District in 1872, while it employed over 40 percent of all workers in manufacturing in São Paulo. By the early twentieth century, both the Federal District and Rio de Janeiro had developed substantial textile sectors, with the former ranking first and the latter ranking third largest in the country; São Paulo ranked second (see Table 2). In 1920, around 10 percent of manufacturing workers were still employed in this industry in Rio de Janeiro, while in São Paulo the share of manufacturing workers in textiles had fallen to around 8 percent, a testimony to both the mechanization of the industry and the strong diversification of the Paulista economy. Despite representing a relatively small share of total manufacturing employment in 1920, the sector still ranked second in the country after foodstuffs in terms of production value.<sup>106</sup>

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<sup>106</sup> Fundação Getúlio Vargas, *Atlas Histórico*.

We now turn to municipal-level evidence on industrialization and slavery, which is summarized in Tables 3 and 4.<sup>107</sup> The former deals with manufacturing employment in general, while the latter focuses on employment in textiles. The first two columns in both tables feature regressions in which the dependent variable refers to 1872—that is, pre-abolition—while the second set of regressions (columns 3 and 4) features the same variables in 1920, about thirty years after abolition. The first column in each set regresses the dependent variable—industrial or textile employment per 1,000 inhabitants—on the share of slaves in the population of each municipality. The second column includes a set of controls that accounts for different aspects of the industrialization process.

First, the share of workers employed in agriculture accounts for the agrarian orientation of the municipality. This is important because we want to make sure that our results do not simply capture the comparative advantage of each municipality in manufacturing or agriculture, which of course is also related to the prevalence of slavery. Second, we control for factors identified in the historiography as key contributors to Brazil’s industrialization. These are the share of immigrants in the population, the literacy of the free population (a proxy for human

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<sup>107</sup> Data is available for our outcomes of interest for 251 out of the 263 total municipalities in the two states and the Federal District in 1920. Out of these, however, only 169 had achieved the status of municipalities or parishes by 1872, which means that their data was reported separately. In order to exploit all available information, for the analysis of the 1872 outcomes we only include the 169 geographical units for which we have independent data; however, for the analysis of the 1920 outcomes, we also include administrative units created successively and assign them the values of the 1872 variables of their municipalities of origin. In the appendix, we show that our results for 1920 are almost identical if we restrict our analysis to units that already existed, as municipalities or parishes, in 1872. We furthermore show that our conclusions hold when the two capitals—São Paulo and Niterói—as well as the Federal District itself are excluded from the analysis. Thus, our results are also robust to excluding the region’s most important urban and industrial areas, which are potential outliers.



capital), and the presence of a railway station.<sup>108</sup> These variables are all from the year 1872 to reduce the risk of reverse causality. Third, we control for export market potential by introducing the distance from the closest port (Rio de Janeiro or Santos). Fourth, we account for the impact of coffee production by identifying coffee producing municipalities through two dummies: *early coffee producer* and *late coffee producer*. The former captures municipalities that began commercial coffee production up until 1886—in other words, basically up until the abolition of slavery. The latter identifies municipalities that began production around or after abolition and could thus rely exclusively on free labor. Note that we do not necessarily expect the two types of coffee municipalities to have a different relationship with manufacturing, if the principal difference between the two was, indeed, differing intensity in the use of slave and immigrant labor, for which we control. Finally, we also introduce a dummy identifying municipalities that produced sugar at a commercial level to account for the impact of a commodity which, although in decline, was still one of Brazil’s largest exports.<sup>109</sup> All standard errors take spatial autocorrelation into account, following Timothy Conley.<sup>110</sup>

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<sup>108</sup> On the importance of railways in Brazil, see Summerhill, “Big Social Savings” and *Trilhos do Desenvolvimento*. Human capital, here proxied by literacy, is widely considered an engine of economic development; see, for example, Easterlin, “Why Isn’t the Whole World Developed?” and Lucas, “Mechanics.” We exclude slaves from our calculation of literacy because they were not educated, and we would thus conflate the effect of slavery with that of literacy if we included slaves in the calculation of the latter.

<sup>109</sup> In the appendix, we also control for inequality in landholdings by calculating the land Gini in 1920. This variable serves as a proxy for the concentration of slaves in plantations prior to abolition in 1888. The literature of the new history of capitalism argues that the use of slaves as collateral was an important way to access credit and finance industrialization: Beckert and Rockman, *Slavery’s Capitalism*, 16. Therefore, regions with greater land inequality may have had greater industrial development. By including land inequality in our analysis, we test this additional claim of the new history of capitalism and its potential interplay with slavery. However, we find no positive relationship between inequality and industrial employment.

<sup>110</sup> Conley, “GMM Estimation.” In our specific historical context, spatial autocorrelation manifested itself in the fact that municipalities closer together were more likely to experience similar shocks in our variables of interest (such as industrial employment and incidence of

Table 3: Slavery and manufacturing employment, 1872 and 1920.

	(1)	(2)	(3)	(4)
	Workers in manufacturing per 1000 inhabitants			
	1872		1920	
Slaves share in pop, 1872	-34.07*** (11.46)	-55.62*** (19.51)	24.69 (18.52)	-9.785 (16.13)
Share workers in agriculture, 1872		-37.80 (28.85)		-21.58* (11.80)
Share Immigrants, 1872		-16.67 (51.86)		216.5*** (43.38)
Literacy, 1872		59.06 (43.66)		37.08** (16.52)
Early coffee producer		-3.623 (8.899)		10.84 (6.813)
Late coffee producer		-9.296 (8.455)		11.40** (5.773)
Sugar producer		-9.727 (8.877)		19.81*** (4.935)
Railway station, 1872		0.936 (6.431)		19.96 (13.05)
Distance from the port		-2.690 (4.000)		-3.260* (1.812)
Constant	36.66*** (4.128)	51.26*** (19.85)	22.78*** (3.632)	22.42* (11.48)
Observations	169	169	251	251
R-squared	0.025	0.096	0.018	0.274
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

slavery) simply because of physical proximity. Ignoring this possibility might have led to incorrect statistical inference.

Notes: Standard errors are Conley, “GMM Estimation,” with a 100 km cut-off estimated using the code provided by Colella et al., “Inference.” Sources: Data on slaves, immigrants, literacy, land inequality, and workers in manufacturing, textiles and agriculture comes from the 1872 and 1920 censuses, Brazil, *Recenseamento Geral*; Brazil, *Recensamento do Brasil*. Distance from the port and the coordinates of municipality centroids for the Conley standard errors are calculated based on maps provided by IBGE.<sup>111</sup> The coffee and sugar producer dummies are obtained based on data in Naritomi et al., “Institutional Development.” *Early coffee producers* are those that began commercial coffee production before 1886, while *Late* producers are those who began after this date. The railway station dummy was created based on information from Mennucci.<sup>112</sup> Units of observations are 1920 municipalities.

We find that, in 1872, the share of slaves in the population was negatively correlated with employment in manufacturing (column 1, Table 3). This remains true even if we control for the key factors outlined above (column 2); in fact, the association becomes substantially larger in absolute terms. More precisely, a one standard deviation increase in the share of slaves in the population—approximately 13 percentage points (p.p.)—is associated with 16 percent of a standard deviation decrease in manufacturing employment when no controls are included, and a 26 percent of a standard deviation decrease when controls are included. The picture changes after abolition. In 1920, slave numbers from the 1872 census appear to be positively correlated with the share of workers in manufacturing, albeit not in a statistically significant way (column 3). Not only is this relationship probably spurious because of other non-observed variables, such as wealth, but it is also completely explained away by the variables we do observe. When these are controlled for, the coefficient turns negative again (column 4).

What is more interesting, however, is exploring the changes in the coefficients of the control variables between 1872 and 1920. The evidence is, of course, only suggestive, as we do not have a causal inference identification strategy. But the empirical patterns in the data are

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<sup>111</sup> IBGE, “Evolução da Divisão.”

<sup>112</sup> Mennucci, “Estações Ferroviárias.”

revealing. What emerges is that the abolition of slavery allowed municipalities to exploit their potential to become manufacturing centers.

For example, while we see a negative association between immigrants and manufacturing employment in 1872, this association is positive and very strong in 1920, despite using immigrant numbers from 1872. The negative association in 1872 can be explained by the fact that migrants who arrived in earlier waves were employed in agriculture rather than in manufacturing. More recent immigrants tended to settle where their predecessors did, but they worked in industry, which explains the large magnitude of the result.<sup>113</sup> The key element is that the association between immigration and manufacturing, which we know to be large from the historiography, is only visible after abolition.<sup>114</sup> This result also highlights the presence of potential distortions in the Brazilian economy brought about by slavery: locations with high potential for industrialization, as evidenced by post-abolition developments, were actually disadvantaged earlier on due to a continued focus on cash crops fueled by the prevalence of slave-based production. If we consider the fact that slavery discouraged free migrants from settling, slavery might have also been harmful through this additional indirect channel.<sup>115</sup>

Further evidence that productive potential was not fully exploited while slavery still existed comes from the literacy coefficients. They indicate that human capital was positively

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<sup>113</sup> Chain migration is a well established phenomenon in the literature on migration; see, for example, Sánchez-Alonso, “Age of Mass Migration,” for a general discussion of migration to Latin America in the first era of globalization, and Moretti, “Social Networks,” and Gomellini and Ó Gráda, “Outward,” on emigration from Italy, the main country of origin for arrivals to Brazil in this period.

<sup>114</sup> Dean, *Industrialization*; Suzigan, *Indústria Brasileira*. On immigrants’ contribution to Brazilian economic development more generally, see also Papadia, “Slaves, Migrants, and Development”; Stolz et al., “Growth Effects”; de Carvalho Filho and Monasteiro, “Immigration”; and Rocha et al., “Human Capital.”

<sup>115</sup> Luna and Klein, *Slavery*.

associated with manufacturing employment in a statistically significant way only after abolition. Another notable result stems from the coffee producer dummies. As discussed above, profits and foreign exchange from coffee exports were key for kickstarting other economic activities, including industry.<sup>116</sup> This factor echoes arguments in the US literature about cotton. The quantitative evidence suggests that a relationship between coffee production and industrialization did in fact exist, but, once again, only after abolition since the coefficients of the dummies are negative and statistically insignificant in 1872. Moreover, although the size of the *early* and *late coffee producer* coefficients is similar, only the coefficient of the *late coffee producer* dummy is estimated precisely enough to be statistically significant, which suggests a closer relationship between coffee production based on free labor and industrial employment. Of course, earlier investments from coffee proceeds might have been made outside of the coffee-producing municipalities; this would explain the negative statistical relationship. This dynamic would testify, once again, to slavery's damaging effect on local development. This effect may not have been restricted to the local level either, if distortions in the allocation of capital associated with slavery were present—that is, if capital was exported to areas less suited to manufacturing because of the presence of slavery. Interestingly, sugar-producing municipalities also exhibit higher manufacturing employment after abolition, suggesting similar dynamics to those of coffee.

Finally, a further testimony to the potential distortions due to slavery is the fact that distance from a port only becomes negatively associated with manufacturing employment in a statistically significant way in 1920. Once again, this could be a story of wasted potential for

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<sup>116</sup> Haber, "Introduction"; Ricci, "Economia Cafeeira."

municipalities well placed to become manufacturing centers, especially if we consider the higher transport cost in the nineteenth century when Brazilian railways were underdeveloped.<sup>117</sup>

Results for the textile industry alone are very similar to those for overall manufacturing. Employment is negatively associated with slavery in 1872, while positively so in 1920 (columns 1, 2, and 3, Table 4). Any positive statistical significance, however, is explained away by our set of controls (column 4). In terms of magnitude, a one standard deviation increase in the share of slaves in the population is associated with 20 percent of a standard deviation lower textile employment in 1872 when no controls are included, and nearly 28 percent lower textile employment when controls are included. As above, we find that a large immigrant labor force is positively associated with textile employment after abolition, while being negatively associated with it in 1872—this time in a statistically significant way. Literacy also appears to have had a similar stimulating post-abolition effect on textiles as it had on the overall manufacturing sector. The coefficients for coffee and sugar production, instead, although positive after abolition (and negative before that) are not estimated precisely enough to be statistically significant. Finally, distance from a port is, once again, negatively associated with employment in a statistically significant way only after abolition.

Table 4: Slavery and textile employment, 1872 and 1920.

	(1)	(2)	(3)	(4)
	Workers in textiles per 1000 inhabitants			
	1872		1920	
Slaves share in pop, 1872	-39.93*** (10.89)	-54.37*** (20.31)	11.62* (6.166)	4.797 (5.458)

<sup>117</sup> Summerhill, “Big Social Savings.”

Share workers in agriculture, 1872	-25.96 (24.54)		-4.658 (4.852)	
Share Immigrants, 1872	-98.86** (45.07)		54.07*** (10.12)	
Literacy, 1872	53.14 (42.08)		8.301** (3.568)	
Early coffee producer	-6.565 (7.859)		2.803 (2.308)	
Late coffee producer	-6.983 (8.449)		4.179 (2.912)	
Sugar producer	-8.496 (6.493)		0.788 (2.277)	
Railway station, 1872	-5.740 (6.978)		-3.821 (2.843)	
Distance from the port	-4.104 (2.910)		-1.900*** (0.608)	
Constant	18.86*** (4.338)	34.76** (17.21)	-0.223 (0.763)	1.545 (2.930)
Observations	169	169	251	251
R-squared	0.040	0.103	0.023	0.103
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Notes: Standard errors are Conley, “GMM Estimation,” with a 100 km cut-off estimated using the code provided by Colella et al., “Inference.” Sources: Data on slaves, immigrants, literacy, land inequality, and workers in manufacturing, textiles and agriculture comes from the 1872 and 1920 censuses, Brazil, *Recenseamento Geral*; Brazil, *Recensamento do Brasil*. Distance from the port and the coordinates of municipality centroids for the Conley standard errors are calculated based on maps provided by IBGE.<sup>118</sup> The coffee and sugar producer dummies are obtained based on data in Naritomi et al., “Institutional Development.” *Early coffee producers* are those that began commercial coffee production before 1886, while *Late* producers are those who began after this date.

<sup>118</sup> IBGE, “Evolução da Divisão.”

The railway station dummy was created based on information from Mennucci.<sup>119</sup> Units of observations are 1920 municipalities.

The wasted potential story suggested by the post-abolition relevance of factors such as literacy, immigration, and distance from a port may be particularly relevant for textiles because the expansion of early mills—established in the 1870s or even earlier—dominated the increase in productive capacity in the early twentieth century.<sup>120</sup> Thus, any distortion in the allocation of manufacturing capacity due to slavery would have continued in a path-dependent way during the rapid phase of Brazil’s industrial boom leading up to World War I.

In summary, we find no positive association between slavery and industrialization in São Paulo, Rio de Janeiro, and the Federal District. If anything, the evidence points to a negative relationship between slavery and manufacturing at the local level while slavery existed. This interpretation was already available in some of the qualitative historiography of Brazil, and our quantitative evidence supports it.<sup>121</sup> Abolition changed the status quo and well-positioned municipalities were able to leverage key factors—such as the presence of foreign workers, higher than average literacy, proximity to ports, and the proceeds of coffee and sugar production—to rapidly industrialize. Although we cannot capture general equilibrium effects in our regressions, our findings do suggest that slavery might have affected industrial development beyond the local level. That is, if the allocation of capital and the spatial distribution of manufacturing activity were constrained and distorted by the presence of large-scale slavery, as our pre- and post-abolition results indicate, these constraints may have slowed down or altogether hindered Brazil’s overall development as an industrial nation.

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<sup>119</sup> Mennucci, “Estações Ferroviárias.”

<sup>120</sup> Versiani, “Industrial Investment.”

<sup>121</sup> Dean, *Industrialization*; Suzigan, *Indústria Brasileira*.



### *Conclusion*

There is no evidence that slavery benefited the societies that relied largely on it. Not only is slavery abhorrent from a modern normative perspective, but it also mostly had negative development consequences: while slave-owners and a few narrow sectors profited from it, overall society lost out. Our focus on Brazil adds to existing criticism of the new history of capitalism and reinforces interpretations according to which slavery was not the main cause of modern economic growth in the United States.<sup>122</sup> The case of Brazil lends credibility to the view that slavery benefited a small elite but delayed overall economic development in the societies where it existed, as has been argued for the US South.<sup>123</sup>

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<sup>122</sup> Hilt, “Economic History”; Olmstead and Rhode, “Cotton”; Burnard and Riello, “Slavery.”

<sup>123</sup> Wright, “Slavery.”

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## Appendix

In this section, we run three additional specifications to assuage concerns that our results on industrialization are driven by: (1) changes in the composition of the sample between 1872 and 1920; (2) outliers, specifically the three main urban and industrial centers of the Southeast: São Paulo, Niterói, and the Federal District; (3) not accounting for the concentration of slave ownership, which we capture using land inequality.

As mentioned in the text above, and further elaborated in the section on variable definition and sources below, the creation of new municipalities creates a challenge for our analysis. Out of the 251 municipalities for which we have information on industrial and textile employment in 1920, only 169 had achieved the status of parish or municipality by 1872. The census reported data for places with the status of parish or municipality independently. In Tables A1 and A2, we show that, if we drop units for which no independent data was reported in the 1872 census, our results are almost identical. We present these results alongside those already presented in the main text in order to facilitate readers' understanding of our claims.

For industrial employment (see Table A1), the main difference is that the coefficients of the *late coffee producer* dummy and the variable of distance from a port are no longer statistically significant because of a decrease in the precision of the estimates, presumably due to the lower number of observations, while the size of the coefficients only changes marginally. In addition, the *late coffee producer* municipalities are underrepresented in this restricted sample because they were often municipalities created after 1872 as the coffee frontier of São Paulo expanded. The results obtained with the restricted sample for textile employment (see Table A2) exhibit no appreciable differences from those in the main text.

Table A1: Slavery and manufacturing employment, keeping municipalities fixed across time

	(1)	(2)	(3)	(4)
	Workers in manufacturing per 1000 inhabitants			
	1872		1920	
Slaves share in pop, 1872	-34.07*** (11.46)	-55.62*** (19.51)	11.01 (17.93)	-20.54 (15.86)
Share workers in agriculture, 1872		-37.80 (28.85)		-9.828 (10.27)
Share Immigrants, 1872		-16.67 (51.86)		230.1*** (47.06)
Literacy, 1872		59.06 (43.66)		47.12** (20.08)
Early coffee producer		-3.623 (8.899)		9.964 (7.800)
Late coffee producer		-9.296 (8.455)		10.90 (7.549)
Sugar producer		-9.727 (8.877)		22.16*** (5.050)
Railway station, 1872		0.936 (6.431)		20.27 (14.68)
Distance from the port		-2.690 (4.000)		-3.838 (2.618)
Constant	36.66*** (4.128)	51.26*** (19.85)	26.89*** (4.564)	19.47 (12.79)
Observations	169	169	169	169
R-squared	0.025	0.096	0.003	0.302
Standard errors in parentheses				

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Notes: Standard errors are Conley, “GMM Estimation,” with a 100 km cut-off estimated using the code provided by Colella et al., “Inference.” Sources: Data on slaves, immigrants, literacy, land inequality, and workers in manufacturing, textiles and agriculture comes from the 1872 and 1920 censuses, Brazil, *Recenseamento Geral*; Brazil, *Recensamento do Brasil*. Distance from the port and the coordinates of municipality centroids for the Conley standard errors are calculated based on maps provided by IBGE.<sup>124</sup> The coffee and sugar producer dummies are obtained based on data in Naritomi et al., “Institutional Development.” *Early coffee producers* are those that began commercial coffee production before 1886, while *Late producers* are those who began after this date. The railway station dummy was created based on information from Mennucci.<sup>125</sup> Units of observations are 1920 municipalities.

Table A2: Slavery and textile employment, keeping municipalities fixed across time

	(1)	(2)	(3)	(4)
	Workers in textiles per 1000 inhabitants			
	1872		1920	
Slaves share in pop, 1872	-39.93*** (10.89)	-54.37*** (20.31)	8.049 (6.564)	3.291 (6.997)
Share workers in agriculture, 1872		-25.96 (24.54)		0.750 (2.724)
Share Immigrants, 1872		-98.86** (45.07)		62.53*** (4.682)
Literacy, 1872		53.14 (42.08)		5.767 (4.315)
Early coffee producer		-6.565 (7.859)		2.973 (2.562)
Late coffee producer		-6.983 (8.449)		4.808 (3.722)
Sugar producer		-8.496 (6.493)		2.508 (2.117)
Railway station, 1872		-5.740		-3.029

<sup>124</sup> IBGE, “Evolução da Divisão.”

<sup>125</sup> Mennucci, “Estações Ferroviárias.”



		(6.978)		(3.400)
Distance from the port		-4.104		-2.308**
		(2.910)		(0.995)
Constant	18.86***	34.76**	0.686	0.199
	(4.338)	(17.21)	(0.847)	(2.905)
Observations	169	169	169	169
R-squared	0.040	0.103	0.012	0.116
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Notes: Standard errors are Conley, “GMM Estimation,” with a 100 km cut-off estimated using the code provided by Colella et al., “Inference.” Sources: Data on slaves, immigrants, literacy, land inequality, and workers in manufacturing, textiles and agriculture comes from the 1872 and 1920 censuses, Brazil, *Recenseamento Geral*; Brazil, *Recensamento do Brasil*. Distance from the port and the coordinates of municipality centroids for the Conley standard errors are calculated based on maps provided by IBGE.<sup>126</sup> The coffee and sugar producer dummies are obtained based on data in Naritomi et al., “Institutional Development.” *Early coffee producers* are those that began commercial coffee production before 1886, while *Late producers* are those who began after this date. The railway station dummy was created based on information from Mennucci.<sup>127</sup> Units of observations are 1920 municipalities.

While the Federal District and the cities of São Paul and Niterói represent just three observations out of 251—and we are not weighing our observations by population, meaning that these cities do not have disproportional influence in our analysis—we decided to re-run the analysis excluding them. This allows us asses to what extent our results are driven by these three major urban and industrial hubs, which may be considered outliers. Results similar to those in the body of the article would allow us to conclude with more confidence that our findings reflect the general relationship between slavery and industrialization in Brazil. The outcomes of this robustness exercise are presented in Tables A3 and A4.

<sup>126</sup> IBGE, “Evolução da Divisão.”

<sup>127</sup> Mennucci, “Estações Ferroviárias.”

Table A3: Slavery and manufacturing employment, excluding the Federal District and the cities of São Paulo and Niterói.

	(1)	(2)	(3)	(4)
	Workers in manufacturing per 1000 inhabitants			
	1872		1920	
Slaves share in pop, 1872	-32.38*** (10.36)	-51.68*** (19.67)	25.79 (17.59)	5.790 (14.70)
Share workers in agriculture, 1872		-36.17 (29.02)		-9.932 (9.101)
Share Immigrants, 1872		-20.42 (47.48)		161.8*** (20.99)
Literacy, 1872		56.79 (45.22)		23.78** (10.72)
Early coffee producer		-2.657 (8.766)		12.78** (5.946)
Late coffee producer		-8.181 (8.138)		12.52*** (4.774)
Sugar producer		-9.378 (8.625)		20.18*** (4.120)
Railway station, 1872		-3.408 (7.057)		8.630 (8.285)
Distance from the port		-2.716 (4.085)		-2.142 (1.432)
Constant	35.76*** (3.694)	49.73** (19.67)	21.23*** (3.003)	14.81 (9.031)
Observations	166	166	248	248

R-squared	0.023	0.078	0.027	0.171
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Notes: Standard errors are Conley, “GMM Estimation,” with a 100 km cut-off estimated using the code provided by Colella et al., “Inference.” Sources: Data on slaves, immigrants, literacy, land inequality, and workers in manufacturing, textiles and agriculture comes from the 1872 and 1920 censuses, Brazil, *Recenseamento Geral*; Brazil, *Recensamento do Brasil*. Distance from the port and the coordinates of municipality centroids for the Conley standard errors are calculated based on maps provided by IBGE.<sup>128</sup> The coffee and sugar producer dummies are obtained based on data in Naritomi et al., “Institutional Development.” *Early coffee producers* are those that began commercial coffee production before 1886, while *Late producers* are those who began after this date. The railway station dummy was created based on information from Mennucci.<sup>129</sup> Units of observations are 1920 municipalities.

Table A4: Slavery and textile employment, excluding the Federal District and the cities of São Paulo and Niterói.

	(1)	(2)	(3)	(4)
	Workers in textiles per 1000 inhabitants			
	1872		1920	
Slaves share in pop, 1872	-39.38***	-55.00***	11.84*	5.667
	(10.23)	(20.81)	(6.230)	(5.526)
Share workers in agriculture, 1872		-27.19		-4.557
		(25.25)		(4.370)
Share Immigrants, 1872		-82.97**		57.30***
		(38.80)		(13.62)
Literacy, 1872		55.28		8.193***
		(43.34)		(3.151)
Early coffee producer		-5.802		3.236
		(7.704)		(2.448)
Late coffee producer		-6.086		4.649
		(8.163)		(3.133)

<sup>128</sup> IBGE, “Evolução da Divisão.”

<sup>129</sup> Mennucci, “Estações Ferroviárias.”

Sugar producer	-7.926 (6.273)		0.983 (2.271)	
Railway station, 1872	-6.548 (6.781)		-5.231* (2.715)	
Distance from the port	-4.313 (2.920)		-1.928*** (0.679)	
Constant	18.70*** (4.050)	34.49** (17.35)	-0.378 (0.741)	1.055 (2.710)
Observations	166	166	248	248
R-squared	0.039	0.101	0.024	0.102
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

Notes: Standard errors are Conley, “GMM Estimation,” with a 100 km cut-off estimated using the code provided by Colella et al., “Inference.” Sources: Data on slaves, immigrants, literacy, land inequality, and workers in manufacturing, textiles and agriculture comes from the 1872 and 1920 censuses, Brazil, *Recenseamento Geral*; Brazil, *Recensamento do Brasil*. Distance from the port and the coordinates of municipality centroids for the Conley standard errors are calculated based on maps provided by IBGE.<sup>130</sup> The coffee and sugar producer dummies are obtained based on data in Naritomi et al., “Institutional Development.” *Early coffee producers* are those that began commercial coffee production before 1886, while *Late* producers are those who began after this date. The railway station dummy was created based on information from Mennucci.<sup>131</sup> Units of observations are 1920 municipalities.

The results for manufacturing employment (Table A3) are reassuringly very similar to those in the main text, both qualitatively and quantitatively. While the slavery coefficient now remains positive post-abolition after we introduce our controls, it is small and statistically insignificant. Other differences are that the *early coffee producer* dummy emerges as statistically significant and positively related to manufacturing employment post-abolition, while distance from a port is no longer statistically significant.

<sup>130</sup> IBGE, “Evolução da Divisão.”

<sup>131</sup> Mennucci, “Estações Ferroviárias.”

The results for textile employment (Table A4) are nearly identical to those in the main text. In contrast to the result above, we find a statistically significant negative association between textile employment in 1920 and having a railway station in 1872. This result is not related to the main topic of this paper, so we will not venture into a full explanation. However, we note in passing that early railway lines were not designed to serve the needs of the industrial sector; rather, their location was influenced by the financial and political power of local landowners.<sup>132</sup>

As a final exercise, we include land inequality as a proxy for the concentration of slaves in our regressions. The aim is to test the idea, found in literature on the new history of capitalism, that slaves served as collateral for credit which could be used to invest in industrialization.<sup>133</sup> A higher concentration of slaves in the hands of few landowners would have facilitated such operations. We proxy the concentration of slaves using the concentration of land, since information on the former is unavailable in a systematic way. We measure land inequality using the Gini coefficient for the 238 municipalities for which data is available in the census; 162 of these had obtained the status of parish or municipality by 1872.<sup>134</sup> Unfortunately, data availability precludes us from constructing this variable in 1872, so we calculate it in 1920, relying on the fact that inequality is a slow-moving variable.

Before moving on to the results—presented in Table A5—it should be noted that the new history of capitalism’s reading of the role of inequality stands in sharp contrast with classic contributions by economic historians, which highlight the detrimental role of inequality on

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<sup>132</sup> Summerhill, “Transport Improvements.”

<sup>133</sup> Beckert and Rockman, *Slavery’s Capitalism*, 16.

<sup>134</sup> Nunn, “Slavery, Inequality, and Economic Development.”

institutional development and, consequently, economic growth.<sup>135</sup> While research on the relationship between inequality and development in Brazil has been mostly inconclusive, the dominant view is still that inequality has had a detrimental effect on development.<sup>136</sup>

Table A5: Slavery and manufacturing/textile employment, including land inequality.

	(1)	(2)	(3)	(4)
	Workers in manufacturing per 1000 inhabitants		Workers in textiles per 1000 inhabitants	
	1872	1920	1872	1920
Slaves share in pop, 1872	-59.64*** (21.15)	-5.426 (15.84)	-59.05*** (21.27)	5.330 (4.641)
Share workers in agriculture, 1872	-43.58 (33.38)	-18.00 (11.35)	-32.44 (28.82)	-4.403 (4.983)
Share Immigrants, 1872	-25.16 (41.37)	196.6*** (36.85)	-90.61** (39.75)	55.72*** (11.98)
Literacy, 1872	65.01 (47.20)	35.74** (16.01)	59.62 (44.67)	8.957** (3.643)
Early coffee producer	-5.291 (9.794)	12.38** (5.237)	-7.471 (8.341)	3.372 (2.060)
Late coffee producer	-11.70 (9.584)	11.67** (5.280)	-8.634 (9.523)	4.579 (2.813)
Sugar producer	-9.231 (8.873)	17.67*** (4.363)	-7.192 (5.899)	0.654 (2.002)
Railway station, 1872	2.165 (4.582)	16.63 (15.31)	-2.526 (5.205)	-4.180 (3.206)
Distance from the port	-1.903	-2.928	-3.255	-2.040**

<sup>135</sup> Engerman and Sokoloff, “Factor Endowments”; Engerman and Sokoloff, *Economic Development*.

<sup>136</sup> Summerhill, “Colonial Institutions”; Funari, “Inequality”; Reis, “Historical Perspectives.”

	(3.502)	(1.976)	(2.200)	(0.812)
Land Gini	-18.41	18.99	-19.90	4.692
	(19.88)	(12.80)	(18.42)	(4.203)
Constant	65.00**	7.294	48.70*	-2.047
	(30.55)	(7.890)	(28.37)	(5.069)
Observations	162	238	162	238
R-squared	0.112	0.239	0.123	0.105
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Notes: Standard errors are Conley, “GMM Estimation,” with a 100 km cut-off estimated using the code provided by Colella et al., “Inference.” Sources: Data on slaves, immigrants, literacy, land inequality, and workers in manufacturing, textiles and agriculture comes from the 1872 and 1920 censuses, Brazil, *Recenseamento Geral*; Brazil, *Recensamento do Brasil*. Distance from the port and the coordinates of municipality centroids for the Conley standard errors are calculated based on maps provided by IBGE.<sup>137</sup> The coffee and sugar producer dummies are obtained based on data in Naritomi et al., “Institutional Development.” *Early coffee producers* are those that began commercial coffee production before 1886, while *Late producers* are those who began after this date. The railway station dummy was created based on information from Mennucci.<sup>138</sup> Units of observations are 1920 municipalities.

Several results emerge from the analysis. First, the association between slavery and manufacturing employment we find in this article is not affected by including inequality. Secondly, the coefficients of the other variables also remain qualitatively and quantitatively similar. Finally, for inequality, we find that it is negatively related to both total manufacturing employment and textile employment in 1872, but the relationship turns positive in 1920. In both cases, the results are statistically insignificant. The lack of a statistically significant negative effect in 1872, however, is not conclusive due to the measurement error introduced by the fact that we are forced to use inequality measured in 1920. In any case, the new history of

<sup>137</sup> IBGE, “Evolução da Divisão.”

<sup>138</sup> Mennucci, “Estações Ferroviárias.”

capitalism's claim that inequality contributed to industrial development does not appear to stand up to scrutiny in the Brazilian context.

### *Variable Definition and Sources*

Data sources and variable construction are discussed throughout the text. Here we provide some additional information.

We consider workers to be employed in manufacturing if they are reported under the following heading in the 1872 census: *Profissões manuaes ou mecanicas—Operarios* (Manual or mechanical professions—Workers). Workers employed in textiles are a subset of this category classified as *Em tecidos* (In textiles). For the 1920 census, the classification of manufacturing workers is as follows: *Profissões—ransformação e emprego da materia prima—Industrias* (Professions—Transformation and use of raw material—Industries). Textiles workers are, again, a subset of these, classified under *Segundo a natureza da materia—Textis* (According to the nature of the raw material—Textiles). We consider workers to be employed in agriculture if they are reported under the following heading in the 1872 census: *Profissões agricolas—Lavradores & criadores* (Agricultural professions—Farmers & ranchers). Immigrants are foreign born (*Estrangeiros*) residing in Brazil. In 1872, this measure excludes Africans, given that they were ex-slaves rather than voluntary migrants. Literacy in 1872 measures the share of the population reported as able to read and write. All slaves were classified as illiterate; therefore, we calculate this variable only relative to the free population to prevent conflating the effects of slavery with those of illiteracy. Distance from a port is measured from the centroid of each municipality and is an “as the crow flies” distance, taking into account the earth’s curvature. The ports considered in this calculation are those in Rio de Janeiro or Santos, whichever is closer.



As discussed above, a key challenge in analyzing Brazilian municipal data through time is that many new municipalities were created over time. In order to maximize the information available, we start from parish-level data in the 1872 census and assign each parish to the corresponding municipality in 1920. As a result, the data reflects municipalities, and their borders, as they were in 1920. Municipalities or parishes which did not exist in 1872, and for which independent data is consequently not available to construct the 1872 variables, are assigned the values of their municipality of origin in the analysis in the main text. As shown in this appendix, our results are robust to dropping these municipalities from the analysis.