How a nation was born: Brazilian economic growth, 1574–1920

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Abstract

We construct the first long-run series of GDP per capita for Brazil, covering the period from 1574 to 1920. We build a new, hand-collected dataset including over 30,000 observations for prices and wages covering most major regions of Brazil: Bahia, Rio de Janeiro, Pernambuco, São Paulo, and Rio Grande do Sul. Our estimates imply an average per-capita growth rate of approximately zero during the colonial era (1574–1821), 0.69% per year during the imperial era (1822–1888), and 1.02% per year during the Early Republic. The latter estimates lie below the "pro-growth" view of late-nineteenth-century Brazil but above the traditional narrative of complete stagnation.

JEL classifications: N36; N16; N32; O47.

Keywords: Brazilian economic history; long-run economic growth; GDP per capita reconstruction; comparative development; colonial economy; historical national accounts.

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1 Introduction

Over the past two decades, historical national accounting has undergone major advances in regions such as Europe, Asia, and Latin America (Ward & Devereux, 2012; Fouquet & Broadberry, 2015; Abad & Van Zanden, 2016; Devereux, 2019; Broadberry, 2021). Increasingly sophisticated reconstructions have reshaped our understanding of long-run economic performance. Brazil, however, despite its size, complexity, and early integration into global commodity markets, has remained largely absent from this quantitative renaissance. As a result, many of the central questions about the timing, pace, and character of Brazil's economic development remain unresolved. This is particularly true for the period prior to 1800, which was determinant. This paper addresses these limitations by assembling and analyzing new long-run estimates of Brazilian growth from 1574 to 1920, placing the country within a comparative framework that advances our knowledge about the country and allows us to reassess how, and on what economic foundations, the Brazilian nation emerged.

The historical trajectory of Brazilian living standards and aggregate output before the twentieth century remains contested due to sparse, fragmented, and regionally heterogeneous evidence. Existing work is almost entirely silent about the period before the nineteenth century, and provides conflicting views about that century, especially the second part, with some studies suggesting growth comparable to parts of Western Europe and Latin America (Summerhill, 2003; Reis, 2023; Bacha et al., 2024; Bacha et al., 2025), and others emphasizing stagnation (Leff, 1972a; Goldsmith, 1986).[1] We contribute by assembling a new dataset from archival sources and use it to construct GDP per capita indices from the late 1500s through 1920.[2]

We find that Brazil's long-run trajectory was characterized by remarkable stability for more than two centuries, followed by a slow but persistent rise beginning in the mid-nineteenth century. The early period (c. 1574–c. 1800) exhibits no sustained gains in income per head despite large changes in export composition, regional expansion, and population growth. The gold boom of the early eighteenth century generates a temporary lift, but one that quickly dissipates—precisely the pattern predicted

[1] Complementarily, Lambais and Palma (2023) study the effects of historical slavery and the slave trade on the real wages of unskilled workers in Bahia and Rio de Janeiro.

[2] The first year we were able to get reliable information on market-set prices and wages was 1574, and we stop in 1920 because it is the year with the first widely-used benchmark available, based on Haddad (1974).

by a resource-boom model with limited domestic spillovers.[3] Around the period of independence, modest declines associated with political disruption and wartime dislocation gave way to a gradual rise from the 1850s onward.[4] While this improvement was associated with the coffee economy, declining mortality, and the early stages of infrastructural and institutional modernization, it remained far smaller than the explosive growth of the North Atlantic core driven by the Industrial Revolution. By 1920, Brazil's GDP per capita had fallen behind that of Iberian Europe, where it once stood, and had fallen decisively behind industrializing Western Europe and the United States.

Our reconstruction of GDP in this paper is complicated by the presence of slavery during most of the period covered. Our Engel-elasticity framework accounts for heterogeneous consumption across free and enslaved populations, enabling us to estimate the extent to which the large share of the enslaved population depressed effective demand and, by extension, aggregate output. The results indicate that Brazil's high reliance on coerced labor—not merely colonial commercial arrangements—helped produce centuries of near-stationary aggregate income and limited structural transformation. The abolition of the slave trade in 1850 and the legal end of slavery in 1888 coincide closely with the onset of Brazil's first sustained rise in GDP per capita.[5]

In the rest of the paper we proceed as follows. In Section 2, we describe the archival sources and construction of the price, wage, and population series. In Section 3, we outline the Engel-elasticity and sectoral-productivity framework used to map relative prices and wages into GDP per capita. In Section 4, we present the main results and compare them with prior estimates for Brazil in the literature. In Section 5, we situate Brazil in an international comparative perspective. Finally, in Section 6 we conclude.

[3] See Kedrosky and Palma (2025) for information on the related resource curse taking place at the same time in Portugal.

[4] Independence from Portugal was formally declared in 1822, but it had existed de facto since the arrival of the court in 1808. See, for example, Cariello and Pereira (2024).

[5] For related evidence focusing on other indicators, see also Palma et al. (2021) and Lambais and Palma (2023).

2 Data

Archival sources. We draw on a diverse set of account books, probate inventories, and institutional records. In total, we use more than 30,000 observations covering most major regions of Brazil: Bahia, Rio de Janeiro, Pernambuco, São Paulo, and Rio Grande do Sul. Our sources include the probate inventory of Mem de Sá (1569–1579) and the account book of the Sergipe do Conde Sugar Mill (1600–1750) at the *Torre do Tombo* Archive in Lisbon, account books from the Holy House of Mercy (*Santa Casa da Misericórdia*) in Salvador, Rio de Janeiro, and Porto Alegre, records from religious institutions (e.g. convents and churches), records from various sources at state and municipal public archives and the national archive, and probate inventories from the Public Archive of Bahia.[6] These sources provide prices for key consumables and daily wages for unskilled and skilled workers.

Population benchmarks. Because no continuous population series exists for Brazil prior to 1872, we compile benchmark totals from secondary sources to guide the construction of population paths and urbanization shares. Table 1 lists the main anchors used.[7]

Table 1: Brazil population estimates (1570–1920)

Year	Population	Source
1570	17,200	Gândavo (Carrara, 2014)
1583	37,600	Cardim (Carrara, 2014)
1585	50,550	Padre Anchieta (Carrara, 2014)
1590	98,900	Soares (Carrara, 2014)
1780	1,564,981	Alden (1963)
1808	2,424,463	Botelho (2015)
1835	3,972,723	Botelho (2015)
1872	10,112,061	Census (IBGE, 1990)
1890	14,333,915	Census (IBGE, 1990)
1900	17,318,556	Census (IBGE, 1990)
1920	30,635,605	Census (IBGE, 1990)

[6] All the sources are listed in the Appendix Section A.

[7] The native population is accounted for as they assimilated into the colonial population. For estimates of the native population independently of assimilation, see, for example, Bucciferro (2013).

Urban and slave shares. In addition to building a national series, we compile a wide-array of secondary sources that have population estimates for locations at various levels, from the village up to the province/state level.[8] These sources present the population divided in free and enslaved population and rural and urban population, among other characteristics. Using these estimates, we assign the slave share 25% from 1574 to 1850, which the sources indicate is the average baseline, declining to 15% in the first national census in 1872 and then to zero with the abolition in 1888. For the urban share, we assign 20% throughout the period, which the sources show to be an approximate average when such information is available.[9]

Prices, consumption basket, and CPI. Our "barebones" subsistence basket includes four staples (cassava flour, meat, bacon, and beans) and five non-food items (soap, cotton cloth, candles, lamp oil, and fuel/firewood). With 11,000 price observations, we construct food and non-food consumer price indexes (CPIs) and combine them into an overall CPI. Item definitions and measurement conventions are harmonized across archives and time (see Appendix Section C).

Nominal and real wages. We collect over 23,000 wages for skilled and unskilled free male workers. Rates are monetary and exclude in-kind payments. The large majority of the data are daily wages, but some data points include weekly, monthly, and annual wages. Annual real wages are computed as the number of barebones baskets that can be purchased with a year's labor income. We convert wages into annual earnings using an assumption on working days (baseline 250 days).[10]

CPI and real wage series. To build the aggregate annual series, we take the median of all data points available for all locations in each year and interpolate missing years.[11] Figure 1 presents the CPI and the annual real wages indexes for skilled and unskilled free males. The series exhibits substantial medium-run variability associated

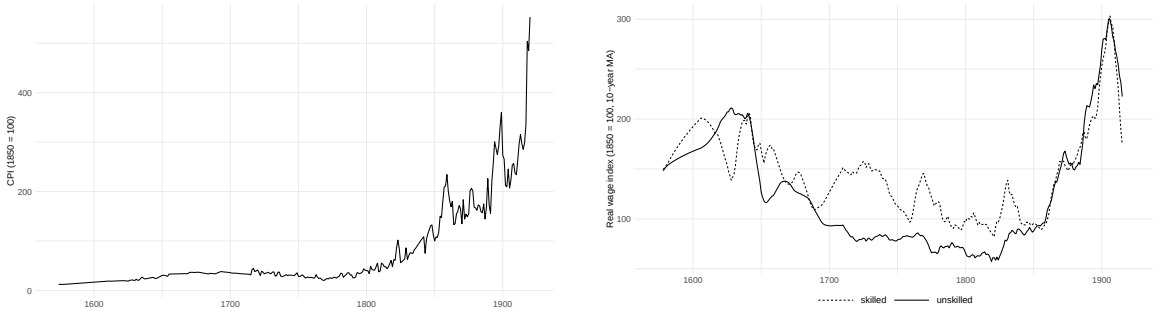
[8] Our sources include Alden (1963), Morse (1974), Marcílio (1984), IBGE (1990), Bergad (1996), Carrara (2014), Botelho (2015), and Teodoro de Matos (2023).

[9] We present robustness exercises in the Appendix Section E varying these shares.

[10] Mattoso (1992) shows that the 250-day assumption is realistic for the Brazilian case, given the practice of holidays and one resting day per week.

[11] See Appendix Section D for the details. We acknowledge that there might be regional differences; population-weighted and regional series are currently under construction.

with commodity cycles, wars, and institutional changes, but the long-run trend is consistent for our GDP mapping, as explained in the next section.



(a) Consumer Price Index (b) Annual real wage

Figure 1: CPI and real wages, 1574–1920

Notes: Consumer prices are the total cost of an annual barebones basket transformed to an index (1850 = 100). Real skilled and unskilled annual wages are nominal wages divided by the barebones basket and transformed to an index (1850 = 100). Annual real wage is presented as a 10-year moving average.

3 GDP per capita method

Following Allen (2000), we apply an Engel-elasticity mapping to infer income from budget shares and real wages. We consider a demand system with a constant elasticity linking per-capita agricultural output to relative prices and real wages, which explicitly incorporates food and non-food consumption. Let $Q_{a,t}$ denote agricultural output, N_t the population, I_t a real wage index, P_t are food prices (total cost of the food basket), M_t non-food prices (total cost of the non-food basket), and CPI_t is the consumer price index (total cost of the barebones basket) in year t. The real wage index I_t is a weighted series of the unskilled and skilled real wage indexes. With α as the (real) food own-price elasticity, β as the Engel elasticity, and χ as the cross-price elasticity with respect to the (real) non-food price, we consider:

$$q_{a,t} = \frac{Q_{a,t}}{N_t} = \kappa \left(\frac{P_t^{\text{food}}}{CPI_t} \right)^{\alpha} (I_t)^{\beta} \left(\frac{M_t^{\text{nonfood}}}{CPI_t} \right)^{\chi}. \tag{1}$$

The constant, which we assume $\kappa = 1$, captures agricultural trade in food and the level of per-capita consumption implied by the demand system. This assumption is

reasonable, as Brazil in this period was neither a net importer nor a net exporter of the foodstuffs we consider in the CPI, and, since we work in index form, the constant affects only levels, not elasticities or time-series variation. We then use the agricultural product per capita combined with agricultural share of labor, inferred as one minus the measured urban population share, and an agricultural productivity gap (relative to the economy-wide average) to build product per capita for the whole economy (Palma & Reis, 2019). Thus, the aggregate GDP per capita y_t is the agricultural product per capita $q_{a,t}$ scaled by the agricultural share of labor L_a/L and the agricultural productivity gap p:

$$y_t = \frac{q_{a,t}}{p \times L_a/L}. \tag{2}$$

To account for slavery, we allow the share of the population that is enslaved to vary over time.[12] Enslaved individuals are assumed to consume a fixed barebones basket that does not scale with the real wage. Operationally, we normalize their effective income to $I = 1$. Because food demand scales with the real wage with elasticity β, the implied average (population-weighted) demand is a mixture of free and enslaved consumption. Relative to the counterfactual in which the entire population were free and faced wage I_t, the ratio of effective demand is

$$\phi_t \equiv \frac{q_{a,t}^{\text{eff}}}{q_{a,t}^{\text{free}}} = (1 - s_t) + s_t I_t^{-\beta}. \tag{3}$$

We therefore take into account the presence of slavery by multiplying the baseline demand expression by ϕ_t:

$$q_{a,t}^{\text{eff}} = \phi_t \cdot \kappa \left(\frac{P_t^{\text{food}}}{CPI_t} \right)^{\alpha} (I_t)^{\beta} \left(\frac{M_t^{\text{nonfood}}}{CPI_t} \right)^{\chi}. \tag{4}$$

Baseline parameters. Our baseline parameters are own-price elasticity $\alpha = -0.4$, Engel elasticity $\beta = 0.3$, cross-price elasticity $\chi = 0.1$, agricultural productivity gap $p = 0.7$, unskilled (80%) and skilled (20%), rural population share $L_a/L = 0.8$, and a slave share schedule s_t starting at 0.25 until 1850, declining to 0.15 in 1872, and then to zero in 1888. The elasticity parameters are the same as the ones used for Spain and Portugal in Álvarez-Nogal and Prados de la Escosura (2013) and Palma and Reis

[12] We account for slaves as they were part of the market economy, even though it was one with an important coercion element. For natives, we consider them only to the extent that they were part of the market economy and hence appear in the statistics.

(2019).[13] The unskilled/skilled weights and the productivity gap are the same as for Portugal in Palma and Reis (2019). The rural and slave shares are from our estimates described in Section 2. In the Appendix Section E, we show the robustness of our baseline series in relation to many other combinations of these parameters.

4 Brazil's GDP per capita, 1574–1920

Figure 5 shows indexes of per-capita GDP and population (1850 = 100). The compound annual growth rate of GDP per capita over the full 1574–1920 period is −0.02%. This average rate, however, masks a sharp divide between the colonial and non-colonial periods, and even more so, between the period with and without the slave trade and slavery. The colonial period (1572–1821) exhibits an average growth rate of −0.15%, whereas the period after independence (1822–1920) exhibits an average growth rate of 0.45%.[14] If we look at the periods with slave trade (1574–1850) and slavery (1574–1888) against the periods after the prohibition of the slave trade (1851–1920) and abolition (1889–1920), the difference is striking: −0.14% and −0.01% against 0.35% and 0.62%.[15] These results confirm the patterns previously suggested in Palma et al. (2021) and Lambais and Palma (2023): A heavily slavery-focused economy plausibly delayed the modernization of Brazil.

The figure shows a pattern for Brazil described by a discernible lift beginning in the late seventeenth century and peaking in the early eighteenth century, after which the series returns to its earlier level. This is precisely the pattern one would expect from a resource boom: positive income effects while extraction surges, followed by a return to baseline as the boom wanes and population responds. The short duration and limited magnitude of the uptick make clear that it did not inaugurate a new growth path, and that political institutions became less inclusive at this time in Portugal and Brazil (Henriques & Palma, 2023; Abad & Palma, 2021).

[13] Abad and Van Zanden (2016) use for Latin America a slightly higher baseline Engel elasticity ($\beta = 0.4$), combined with $\alpha = -0.5$ and $\chi = 0.1$, but note that the results are unchanged using the same elasticities as in our paper.

[14] Lambais and Palma (2023) provide evidence that the early modern decline of living standards in Brazil was related to the (documented) import of more than three million enslaved Africans, and the subsequent rise of living standards was related to the end of the slave trade.

[15] These patterns do not depend on the choice of the slave share, as shown in the Appendix Section E.

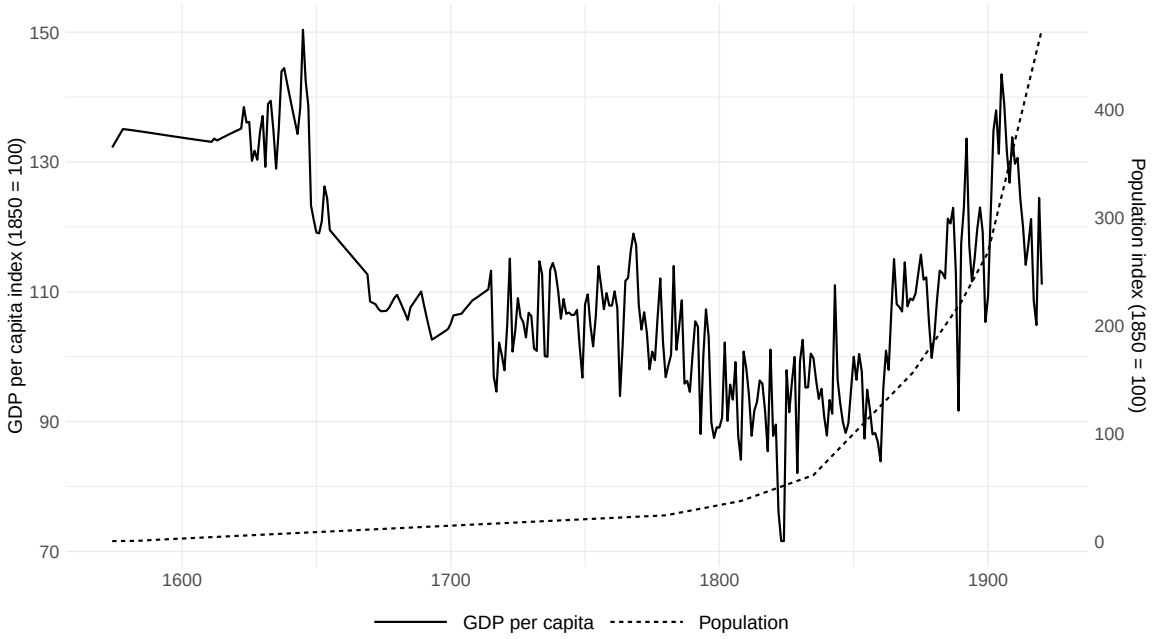


Figure 2: Real GDP per capita and population for Brazil (1574–1920)

Notes: GDP per capita is constructed as described in Section 3 and transformed to an index (1850 = 100). The population series is interpolated from the figures described in Table 1 and transformed to an index (1850 = 100).

4.1 Comparison with previous estimates

We now briefly compare our estimates with those in the literature. No estimates existed for the period before the early nineteenth century, hence all comparisons refer to the period since then. We compare our preliminary growth path to the prior estimates in Table 2.[16] Our 1850–1900 per-capita growth of roughly 0.37% sits between stagnation (Maddison, 1992) and the near-stagnation estimates of Goldsmith (1986) and Leff (1972b) and the higher growth found by Reis (2023) and Bacha et al. (2024). For the first half of the nineteenth century (1820–1850), our estimates again fall between stagnation and higher growth estimates. The discrepancy arises from differences in (i) coverage and micro-foundations (demand versus proxies), (ii) treatment of non-food consumption, (iii) assumptions on working days and Engel

[16]Prados de la Escosura (2009) assumed no per-capita GDP growth in the first half of the nineteenth century and a per capita value of 683 GK international 1990 dollars for Brazil in 1800, 1820, 1850, 1860. Those were guesses rather than estimates, so we exclude them from the comparisons.

elasticity, and (iv) population dynamics and urbanization shares.

Table 2: Comparative growth rates of GDP per capita

			Imperial	Early Republic		
Source	Period available	Type	1822–1888	1889–1919	1820–1850	1850–1900
Lambais Palma	1574–1920	demand	0.69	1.02	0.35	0.37
Bacha Tombolo Versiani	1820–1980	proxies	1.00	0.57	0.75	0.39
Maddison	1820–1920	guesstimate	0.21	0.42	0.00	-0.01
Goldsmith	1850–1900	proxies	—	—	—	0.26
Leff	1850–1900	proxies	—	—	0.00	0.10
Contador Haddad	1861–1970	proxies	0.36	—	—	-0.35
Reis	1872–1920	income	—	1.25	—	0.90
Haddad	1900–1947	production	—	1.16	—	—
Abreu Lago Villela	1822–1888	guesstimate	0.2–0.5	—	—	—
Furtado	1850–1900	guesstimate	—	—	—	1.00

Notes: Compound annual growth rates in each period. Sources: Bacha et al. (2024) and Bacha et al. (2025); Maddison (1992); Goldsmith (1986); Leff (1972b); Contador and Haddad (1975); Reis (2023); Haddad (1974); Abreu et al. (2022); Furtado (1963). *Type* refers to how the GDP per capita was constructed or inferred. *Bacha Tombolo Versiani* is a weighted real index of exports, imports, government budget, and money supply. *Maddison* is a guesstimate prior to 1900 and after based on *Haddad*. *Goldsmith* is a weighted real index of exports, imports, urban wages, government spending, and money supply. *Leff* is a money-supply-implied trend statement. *Contador Haddad* is a weighted real index based on imports, exports, government spending, cement consumption, and installed energy capacity. *Reis* is an income approach reconstruction based on the 1872 and 1920 censuses. *Haddad* is a production approach reconstruction. *Abreu Furtado Villela* and *Furtado* are guesstimates based on qualitative interpretations. Growth rates were calculated using the familar compound growth formula.

Figure 3 compares our GDP per capita index with six previously published series for 1820–1919 (all indexed to 1900 = 100). Before 1900, all series broadly agree: they fluctuate between 70 and 90 for most of the nineteenth century, then converge to 100 in 1900 by construction, with the *Bacha Tombolo Versiani* index generally higher after 1890. The main differences emerge after 1900. Our series rises to roughly 125–130 in the early 1910s, retreats to around 100 during World War I, and ends the period slightly above 110. Three of the comparison series—*Maddison*, *Haddad*, and *Reis*—follow a similar post-1900 trajectory but reach somewhat higher levels in the 1910s. The sharpest divergence is observed for *Contador Haddad*, which exhibits a higher level throughout and a pronounced wartime spike above 250 that has no counterpart in our estimates or in any of the other series, likely due to the inclusion of cement consumption and installed energy capacity. *Bacha Tombolo Versiani* tracks our series most closely throughout.

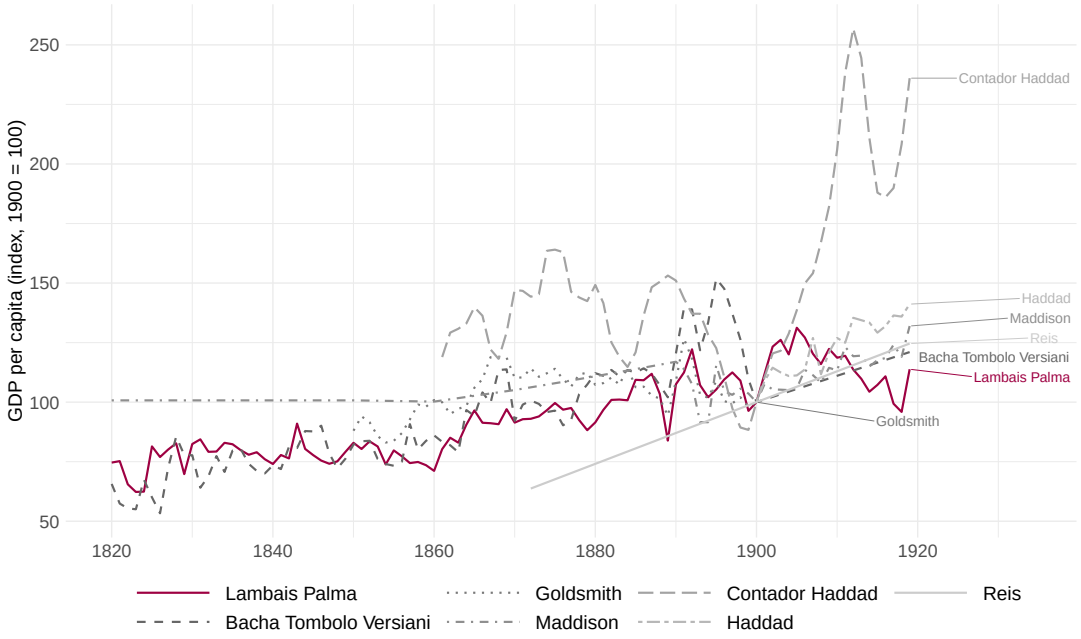


Figure 3: Index comparison with prior estimates (1820–1919)

Notes: GDP per capita index (1900 = 100). Sources: Haddad (1974), Contador and Haddad (1975), Goldsmith (1986), Maddison (1992), Reis (2023), Bacha et al. (2024), and Bacha et al. (2025). *Reis* is interpolated between 1872–1919 and *Bacha Tombolo Versiani* is interpolated between 1900–1919.

In Figure 4, we transform our index to 1990 Geary-Khamis (GK) international dollars anchored on the benchmark for 1920 from the Maddison Project (Bolt & van Zanden, 2014), for which the original source is Haddad (1974), and compare to the Maddison Project and Bacha et al. (2025) series, which are the ones also available in 1990 dollars. Our estimates show that at the beginning of the nineteenth century, Brazil was probably richer than previously thought, implying a steady long-run growth rate during the century, and ending the series in 1919 also richer than previously implied by the Maddison Project, aligned with the level estimated by Bacha et al. (2024).

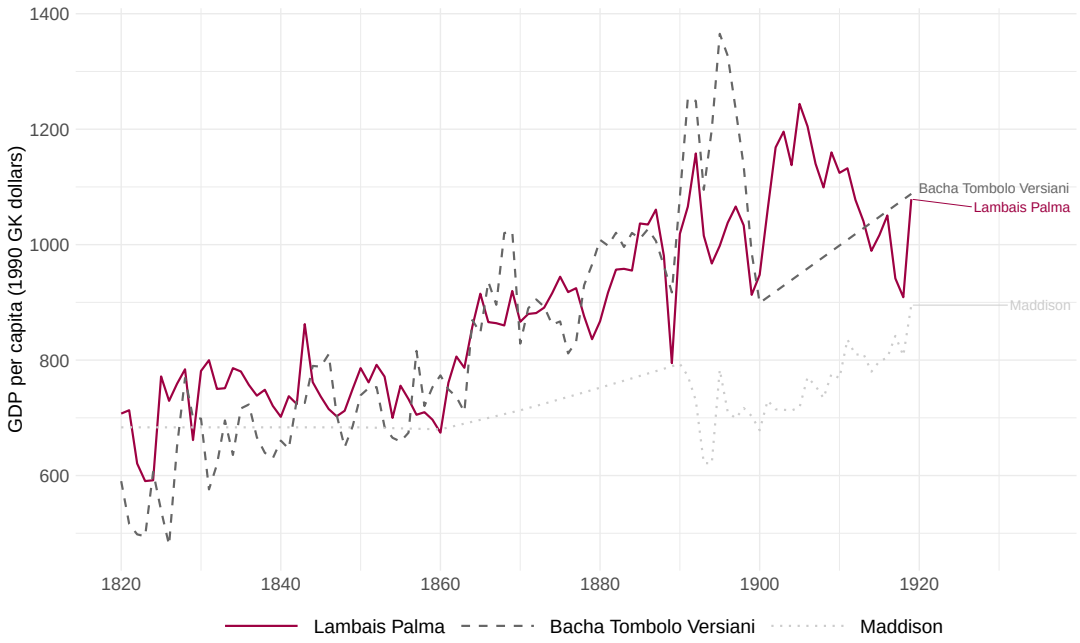


Figure 4: 1990 GK dollars comparison with prior estimates (1820–1919)

Notes: GDP per capita in 1990 GK dollars. Sources: Maddison (1992), Bacha et al. (2024), and Bacha et al. (2025). *Bacha Tombolo Versiani* is interpolated between 1900–1919, and *Maddison* is interpolated between 1820–1860 and 1860–1870.

5 International comparisons

Figure 5 plots GDP per capita in 1990 GK dollars for Brazil alongside a set of European and American countries from the late sixteenth century to 1920. Read against its peers, Brazil's trajectory is one of remarkable long-run stability at a low level, punctuated by brief lifts and a late-nineteenth-century improvement that remains modest relative to the dramatic acceleration of the North Atlantic economies. The result is a widening gap between Brazil and the eventual leaders, even as Brazil inches ahead of some Latin American neighbors by the turn of the twentieth century.

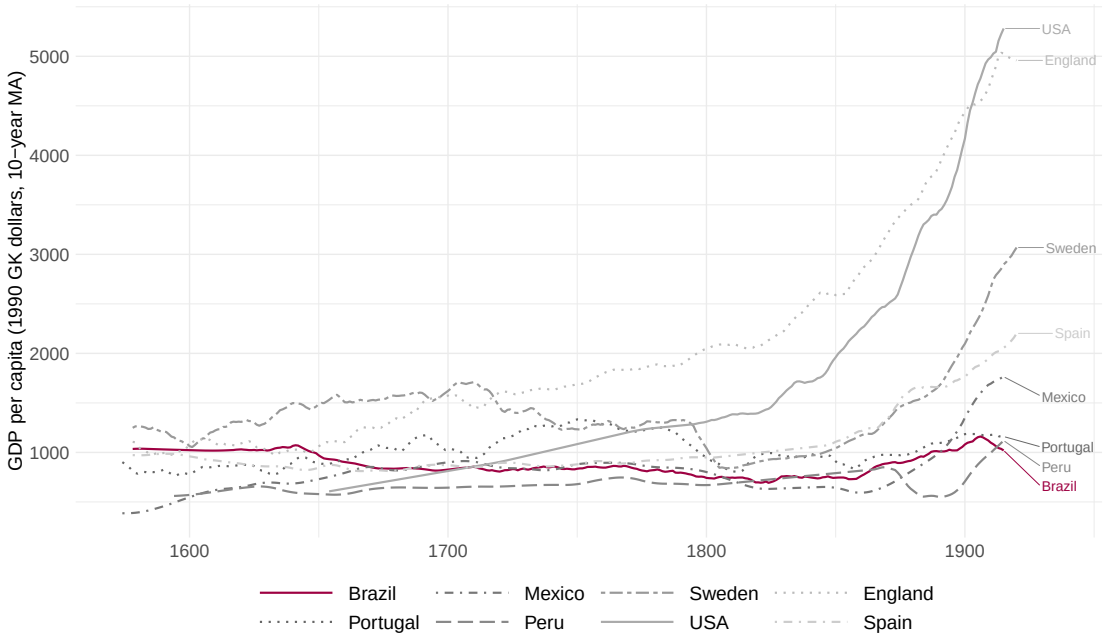


Figure 5: International comparisons (1574–1920)

Notes: GDP per capita in 1990 GK dollars, 10-year moving average. Sources are Brazil: our paper; Mexico and Peru: Abad and Van Zanden (2016), Prados de la Escosura (2009), and Bértola and Ocampo (2012); Portugal: Palma and Reis (2019), Palma and Henriques (2023), and Batista et al. (1997); Spain: Álvarez-Nogal and Prados de la Escosura (2013); England: Broadberry et al. (2015); Sweden: Schön and Krantz (2012); USA: McCusker (2006) and Sutch (2006).

For more than two centuries (c.1574–c.1800), Brazil's real GDP per capita series hovers close to the $800–1,100 range. The line is not flat; initially, the level was remarkably high, and there are gentle undulations over time, but the predominant impression is one of stagnation.[17] This prolonged steadiness suggests that, despite sizable shifts in export composition and the expansion of frontier settlement, average incomes per head did not trend upward in a sustained way. The colonial economy's well-known features—heavy reliance on coerced labor, limited urbanization outside a few hubs, a domestic market not fully integrated, and a narrow export base—are consistent with such a profile. They could generate occasional windfalls yet leave aggregate living standards roughly unchanged once translated to GDP per capita and smoothed over a decade.

[17]The fact that the level was initially high is consistent with the evidence and hypothesis presented in Lambais and Palma (2023).

Around 1800–1820, the Brazilian series reaches its lowest point, clearly below $700, when Portugal does as well (Palma & Reis, 2019). The timing aligns with a period of considerable disruption—the displacement of the court from Portugal to Brazil, the global trade shocks of the Napoleonic era, institutional changes culminating in independence, and the associated fiscal-monetary strains that accompany political realignment. In the series, this appears not as a collapse—Brazil avoids the sharp trough visible in Mexico and Peru—but rather as a mild reduction from an already modest base. The resilience is noteworthy: Brazil's income per capita does not crater as it does in other countries, such as Sweden, Portugal, Mexico, or Peru.

Beginning in the mid-nineteenth century, Brazil exhibits an upward trend. The increase is gradual at first, then clearer after the 1860s, carrying GDP per capita into the $1,000 band by the late 1880s. It was only then that Brazil again reached the same real per capita income level it had two and a half centuries earlier. Historically, this timing of improvement coincides with export diversification and deepening connections to world markets—most prominently the coffee boom—alongside incremental infrastructure build-out and the early stages of industrialization (Summerhill, 2003). The improvement is real but bounded: By 1920, the line eases off slightly, suggesting vulnerability to external shocks and the limits of an export-led upswing before broader structural transformation takes hold.

The comparative series put Brazil's story into stark relief. For two centuries, Brazil sits in a lower cluster with Iberian Europe and the Spanish American economies. Over the nineteenth century, however, England and then the United States broke decisively away, later accompanied by Sweden and Spain. This is the great divergence in miniature: Not a collapse in Brazil, but a powerful acceleration elsewhere that Brazil does not match. Within Latin America, Brazil compares more favorably: By the 1880s, it edged ahead of Mexico and Peru, partly because it avoided their nineteenth-century fall and managed a steadier late-century ascent; yet it had lost its edge relative to Mexico before 1900.

Overall, three features stand out from this comparative exercise. First, there were centuries of near-stationary income per head, which are hard to square with narratives that posit continuous gains from colonization or from scale alone. Second, there are commodity cycles without structural breaks: Short-run lifts dissipate, implying limited spillovers from booms into economy-wide productivity. Third, late and modest modernization: Improvements arrive in the late nineteenth century, with the end

of slavery, but by then the industrial leaders have already compounded decades of growth.

6 Concluding discussion

From the late 1500s to the mid-1600s, Brazil's GDP per capita was relatively high, but it then declined and remained strikingly stable at a low level until the 1800s, interrupted only by an eighteenth-century resource boom that quickly reverted. The nineteenth century brought mild early weakness followed by a sustained but moderate rise that peaks just before the First World War, after which there was a small retreat. Relative to peers, Brazil improved within the Latin American cluster by 1900 but fell dramatically behind the North Atlantic leaders and, by 1920, also trailed some Western European countries. Our results suggest that Brazilian macroeconomic history can be characterized by late acceleration from a prolonged baseline, insufficient to close the gap once industrialization elsewhere compounded advantages for decades.

Our reconstruction enables a systematic comparison with existing estimates for Brazilian economic growth in the nineteenth century, which have produced sharply divergent narratives. Some authors argued for growth comparable to contemporaneous Latin American leaders, while others argued for near-stagnation. Our results lie between these extremes: We identify positive but modest growth consistent with rising real wages and partial diversification, but below the levels implied by the most optimistic interpretations.

Classical Brazilian economic historiography, notably associated with Furtado (1963), advanced the view that the country's long-run "backwardness" originated in structural legacies of the colonial period, particularly low aggregate savings and investment stemming from a weak domestic market and a skewed income distribution rooted in monoculture and latifundia. According to this interpretation, these colonial arrangements locked Brazil into periods of growth "involution" and stagnation until the second half of the nineteenth century, with more pronounced growth only after 1930. Nathaniel Leff challenged this conventional account and standard dualist development models, arguing that the mechanisms emphasized by these narratives were insufficient to explain Brazil's developmental trajectory. He argued that Brazil was stuck in "economic retardation" mainly because of a permanent elastic labor supply arising from immigration and slavery, which did not give way to scarcity and rising

wages, even in the nineteenth century (Leff, 1972a, 1982).

Subsequent scholarship demonstrated that, contrary to simplified extraction-centered models influenced by Furtado's dominant influence in earlier historiography, the late-colonial Brazilian economy possessed a far more intricate and internally articulated structure (Martins Filho & Martins, 1983; Florentino & Fragoso, 2001). Patterns of production, trade, and credit within Portuguese America formed more robust domestic markets and a sophisticated network that connected agrarian, mercantile, and Atlantic markets in ways previously overlooked. By the late eighteenth and early nineteenth centuries, colonial Brazil exhibited complex mechanisms of internal circulation and economic coordination, challenging the notion of a wholly dependent, externally driven colonial order (Baerlocher et al., 2025).

Our results suggest, instead, that Brazil's development problems had older roots, being related to matters such as the legacy of slavery (Palma et al., 2021; Lambais & Palma, 2023). While Leff convincingly questioned the causal channels proposed by Furtado and his followers, our findings suggest that the chronology of Brazil's historical economic growth roughly overlaps with that proposed by the earlier historiography. In other words, although the mechanisms differ substantially from those posited by the classical structuralist tradition, the timing of Brazil's divergence from the frontier remains broadly consistent with it.

Finally, we placed Brazil within the global context of early modern and modern economic performance. The country's prolonged stagnation contrasts with the gradual rise observed in parts of Europe and with the accelerating trajectories in England and the United States. The great divergence between Brazil and the North Atlantic economies thus appears not as a sudden break, but as the cumulative result of centuries of institutional and structural differences. In this sense, our findings help reconcile the suggested growth chronologies of classical Brazilian structuralist narratives—which emphasized colonial legacies—with more recent scholarship that identifies specific economic problems rooted in slavery as the decisive issue: While the timing of the divergence aligns with the earlier literature, the underlying mechanisms differ significantly.

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Online Appendix for

"How a nation was born: Brazilian economic growth, 1574–1920"

A Archival sources

Arquivo Nacional da Torre do Tombo (Lisbon)

- Maço 13: n. 19 (PT/TT/AJCJ/CJ013/00019);
- Maço 14: n. 4 (PT/TT/AJCJ/CJ014/00004);
- Maço 17: n. 4, 19, 22, 24, 25, 27, 28, 29, 30, 31, 32, 33 (PT/TT/AJCJ/CJ017/00004 to 00033);
- Maço 19 (PT/TT/AJCJ/CJ019);
- Maço 30 (PT/TT/AJCJ/CJ030).

Arquivo Distrital de Braga (Portugal)

- Mosteiro de São Bento, Rio de Janeiro, Estados, Livro 1 (1623–1748).

Arquivo do Mosteiro de São Bento da Bahia (Salvador)

- Estados, Livro 1 (1711).

Arquivo da Santa Casa de Misericórdia da Bahia (Salvador)

- Account books (1648–1709): F843; F845; F848; F849; F850; G1017; G1019.
- F810 (1863).
- D389 (1869); D429 (1910); D430 (1911); D432 (1913); D433 (1914).
- Receipt folders, various years (1770–1920).

Arquivo Público do Estado da Bahia (Salvador)

- Tribunal da Relação da Bahia, Série Inventários: 01/232/351/02; 03/1309/17778/03; 03/1416/1885/01; 03/1416/1885/02; 04/1572/2041/02; 04/1581/2050/01; 04/1596/2065/03; 04/1614/2083/08; 04/1695/2165/18; 04/1766/2236/08; 07/3148/05; 08/3473/09.

Arquivo do Convento de São Francisco da Bahia (Salvador)

- Receitas e Despesas, various years (1790–1825).

Arquivo Provincial Franciscano (Recife)

- Convento de São Francisco, Rio de Janeiro, Account book (1790–1820).
- Receitas e Despesas do Hospital da Boa Viagem (1842–1863).

Arquivo da Ordem Terceira de São Francisco do Recife (Recife)

- Despesas, various years (1812–1890).
- Documentos de Despesas com obras na Igreja (1852–1854).
- Documentos de Despesas com Consertos de Prédios (1814–1815; 1863–1864).
- Recibos e Boletos (1872–1874).
- Recibos 2370 (1875).
- Recibos 2432 (1879).
- Recibos 2549 (1874–1875).
- OTSF 1836 (1834).
- Documentos de Outubro de 1891 a Março de 1898 (1855).

Instituto Arqueológico, Histórico e Geográfico Pernambucano (Recife)

- Cód. 0487, Livro de Despesas da Irmandade do Divino Espírito Santo do Recife (1797–1854).
- Receita e Despesa da Casa dos Expostos (1792–1800).

Arquivo da Cúria Metropolitana de Olinda e Recife (Recife)

- Irmandade de São Pedro dos Clérigos, Livro da Despesa, LAB 2727 (1805–1869).
- Irmandade Santa Cecília, LAB 873, various years (1849–1914).
- Irmandade de Santa Cecília, LAB 2255, various years (1880–1900).
- Irmandade de Santa Cecília, LAB 2256, various years (1912–1914).
- Receita e Despesa Irmandade Santa Efigénia, various years (1754–1790).
- Cód. 481, Receita e Despesa Irmandade Bom Jesus das Portas, various years (1787–1836).
- Matriz do Corpo Santo, LAB 1497 (1851–1854).
- Receita e despesa da Matriz Corpo Santo, LAB 1541–1694, various (1829).
- Receita e despesa da Matriz Corpo Santo, LAB 1699–1841, various (1830).
- Receita e despesa da Matriz Corpo Santo, LAB 1826 (1830).
- Receita e despesa da Matriz Corpo Santo, LAB 1577 (1829).
- Receita e despesa da Matriz Corpo Santo, LAB 1862–1863 (1838).
- Matriz do Corpo Santo, Pagamento dos oficiais, LAB 1547 (1815–1816).
- Matriz do Corpo Santo, Ferias dos trabalhadores, recibos e contas, various years (1817–1819).
- Matriz do Corpo Santo, Ferias dos oficiais e recibos, various years (1822–1829).

- Matriz do Corpo Santo, Receitas e Despesas, século XIX (1893).
- Matriz do Corpo Santo, various loose documents (1832–1840).
- Património da Sé, Receita e Despesa, NLAB 1393–1497, various years (1865–1893).
- Receita e Despesa da Sé, LAB 1024–1133 (1855–1915).

Arquivo da Santa Casa de Misericórdia do Rio de Janeiro (Rio de Janeiro)

- Recolhimento, Account book (1768–1780).
- Account book (1795–1802).

Arquivo Nacional (Rio de Janeiro)

- Diversos códices da antiga SDH, Códice 513, Vol. 1 e Vol. 2, Hospital dos Lázaros, Account book (1763–1795).
- Caixa 759, Pacote 1, Hospital dos Lázaros (1808–1887).
- Vice-Reinado, Caixa 487, Pacote 2, Real Fazenda (1777–1802).
- Vice-Reinado, Caixa 499, Pacotes 1 e 2 (1790–1808).
- Polícia da Corte, Códice 362, Vol. 1 (1808–1812).
- Polícia da Corte, Códice 366, Vol. 1 (1815–1819).
- Série Justiça
  - Prisões e Casas de Correções, Accounting, various (1834–1860).
  - Secretaria de Polícia da Corte, Accounting, various (1831–1871).
- Junta do Comércio, Agricultura, Fábricas e Navegação
  - Caixa 360, Pacotes 2 e 3, Administração da pesca da baleia (1816–1841).
  - Caixa 367, Pacote 1, Generalidades (1809–1850).
  - Caixa 372, Pacote 3.
  - Caixa 398, Pacote 3 (1809–1849).
  - Caixa 399 e 400, Pacotes 1 a 3, Junta, Account book (1809–1849).
  - Caixa 423, Pacotes 1 e 2, Fábricas (1808–1859).
  - Caixa 446, Pacote 2 (1809–1850).
  - Caixa 458, Pacote 1, Avulsos (1810–1856).
  - Códice 176, Vol. 1, Accounts (1814–1821).

Arquivo Provincial Franciscano (São Paulo)

- Convento Santo Antônio, Rio de Janeiro, Accounts (1854–75).
- Convento Santo Antônio, Rio de Janeiro, Receipts (1867).

Arquivo da Ordem Jesuíta (São Paulo)

- Accounts, Rio de Janeiro, 1835.

Arquivo Histórico Municipal de São Paulo (São Paulo)

- Fundo Câmara Municipal de São Paulo, Caixa 41 (Caixas Avulsas), various years (1789–1799).
- Fundo Câmara Municipal de São Paulo, Vol. 338, Obras Públicas (1791–1792).
- Papéis Avulsos, Vols. 1–14, various years (1770–1810).

Arquivo Público do Estado de São Paulo (São Paulo)

- Box 5.213.18, various years (1827–1834).
- Box 5214, various years (1835–1839).

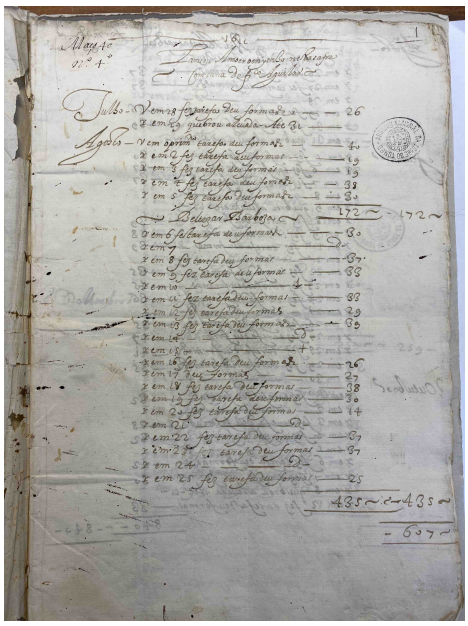
Arquivo da Santa Casa de Misericórdia de Porto Alegre (Porto Alegre)

- Contratos, various years (1864–1920).
- Relatórios, various years (1867–1920).

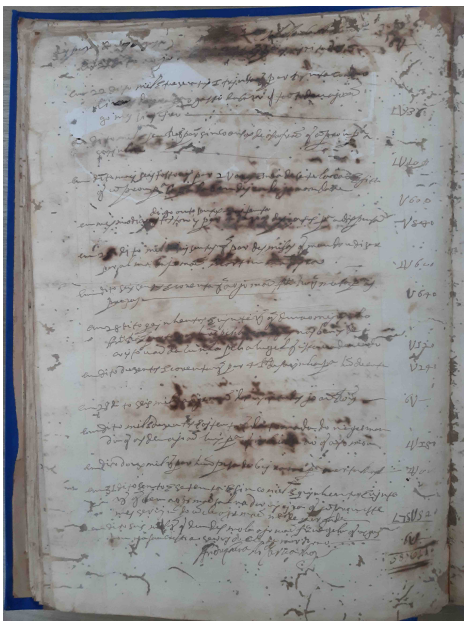
Arquivo Histórico do Rio Grande do Sul (Porto Alegre)

- Obras Públicas, Caixa 01, Maço 01 (1830–1838).
- Tesouro, Maço 120 (1818–1819).

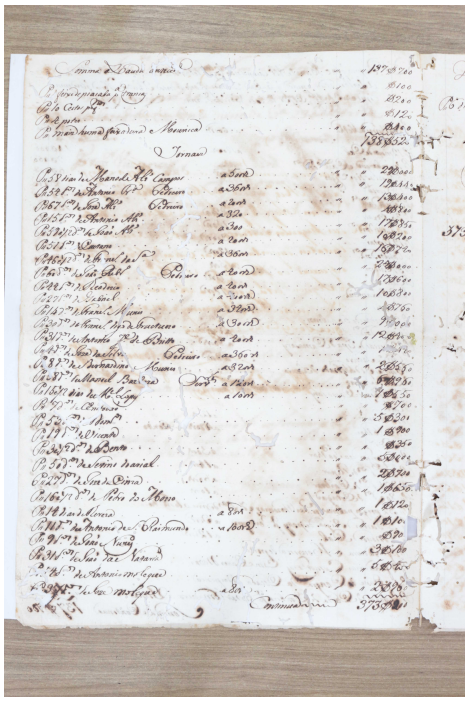
B Sample images from the archives



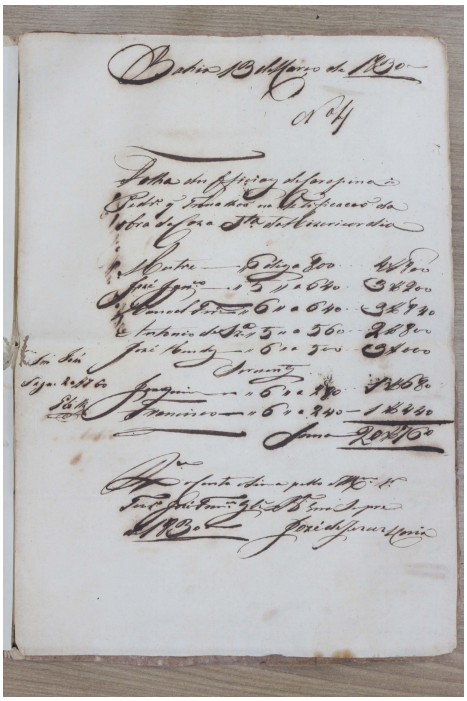
(a) Sugar mill account book, 1611.



(b) Holy House account book, 1647.



(c) Holy House account book, 1790.



(d) Holy House receipts, 1830.

Figure B.1: Samples of historical sources

C Weights and measures

For the firewood energy conversions, based on Miller (1995) we find the conversion of "carro" and "tarefa" to cubic meters, then based on Reyes et al. (1992) we set medium hardwood as 600 kilograms per cubic meter, finally to convert firewood kilograms to M BTU we follow Allen et al. (2012). For measures that we found two indications in the literature, marked with (1) and (2) in the table, we take the average of the two conversion factors.

Table C.1: Conversions to the metric system

unit	conversion factor	to	source
alqueire	36.27	litro	Mattoso (1992, p. 503)
alqueire beans	29.02	kg	Mattoso (1973, p. 170)
litro beans	0.8	kg	Mattoso (1973, p. 170)
litro cassava (1)	0.65	kg	Canabrava (1972, p. 116)
litro cassava (2)	0.69	kg	Barickman (2003, p. 214)
alqueire cassava (1)	23.5	kg	Canabrava (1972, p. 116)
alqueire cassava (2)	24.99	kg	Barickman (2003, p. 214)
sirio cassava (1)	44.06	kg	Canabrava (1972, p. 116)
sirio cassava (2)	46.86	kg	Barickman (2003, p. 214)
arroba	14.75	kg	Schwartz (1985, p. xxiii)
quintal	58.98	kg	Schwartz (1985, p. xxiii)
moio	2178	litro	Schwartz (1985, p. xxiii)
sirio	1.87	alqueire	Schwartz (1985, p. xxiii)
libra	0.46	kg	Mattoso (1973, p. 170)
pipa	424	litro	Simonsen (1977)
canada Bahia	6.85	litro	Mattoso (1973, p. 170)
canada Rio de Janeiro	2.66	litro	Johnson Jr. (1973, p. 238)
vara	1.1	m	Schwartz (1985, p. xxiii)
covado	0.66	m	Mattoso (1992, p. 503)
acha firewood kg	0.026	M BTU	conversion (see text)
feixe firewood kg	0.15	M BTU	conversion (see text)
tarefa firewood kg	75.4	M BTU	conversion (see text)
carro firewood kg	9.43	M BTU	conversion (see text)

D The final dataset: methodological details

The subsistence bare-bones price basket To construct the price series, we gather annual information on a "barebones" basket of goods. The barebones basket was first proposed in Allen et al. (2011) as a practical solution to the "index number problem." We aim to compare the change in aggregate welfare of a representative family between two points in time and between two places, relative to a basket of goods. During our period, many transactions at different prices occur, thereby changing the aggregate basket price. In theory, comparing the income in the two periods to the price index should show the change in welfare. There are, however, two problems. One choice is whether to fix the basket in the initial or final period, and the other is which actual goods to include in the basket when comparing two different places.

We want to compare workers in Brazil with those in Europe, for example, but the food available in each place differed widely. While people in Brazil consumed manioc flour and beans, those in Europe consumed oats, wheat bread, butter, cheese, beer, and wine. To build the index, in theory, the same products should be available in both places so the worker can choose to consume the first bundle when presented with Brazilian prices and the second bundle when presented with European prices. People in Brazil, however, did not have access to the European basket at local prices, so comparing living standards across the two continents is not straightforward. One solution is to use the most basic substitutes in the basket. In Brazil, for example, the most basic substitute for oats is cassava flour. We use the most basic food items in quantities with the amount of calories and proteins necessary for daily survival and also add a necessary bundle of non-foodstuffs that is approximately the same everywhere: cloth, soap, fuel (firewood), candles, and lamp oil.[1]

The barebones solution represents an empirical approach to the theoretical ideal because we are choosing the most basic items that are necessary for subsistence, thus the worker's choice is already tangential to the indifference curve. The Brazilian barebones basket can then be considered the Laspeyres index, and the European basket the Paasche index. Allen et al. (2011) compare Chinese and European baskets (and also China and Japan) in local prices and an average of the two, which gives the Fisher index, and find there is not much of a difference between the three indexes.

[1]The bare-bones basket contrasts with a basket with more variety known as the "respectability basket" (Allen, 2001; Allen et al., 2011, 2012).

This result, they argue, gives us the confidence to work just with an equivalent of the Laspeyres index, since a fixed subsistence basket of goods leads to intuitive interpretations. The barebones approach has since been adopted in the literature.[2]

We adapt the barebones foodstuffs to Brazilian standards following Mattoso (1986, 1992), who documents in detail the historical consumption patterns in Bahia.[3] Mattoso (1992) finds that a family of five had an annual consumption of 870 kilos of cassava flour, 156 kilos of beans, and 156 kilos of meat.[4] We rebalance these amounts and set the annual consumption of one adult to 120 kilos of cassava flour, 70 kilos of beans, 65 kilos of meat, and 5 kilos of bacon.[5] This translates to approximately the same amount of daily calories and proteins as the standard in Europe, United States, Mexico, Peru, Bolivia, and Colombia, with proteins slightly below Argentina, Chile, and North China and above West Africa. Table D.1 shows a summary of the barebones basket in comparative perspective. Section C shows the conversion weights and measures.

[2]See, for example, a review in Abad and Maurer (2025).

[3]The need to adapt baskets to local consumption patterns is well established in the literature (Allen, 2017, 2020).

[4]The earliest histories of Brazil mention cassava (also known as manioc) as the main staple which substituted for bread, e.g. Gândavo (2004, p. 63).

[5]Remarkably, in Brazil slaves commonly received three daily meals which included meat. See Soares (1958, p. 74).

Table D.1: Brazil's barebones baskets in global perspective

Good (per person per year)	Brazil	Europe	USA	Mexico, Peru Bolivia, Colombia	Argentina Chile	South China, Japan	North China	West Africa
Cassava flour (kg)	120	-	-	-	-	-	-	-
Meat (kg)	65	5	5	35	105	3	3	3
Beans/peas (kg)	70		20	45		20	20	-
Bacon (kg)	5	-	-	-	-	-	-	-
Wheat/oats (kg)	-	155	-	-	132	-	-	-
Maize (kg)	-	-	165	165	-	-	-	185
Sorghum (kg)	-	-	-	-	-	-	179	-
Butter (kg)	-	3	3	-	-	-	-	-
Rice (kg)	-	-	-	-	-	171	-	-
Oil (kg)	-	-	-	-	-	3	-	3
Soap (kg)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Linen/cotton (m)	3	3	3	3	3	3	3	0
Candles (kg)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Lamp oil (l)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Fuel (MBTU)	3	3	2	3	3	3	3	2
Total daily calories	1945	1936	1936	1943	1938	1939	1942	1939
Total daily protein	57	60	60	60	89	63	71	43

Sources: For Brazil, foodstuffs based on Mattoso (1992); for Europe, Allen et al. (2011); for South America Abad et al. (2012); for the United States Allen et al. (2012); for Asia Allen et al. (2011); and for Africa Frankema and van Waijenburg (2012). See Section C for conversion metrics and further details.

Occupations and wages We collect (mostly daily) wages of free skilled and unskilled male workers.[6] The unskilled workers were mostly called *serventes* which can be translated to "helpers" of carpenters and masons. Skilled workers are primarily carpenters and masons. The choice of construction-sector occupations is common in the literature because it is a type of work that varies little across countries, enabling comparative analysis. These occupations are also the most widely available for extended periods of time, since the first settlement, as is the case of Bahia and Rio de Janeiro. They also represent a large share of the urban labor market: for example, artisans made up on average 28% of the workers in Salvador around the middle of the nineteenth century (Nascimento, 2021).[7]

The wages are always market wages and do not include in-kind transfers. To construct an annual series, we assume a labor year of 250 working days, as is standard

[6]This is for ease of international comparability and due to the lower frequency of female observations.

[7]Depending on the parish and census year, the share of artisans varied from 18% to 36%.

in the literature.[8]

Final dataset To build the final dataset for wages and foodstuffs and non-foodstuffs prices, we combine the primary sources with data from Johnson Jr. (1973), Lobo (1978), Mattoso (1986), Alden (1990), Ball (2018), and Djenderedjian and Martirén (2020).[9] All authors explain they have arrived at annual series taken averages of the available observations, except for Alden (1990) who does not mention anything in the text, but we suspect that he also calculates the average for each year because that was the most common method at the time. With the exception of Lobo (1978), the authors do not disclose the number of observations per year, and we suspect they used some form of sampling. In contrast, our dataset draws on all available manuscripts for each year.

To construct our annual series, we compute the median of the price and wage observations for each year across all locations. We use the median because it is more representative of market prices and is less prone to outliers influencing the annual series than the average. Our results are robust to taking the average of the observations. The only imputation for unskilled wages we add is for 1574, based on the ratio of carpenters and unskilled workers in 1611/12. For prices, we apply the ratio of cassava to beans and meat in 1625/26 for 1574 and the ratio of tallow to firewood (1611/12), lamp oil (1622/24), and soap (1643/44). For both wages and prices, nominal prices and thus the ratios remain stable during this period. After we have an observation for each product-year and occupation-year, we interpolate the missing years. Tables D.2 and D.3 shows the percentage of years covered in each period for prices and wages. Figures D.1 and D.2 shows the nominal prices and wages series.

[8] Mattoso (1992) shows that the 250-day assumption is realistic for the Brazilian case, given the practice of holidays and one resting day per week.

[9] We take data on free skilled and unskilled workers (helpers, carpenters, and masons as in our archival data) for Rio de Janeiro from Lobo (1978). From Johnson Jr. (1973) we use data on cassava, beans, and lamp oil, also for Rio de Janeiro. From Mattoso (1986) we use data on cassava flour, beans, meat, lamp oil, and free unskilled workers, also like in our archival data, for Salvador. From Alden (1990) we use data on cassava flour and meat for Salvador. Their source is market data mainly from the Holy Houses in Rio de Janeiro and Salvador, in addition to religious hospitals and private firms. From Djenderedjian and Martirén (2020) we use data on meat, cassava flour, and unskilled helpers for Rio Grande. From Ball (2018) we use data on unskilled workers in São Paulo.

Table D.2: Percent of the period covered.

Period	Cassava	Beans	Meat	Bacon	Nonfood stuffs
1574–1599	19%	19%	19%	0%	19%
1600–1699	34%	13%	9%	0%	42%
1700–1799	90%	51%	86%	33%	66%
1800–1899	91%	93%	90%	78%	87%
1900–1920	100%	100%	100%	95%	100%

Table D.3: Percent of the period covered.

Period	Unskilled	Skilled
1574–1599	4%	19%
1600–1699	10%	35%
1700–1799	26%	33%
1800–1899	99%	99%
1900–1920	100%	100%

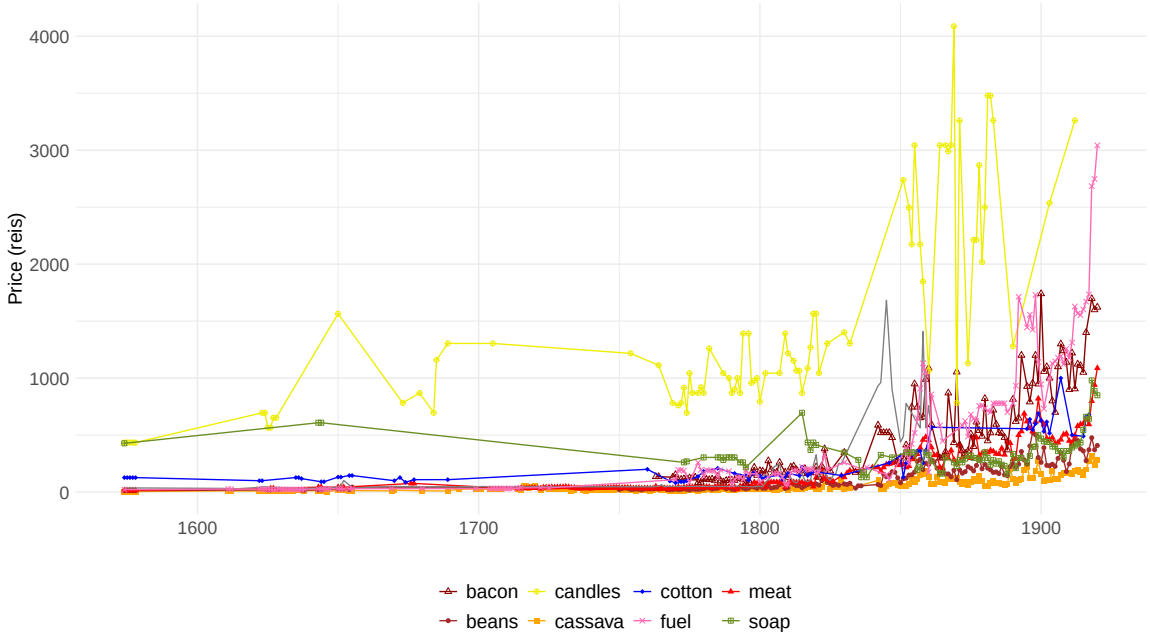


Figure D.1: Barebones basket item prices: bacon, beans, candles, cassava, cotton cloth, firewood, lamp oil, meat, and soap, 1574–1920.

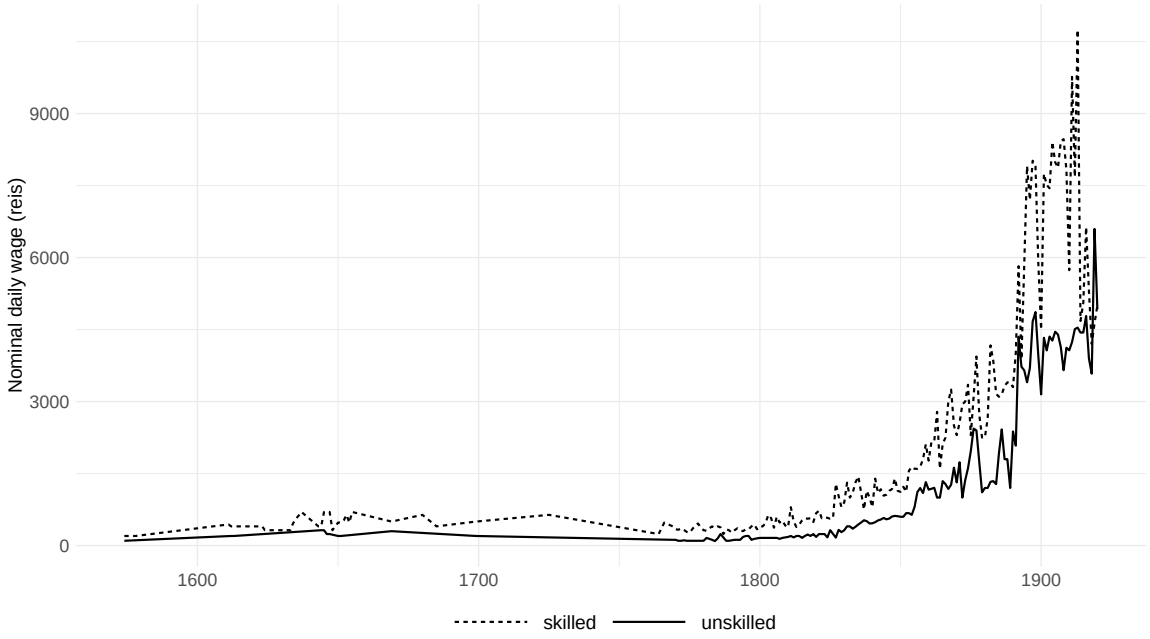


Figure D.2: Nominal daily wages (unskilled and skilled free males), 1574–1920.

Real wages Using the total price of the annual barebones basket for an adult individual, we deflate the nominal annual wage series to arrive at the real wage series.

E Robustness

Figure E.3 presents a robustness exercise for our GDP per capita estimates, varying five key parameters across plausible ranges. We consider three sets of demand elasticities: baseline ($\alpha = -0.4$, $\beta = 0.3$, $\chi = 0.1$), Allen ($\alpha = -0.6$, $\beta = 0.5$, $\chi = 0.1$), and low ($\alpha = -0.3$, $\beta = 0.25$, $\chi = 0.05$); three values for the inter-sectoral productivity gap $p \in \{0.60, 0.70, 0.80\}$; three values for the agricultural labor share $L_a/L \in \{0.70, 0.80, 0.90\}$; four slave share schedules s—baseline (25% until 1850), high (35% until 1850), low (15% throughout), all declining to 15% by 1872 and zero at abolition in 1888, and a no-slavery counterfactual (0% throughout); and two worker-class weight schemes for combining unskilled and skilled wages (80/20 and 90/10). The full factorial combination yields $3 \times 3 \times 3 \times 4 \times 2 = 216$ parameter configurations, each shown as a grey line. The black line denotes the baseline specification used throughout the paper. The narrow spread of the grey lines around the baseline indicates that our estimates are robust to substantial variation in all five parameter dimensions.

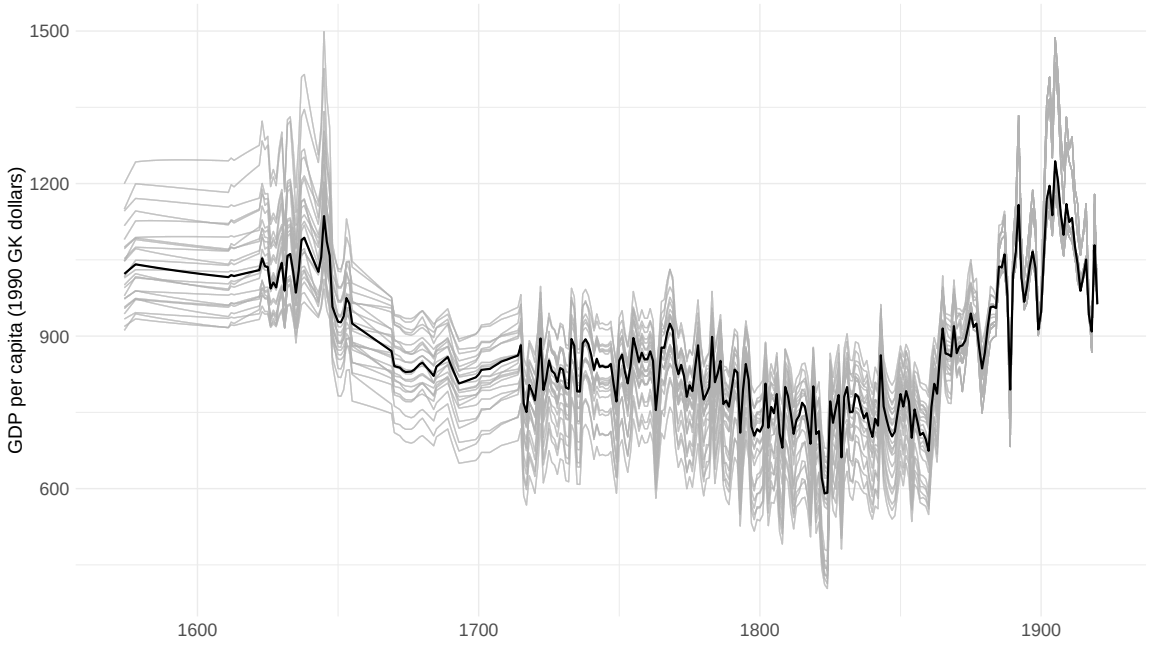


Figure E.3: Robustness of the GDP per capita series

Notes: GDP per capita in 1990 GK dollars. The black line is the baseline estimate in the main text. The grey lines are 216 combinations of different parameters for the elasticities, inter-sectoral productivity gap, agricultural labor share, and slave share (see text).

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