**Dutch Disease in the tropics: commodity booms and export growth in Brazil during the early nineteenth century**

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Abstract: This paper explores the hypothesis that during the nineteenth century Brazil’s export commodities were subjected to a perverse form of the Dutch Disease in which the foreign exchange returns of the coffee boom served to appreciate the exchange rate, effectively pricing the country’s other principal export commodities out of the international market. We construct a composite index of domestic prices for the period 1821-1870 and elaborate nominal and real effective exchange rates, export weighted by the geographic distribution of exports to 11 of Brazil’s principal trading partners. We then review the empirical evidence of Dutch Disease in Brazil, positing that it developed as a consequence of British West Indies slave abolition and the subsequent rise to dominance of Brazilian coffee.

**Introduction**

The traditional narrative of Brazilian export growth during the nineteenth century generally paints a pessimistic picture of the post-independence period. While the coffee sector was expanding rapidly, it had not yet reached the growth rates that would characterise the supposed late-nineteenth century ‘belle époque.’ The eighteenth century gold rush had subsided, and Brazil’s other principal export sectors, namely cotton and sugar, were gradually succumbing to creeping stagnation and decadence. Insurmountable trade costs derived from hostile geography and poor transport infrastructure, political and institutional instability, technological backwardness and a scarcity of manpower (free or enslaved) and capital are standard explanations of the Brazilian export performance experience of the post-independence period.

The recent reconstruction of Brazil’s export series from independence to the end of the first period of globalisation has put into question certain aspects of this traditional narrative. It is evident that the period preceding independence was more dynamic than the series based on official prices, and thus that previous interpretations of Brazilian export growth based on the official series had understated the degree of this dynamism. This finding complements a growing revisionist literature that emphasises the

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dynamism of the post-independence Brazilian economy. The roots of the observed export dynamism during this period are to be found in both the institutional changes taking place in the slave labour markets of the Caribbean and the development of Brazil’s factor endowment (specifically of land and labour). The abolition of slavery in the British West Indies and subsequent divergence in the export performances of Caribbean tropical agricultural producers was accompanied by the incredible expansion of Brazil’s slave labour force and area of cultivable land, which remained largely unrestrained by enforceable property rights institutions until mid-century. Amidst the turmoil of Brazil’s principal competitors, domestic agricultural producers rapidly responded to the country’s competitive advantage, yielding the export growth rates reported by the corrected series.

Table 1: Descriptive statistics of Brazilian export performance by commodity.

<table>
<thead>
<tr>
<th></th>
<th>1821-50</th>
<th>1850-70</th>
<th>1870-90</th>
<th>1890-13</th>
<th>1821-13</th>
<th>1850-13</th>
<th>1870-13</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Growth (constant prices)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td>9.72</td>
<td>2.98</td>
<td>2.03</td>
<td>4.34</td>
<td>5.09</td>
<td>3.08</td>
<td>3.19</td>
</tr>
<tr>
<td>Cotton</td>
<td>1.26</td>
<td>5.60</td>
<td>-6.52</td>
<td>4.90</td>
<td>1.38</td>
<td>1.46</td>
<td>-0.38</td>
</tr>
<tr>
<td>Sugar</td>
<td>4.57</td>
<td>0.13</td>
<td>0.28</td>
<td>-14.62</td>
<td>-2.06</td>
<td>-5.06</td>
<td>-7.53</td>
</tr>
<tr>
<td><strong>Composition of exports</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td>34.63</td>
<td>47.72</td>
<td>58.53</td>
<td>59.88</td>
<td>48.87</td>
<td>55.50</td>
<td>59.01</td>
</tr>
<tr>
<td>Cotton</td>
<td>9.06</td>
<td>12.42</td>
<td>7.11</td>
<td>2.01</td>
<td>7.55</td>
<td>6.85</td>
<td>4.45</td>
</tr>
<tr>
<td>Sugar</td>
<td>31.24</td>
<td>16.30</td>
<td>11.75</td>
<td>2.13</td>
<td>16.52</td>
<td>9.73</td>
<td>6.66</td>
</tr>
<tr>
<td><strong>World export share</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td>34.31</td>
<td>50.18</td>
<td>51.89</td>
<td>69.63</td>
<td>48.28</td>
<td>56.89</td>
<td>59.98</td>
</tr>
<tr>
<td>Sugar</td>
<td>10.33</td>
<td>7.39</td>
<td>4.02</td>
<td>1.86</td>
<td>6.89</td>
<td>5.16</td>
<td>3.42</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.03</td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Source: Absell and Tena, ‘Brazilian export growth.’ Composition of exports is the arithmetic average of annual data. The world export shares are arithmetic averages of quinquennial, annual, and decennial data, respectively.

However this is only one part of the story of Brazil’s export performance during the nineteenth century. While the slave emancipation shock and accompanying expansion of the slave labour force and the area of cultivable land may help to explain Brazil's initial export growth dynamism and the rapid expansion of its world export

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4 Indicators of such dynamism include the level of wealth-holding, the demand for traditional modes of transportation, and the activity in the market for informal loans. On each of these topics respectively, see Zephyr Frank, ‘Wealth Holding in Southeastern Brazil, 1815–60,’ Hispanic American Historical Review 85: 2 (2005), pp. 242-246; Herbert S. Klein, The Supply of Mules to Central Brazil: The Sorocaba Market, 1825-1880, Agricultural History, 64: 4 (Fall 1990), pp. 1-25; Joseph Ryan, ‘Credit where Credit is Due: Lending and Borrowing in Rio de Janeiro, 1802–1900,’ unpubl. PhD diss., UCLA, 2007.

market share, these factors do not account for the loss of competitiveness in certain export industries from 1850 onwards and the divergent export performance across commodities. As can be seen in Table 1, the export growth rates of Brazil’s three principal export commodities, coffee, cotton and sugar, diverged considerably across the century. While the rise of coffee constituted an incredible commodity boom that remained a fixture of the country’s export economy well into the twentieth century, both sugar and cotton (with the fleeting exception of the American Civil War) gradually faded from prominence. Such comparative export performance across commodities is reflected in Brazil’s commodity composition of exports as well as the share of each commodity in world exports.

With the exception of cotton, which was evincing signs of paralysis before Brazilian coffee truly became a world player, the opportunities afforded by the institutional turmoil in the Caribbean were available for the taking for all of Brazil’s principal tropical export commodities. As has been demonstrated by estimates of the number of slaves imported into Brazil and the number of sugar engenho and coffee fazenda registrations, the rapid increase in the availability of factors of production during the post-independence period was characteristic of both the north-eastern sugar and south-eastern coffee producing regions. Yet after the closure of the slave trade in 1850 the sugar and cotton plantations of the north-east lost most of their slave population to coffee fazendas in the south-east. This implies a loss of competitiveness of those sectors concentrated in the north-east, a loss that is reflected in the results of our constant market share analysis. So why did these sectors lose their initial competitive advantage? Was it the trend of international prices, the shifting sands of international demand, protectionist policy in the core, or the relative cost structure of production that created this divergence? Or was there something more sinister at play? Here we explore the roots of this divergent performance across commodities, paying particular attention to a hypothesis that has been posited in the literature: that Brazil’s other export commodities were subjected to a perverse form of the Dutch Disease in which the foreign exchange returns of the coffee boom served to appreciate the exchange rate, effectively pricing the other principal export commodities out of the international market.

The paper is structured as follows. In the next section we briefly outline the Dutch Disease hypothesis and the descriptive evidence from the literature. The following section concerns the construction of our principal variables of interest, the nominal (NEER) and real (REER) effective exchange rates. We then test the Dutch Disease hypothesis by examining the relationship between these exchange rates and export growth by commodity. The final section concludes.

**Dutch Disease in Brazil: conjectures from the literature**

Since the seminal work of W. Max Corden and J. Peter Neary on the macroeconomic effects of booming sectors, the literature on the phenomenon of the

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7 Absell and Tena, ‘Brazilian export growth,’ pp. 21-23. While coffee, cacao and sugar showed a positive competitiveness effect from 1821-1850, this effect would disappear around mid-century, reappearing again only in 1890-1821 in the cases of coffee and cacao and, in the case of cotton, during the American Civil War.
Dutch Disease or, in the words of Corden and Neary, ‘the coexistence within the traded goods sector of progressing and declining, or booming and lagging, sub-sectors,’ has expanded to constitute a booming sector in its own right. This literature generally distinguishes between two principal effects of a commodity boom. The first is the resource movement effect, in which the higher marginal product of the factors in the booming sector draws resources out of non-booming sectors. Thus capital or labour may be reallocated across sectors, generating growth in the booming sector and the stagnation or decline of non-booming sectors. The second effect concerns the impact of the boom on the demand for domestic non-tradeables, which increases as the result of higher real income. Rising demand results in internal inflation, which causes an appreciation of the nominal exchange rate thus pricing the non-booming sector out of the international market. Moreover, it is evident that such booms may also generate an excess demand or supply for money in the short run. A commodity boom will result in a balance of payments surplus and the accumulation of international reserves, increasing the monetary base and resulting in an excess supply of money. This will translate into inflation which will serve to appreciate the real exchange rate.

In the case of Brazil, it has been posited that during the nineteenth century Brazil’s export sectors were subjected to a perverse form of Dutch disease, in which the exchange rate, influenced heavily by a single export commodity, effectively priced Brazil’s other export commodities out of the world market. While the classic model of Dutch disease occurs across various sectors of the economy and results in a process of de-industrialisation, in Brazil this process took place within a single sector and across agricultural commodities. As Nathaniel Leff noted,

In reflection of Brazil’s stronger comparative advantage in coffee, the implicit sterling-milreis exchange rate ... was higher for coffee than for sugar or cotton ... Both regions, however, had to face the same foreign exchange rate. As coffee exports grew, they led to a higher exchange rate than would otherwise have prevailed. This affected adversely sugar and cotton, which required a lower sterling-milreis rate in order to export...

Indeed, Leff’s hypothesis regarding the relationship between coffee revenues and the nominal exchange rate has been confirmed for the second half of the nineteenth century. Cardoso demonstrated that the nominal exchange rate was primarily influenced by coffee export revenues. A percentage point increase in coffee export revenues was associated with a -0.62 decline in the milréis-sterling nominal exchange rate; that is, an appreciation. However, Cardoso did not explore the consequences of this relationship for Brazil’s other export sectors. Other indicators of the effects of Dutch Disease in Brazil during the nineteenth century may also be observed. The aforementioned relocation of slave labour, principally from sugar to coffee plantations, can be interpreted as a resource allocation effect, which, after slave abolition, continued to draw on immigrant labour. Indications of the spending effect are less clear cut. Indeed,

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it is evident that much of the return from coffee exports was absorbed by transport costs, intermediaries (comissários or ‘coffee factors’), and central or provincial governments (by way of export taxation). The effect of the coffee boom on internal demand was perhaps more discreet than theory suggests, the result of externalities in the form of the construction of infrastructure or the development of financial markets which effectively contributed to the expansion of the domestic market.12

Moreover, the Dutch Disease has been used as a causal explanation in other commodity case studies of the period. Leonardo Monastério provided a similar explanation for the decline of the jerked beef (charque) sector in Rio Grande de Sul, observing a negative relation between the price of jerked beef and the real exchange rate for the period 1837-1890, as well as a clear resource allocation effect in the form of the exportation of slave labour from Rio Grande de Sul to Rio de Janeiro.13 Bradford Barham and Oliver Coomes also observed evidence of Dutch Disease effects in the case of the Amazonian rubber boom. The boom negatively affected other export commodities of the region, such as rice and cacao, while the production of agricultural commodities produced solely for domestic consumption, such as manioc, tobacco and rum, increased, assumedly due to the spending effects of the boom.14

Despite the importance of the exchange rate to Brazil’s export performance during the nineteenth century, Leff’s observation regarding this important mechanism has, until now, gone untested.15 Here we take these observations seriously, and aim to test the hypothesis that Brazil’s overall export growth was negatively affected by a form of Dutch Disease in the tropical agricultural export sector. Before exploring this issue, however, we outline the procedure for elaborating our principal independent variables of interest: the nominal and real effective exchange rates.

A new effective exchange rate for Brazil during the nineteenth century

As mentioned above, the literature posits that the effective exchange rate acts as the main transmission mechanism from the booming sector to the rest of the economy. Thus we seek to construct a robust indicator of the effective exchange rate for Brazil. We are also interested in comparisons between nominal and real effective exchange rates in order to isolate price and competitiveness effects and to provide a comparison with previous studies that have relied on an analysis of the nominal rate. Given that our analysis will focus principally on the impact of the effective exchange rate on export growth across agricultural commodities, it is pertinent that our index be trade-weighted - specifically, export-weighted - to account for changes in the geographical distribution of Brazil’s exports over time.

In order to calculate the trade-weighted REER for Brazil, we must first overcome three major hurdles that have for a long time plagued researchers of

15 Leff did, however, include an examination of the determinants of the trend of sugar and cotton prices across the century, concluding that from 1874 to 1913 variations in the exchange rate were the most important determinant of these price trends. Leff , ‘Economic Development,’ p. 257.
nineteenth century Brazilian economic history. The first concerns the availability of bilateral trade statistics. Here we strive to present the most representative REER possible, and to do so we need bilateral trade data for Brazil’s principal trading partners during the period in question. Instead of examining the official sources of Brazil’s trading partners as has been done elsewhere,\textsuperscript{16} perhaps a limiting exercise especially before 1850, we mine the official Brazilian publications for bilateral trade data. While the accuracy of this data is extremely questionable,\textsuperscript{17} it gives an overall picture of the geographical distribution of Brazil’s exports. Data is available for the periods 1836, 1841-1872, 1879-1891, and 1901-1913. The intervening periods have been interpolated. Although the interpolation of bilateral trade data is empirically questionable, we are principally interested in the long-run trend of the geographic distribution of Brazil’s exports, and we assume no major changes during the periods of interpolation. Moreover, the figure for 1836 has been assumed for the period from 1821-1836. We hope to provide a more precise estimation of the geographical distribution of exports for this earlier period in the second revision of this paper, although it is doubtful whether the distribution of Brazil’s exports changed much during the first 15 years of independence.

Table 2: Trading partner sample, Brazilian exports, 1836-1913

<table>
<thead>
<tr>
<th>Country</th>
<th>Period</th>
<th>Percentage of trade</th>
<th>1836</th>
<th>1870</th>
<th>1913</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>1835-1913</td>
<td></td>
<td>3.37</td>
<td>0.92</td>
<td>2.56</td>
</tr>
<tr>
<td>Chile</td>
<td>1830-1913</td>
<td></td>
<td>0.34</td>
<td>0.73</td>
<td>0.28</td>
</tr>
<tr>
<td>Denmark</td>
<td>1821-1913</td>
<td></td>
<td>3.09</td>
<td>0.15</td>
<td>0.23</td>
</tr>
<tr>
<td>France</td>
<td>1821-1913</td>
<td></td>
<td>4.84</td>
<td>9.67</td>
<td>12.28</td>
</tr>
<tr>
<td>Germany</td>
<td>1821-1913</td>
<td></td>
<td>8.23</td>
<td>5.38</td>
<td>14.07</td>
</tr>
<tr>
<td>Great Britain</td>
<td>1821-1913</td>
<td></td>
<td>24.95</td>
<td>43.41</td>
<td>12.69</td>
</tr>
<tr>
<td>Italy</td>
<td>1861-1913</td>
<td></td>
<td>--</td>
<td>0.99</td>
<td>1.29</td>
</tr>
<tr>
<td>Portugal</td>
<td>1833-1913</td>
<td></td>
<td>6.87</td>
<td>5.39</td>
<td>0.50</td>
</tr>
<tr>
<td>Spain</td>
<td>1821-1913</td>
<td></td>
<td>1.92</td>
<td>1.75</td>
<td>0.54</td>
</tr>
<tr>
<td>Sweden and Norway</td>
<td>1830-1913</td>
<td></td>
<td>5.66</td>
<td>0.32</td>
<td>1.01</td>
</tr>
<tr>
<td>United States</td>
<td>1821-1913</td>
<td></td>
<td>17.56</td>
<td>28.61</td>
<td>32.42</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td>76.82</td>
<td>98.33</td>
<td>78.87</td>
</tr>
</tbody>
</table>


The extent of our trading partner sample is limited by the availability of domestic price data. We need wholesale or (preferably) consumer price indices in order to deflate the nominal exchange values for each country included in the sample. In some cases (France, Spain), however, we were obliged to resort to the use of wholesale indices due to the paucity of data available for the earlier years. For this first version of the paper we were able to gather data for 11 of Brazil’s trading partners, as displayed in Table 2. As can be seen, at worst, our sample covers around three-quarters of Brazil’s


\textsuperscript{17} Absell and Tena, ‘Brazilian export growth,’ p. 21, ft 72.
export trade and, at best, we are close to assembling a complete series.\textsuperscript{18} It is, to our
knowledge, the most comprehensive, and thus representative, sample of trading partners
used for the elaboration of the nineteenth century Brazilian effective exchange rate.\textsuperscript{19}

\textit{Table 3: Commodity composition of wholesale price index, Brazil, 1821-1913.}

\begin{tabular}{ll}
\hline
\textbf{INT} & \\
1821-1869: Lobo et al index (1919 weights): sugar, rice, cod fish, coffee, dried beef, wheat flour, mandioc flour, beans, butter. & \\
1870-1913: Catão index: cotton, rice, wheat, manioc, coffee, pinewood, beans, tobacco, corn, herva mate, cocoa, sugar-cane, refined sugar, brandy, processed rice, cod fish, lard, tar, kerosene, dried meat, beer, cement, leather and skins, manioc flour, wheat flour, wine, matches, butter, grease, capital goods, pasta, textiles, processed coffee, cigarettes. & \\
\hline
\textbf{IMP} & \\
1821-1850: Federico-Tena: Irish beef, cotton textiles, wine. & \\
1851-1869: British exports: guns, gunpowder, beer and ale, coal, coke and manufactured fuel, cotton manufactures, hardwares and cutlery, leather, linen manufactures, iron, copper, lead, linseed oil, woolen manufactures, cheese, brandy, tea, tobacco, wine. & \\
\hline
\textbf{EXP} & \\
\hline
\end{tabular}

\textit{Sources:} Lobo et al, ‘Evolução dos preços”; Catão, ‘New wholesale price index”; Federico and Tenajunguito, ‘World Trade”; United Kingdom, Annual Statement, various years; Absell and Tena-Junguito, ‘Brazilian export growth.’

Here we are confronted by our second challenge: the elaboration of a reliable domestic price index for Brazil. Luckily, we are blessed with the work of Luis Catão, whose wholesale price index is sufficiently representative and realistically weighted to be confidently used. The Catão index, however, only covers the period from 1870 onwards (the commodity composition of this index is shown in Table 3).\textsuperscript{20} The earlier period, which covers the rise to dominance of the coffee sector and thus a vital period of interest for our study of the Dutch Disease effect, is missing a comparatively robust estimation of internal price tendencies. Existing price indices, while being important contributions, are either not sufficiently representative, do not cover the entire period in question, or are based on questionable assumptions.\textsuperscript{21} The most commonly used in Brazilian historiography, elaborated by Eulalia Lobo and co-authors, while covering

\textsuperscript{18} The revised version of this paper will include other important trading partners such as Argentina and Austria-Hungary.

\textsuperscript{19} Catão and Solomou’s NEER and REER for Brazil for the period 1870-1913 contained five trading partners: Argentina, France, Germany, Great Britain, and the United States. See Catão and Solomou, ‘Effective exchange rates.’


over a century (1820-1930), contains an extremely limited commodity coverage (minimum of 3, maximum of 9) and a questionable weighting system. In order to obviate the problems of data scarcity and coverage, we have constructed a composite index of three separate price indices that presents are more balanced (but still somewhat problematic) view of price tendencies during this period. We combine the Lobo index with a new import price index for this period as well as an export price index for a number of selected commodities that were present in the domestic consumption basket (according to Catão).

The issue of a reliable import price index is our third major hurdle. For much of the period under question, available Brazilian sources do not list both the quantity and value of principal imports. When available, the resulting unit value calculations differ widely from their British equivalents. This is most likely due to the reliance of customs officials upon an official price list of importable commodities that was modifiable only by Act of Parliament. Thus, even with comprehensive archival work, it is unwise to solely rely upon Brazilian sources for an accurate import price series. Here we follow the work of Ronaldo Gonçalves, who calculated an import price index for the period 1850-1913 using the unit values and quantities of British exports to Brazil. We differ somewhat in our treatment, however, for, unlike Gonçalves, we use imports by value from the Brazilian sources to calculate the weighting system. While perhaps calculated using inaccurate official price lists, the use of these values provides a snapshot of the overall importance of each commodity in Brazil’s imports, rather than merely the weight of such commodities in British exports. Furthermore, following Catão, to these prices we have added the respective ad valorem tariff of each commodity in order to provide a more balanced representation of the cost of these goods in the Brazilian domestic market.

Reliable import prices before 1850 for Brazil are extremely scarce. We thus use the import price index constructed by Giovanni Federico and Antonio Tena-Junguito. While this index only contains prices for three commodities (the original contains a

22 Lobo et al., ‘Evolução dos preços.’
26 The import price index is a Fisher price index using annual import values by commodity from United Kingdom, Annual Statement of the Trade of the United Kingdom with Foreign Countries and British possessions, various years. Data for ad-valorem tariffs comes from a variety of sources, including John MacGregor, Commercial Statistics: A digest of the productive resources, commercial and financial legislation &c. of all nations, Vol. IV.1 (London: Whitaker and Co., 1850), pp. 234-238; United Kingdom, Return of rates of duty on principal articles of British and Colonial produce and manufactures levied by tariffs of foreign countries, various years; Brazil, Tarifa das alfandegas do Imperio do Brasil. (Rio de Janeiro: Typographia Nacional, various years); and Brazil, Tarifa das alfandegas. Rio de Janeiro: (Typographia da Alfandega do Rio de Janeiro, various years). During certain periods tariffs were presented in both specific and ad-valorem forms, assumedly to give Brazilian customs officials leeway in the event of sudden changes in import prices, given that the revenue derived from the taxation of imports was an important part of the both the Imperial and Republican government’s revenue structure. However, we use only the ad-valorem rates, given that we possess no indication of when specific rates were applied and lack a full series of these rates over the period in question.
fourth, wheat flour, which has been removed due to its inclusion in the Lobo et al index), two of these commodities (cotton textiles and wine) accounted for around 20 and 13 per cent of Rio’s imports by value in 1836 and 1849-50, respectively. So while the index is by no means comprehensive, it does represent a number of the most relevant goods for internal consumption missing from the Lobo et al index. Additionally, to this mix we add a selection of export commodities not present in the Lobo et al or Federico-Tena indices, namely raw cotton, cocoa, hides and rubber (after 1850 due to the scarcity of price data before this year). This data comes from Absell and Tena-Junguito, and represent not the official values of exports given in Brazilian sources but rather the corrected values based on international prices. From the new indices we have removed the commodities that appear in the original Lobo et al index in order to prevent double counting (butter and rice from the British series; coffee and sugar from the corrected export series; see Table 3).

Figure 1: Distribution of indices in composite index, Brazil, 1821-1913.

In order to unite these three separate indices, we have constructed a composite index using a simple weighting system. Given that each index is weighted separately according to individual criteria, the composite index merely weighs each element by the number of commodities contained in each index. This is essentially the equivalent of a Paasche index with current period weights. As can be seen in Figure 1, the elaboration of a Laspeyres index using fixed base period weights is problematic due to the periodic changes in the distribution of the commodity composition of the index. A number of caveats are in order here. The Lobo et al index, like the Catão wholesale price index,

28 Sturz, Review, p. 101; Brazil, Ministerio da Fazenda, Proposta e Relatorio do anno 1855, pp. 33-61.
29 Absell and Tena-Junguito, ‘Brazilian export growth,’ p. 38. A second revision of this paper will include import prices of goods from Great Britain for the period 1827-1835, as well as data from Brazilian sources for the 1840s.
30 In this sense we avoid the pitfalls of the construction of a consumption basket based on assumptions derived from scarce qualitative data. See the recent debate on this issue in Revista de Historia Económica / Journal of Iberian and Latin American Economic History, 33:1 (2015). However, this will bias the index in the sense that tradable goods will perhaps be excessively weighted. This is an issue we hope to address in future revisions of the paper.
represents the prices of commodities in Rio de Janeiro. However, a case can be made for taking these prices as being representative on a national level, given Rio’s geographical primacy during the period in question.\(^{31}\) Additionally, one might argue that the index gives excessive weight to tradable goods. Given qualitative observations on the level of industrialization and (under-)development of the internal market, especially prior to mid-century, however, it seems that many of the commodities in the domestic consumption basket, particularly manufactured or refined versions of domestically produced goods, were principally supplied by way of importation, especially in those coastal cities that possessed greater market access. Finally, again regarding the Lobo et al index, we have chosen to utilise a weighting system based on a consumption basket observed in 1919, far from the period in question. The alternative weighting system of 1856, however, is based solely on a single company (Companhia de Luz Stearica) and thus its representativeness is extremely questionable.

*Figures 2.1 and 2.2: Wholesale price level estimate and elements of composite index, Brazil, 1821-1913*

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\(^{31}\) Catão, ‘New wholesale price index,’ p.521.
gradual inflation of internal prices (INT) and the post-Napoleonic War deflation of export prices (EXP). Import prices (IMP), on the other hand, follow a steady trend before spiking up alongside export and internal prices during the War of the Triple Alliance and the American Civil War in the 1860s. Thus the addition of the export and import series serves to offset the inflationary bias of the Lobo et al series.

The final step in the calculation of the trade-weighted effective exchange rates is to obviously collect the relative nominal exchange rates for Brazil and its principal trading partners. In some cases (pre-unification Italy, Portugal) nominal exchange rates were unavailable, further limiting our sample. As mentioned previously, we calculate a trade-weighted nominal effective exchange rate (NEER), unadjusted for inflation as well as a trade-weighted real effective exchange rate (REER).

Nominal and real effective exchange rates and the Dutch Disease in Brazil, 1821-1870

Figure 3 compares the logs of our NEER and REER indices, defined in milréis per foreign currency unit terms. A rise (fall) of the index signifies a depreciation (appreciation) of the milréis relative to our sample of foreign currency units. The general trend of the indices is comparable to Catão and Solomou’s findings for Brazil during the period 1870-1913. However, our effective exchange rate indices span a greater period of time and include a larger sample of trading partners. Given the literature’s focus on the post-1870 ‘belle époque’ period, for this first version of the paper we choose instead to explore the earlier, post-independence period until 1870. Here we merely aim to provide a number of descriptive observations as to the relationship between the exchange rates and export performance by commodity. Future versions of the paper will include more rigorous econometric analysis.

Figure 3: Trade-weighted real effective exchange rate and nominal exchange rates, milréis per foreign currency unit, Brazil, 1821-1913.

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To begin with, we consider the demand conditions during this period. Changes in the demand for Brazil’s export commodities, or the tariff policies adopted by Brazil’s principal trading partners, may serve to explain Brazil’s divergent export performance across commodities. Indeed, demand for Brazil’s export commodities increased during the nineteenth century alongside income growth in the core countries. Our constant market share analysis showed that during the nineteenth century (1821-1913), ‘world’ demand for cotton and sugar was the driving force behind export growth, although negative competitiveness effects were just as important and served to offset increased demand. In the case of coffee, the competitiveness effect was more important, especially in the periods 1821-1850 and 1890-1913, a conclusion also confirmed to a certain extent by the REER trend.\textsuperscript{33} What were the determinants of this competitiveness effect? Was it related to protectionist policy in the core? Did coffee enjoy greater market access than sugar and cotton? In terms of protectionist policy, it is evident that these commodities enjoyed (or suffered from) more or less the same levels of market access during the post-independence period. For most of this period, Great Britain was the principal market for Brazilian sugar.\textsuperscript{34} The commercial treaties forged between the two countries after independence and the destruction of the Portuguese trade monopoly, however, were somewhat asymmetrical in character. It has been argued that this asymmetry was partly responsible for the poor performance of Brazilian exports during the first half of the century.\textsuperscript{35} As Paulo Batista Jr. has shown, British colonial preferences served to exclude non-colonial sugar and coffee producers from the British market until the passage of the Sugar Act in 1846. Batista calculated an ad valorem equivalent of 475 and 266 per cent on the eve of the Sugar Act for imports of Brazilian sugar and coffee, respectively.\textsuperscript{36} With respect to coffee, given the British preference for tea, the United States emerged to become Brazil’s most important client.\textsuperscript{37} As Catão demonstrated, in the second half of the century the price and value of Brazilian coffee largely followed the dictates of US national income.\textsuperscript{38} US duties for coffee declined from five cents a pound to duty free status after 1832.\textsuperscript{39} Brazilian sugar did not achieve similar levels of market access until the reciprocal treaty of 1891, although duties on

\textsuperscript{33} World demand is proxyed by exports of 55 countries from Federico and Tena-Junguito, ‘World Trade.’ For the elaboration and results of the constant market share analysis, see Absell and Tena-Junguito, ‘Brazilian export growth,’ pp. 21-23 and appendix 3.

\textsuperscript{34} Importing in 1846-47 around 20 per cent of Brazil’s sugar alongside other important importers such as Austria and Portugal, in 1900 close to 25 per cent, although by the turn of the century the United States had replaced Great Britain as the principal destination for both sugar and coffee exports. Brazil, \textit{Collecção de mappas estatisticos do commercio e navegação do Imperio do Brasil}, (Rio de Janeiro: Typographia Nacional, 1853), pp. 377-378; Brazil. \textit{Commercio exterior do Brazil (1900), Boletim do serviço de estatistica comercial da Republica dos Estados Unidos do Brazil}, (Capital Federal: s.n., jun. 1900), p. 14.


\textsuperscript{36} A similar tendency can be observed for French colonial preferences, although France occupied a lesser share of Brazil’s exports during this period, 2 and 7.5 percent of Brazilian sugar and coffee exports, respectively. Brazil, \textit{Collecção de mappas}, pp. 377-378.

\textsuperscript{37} In 1846-47 the US already imported around 42 per cent of Brazil’s coffee exports. This would increase to 75 per cent around the turn of the century. Brazil, \textit{Collecção de mappas}, pp. 377-378; Brazil. \textit{Commercio exterior do Brazil}, p. 14.

\textsuperscript{38} Catão, ‘Failure of export-led growth,’p. 9.

\textsuperscript{39} Topik, p.24.
cane sugar decreased from three cents per pound in 1816 to 0.75 cents in 1861. However, the US was a relatively unimportant market for Brazilian sugar during the post-independence period, occupying only 3 per cent of Brazilian exports around mid-century. Thus sugar’s restricted US market access should not have weighted as heavily upon export performance as that of its restricted access to the British market. As far as competition is concerned, however, sugar was at a distinct disadvantage. While the aftermath of slave emancipation allowed Brazil to rapidly expand its export market share of coffee, in the case of sugar a similar trend could be observed for Cuba. While the determinants of the formation of Cuba’s comparative advantage is outside the scope of this first version of the paper, it is evident that the country’s competitive advantage allowed it to fill the gap in the market left by British West Indies producers. Moreover, the cane sugar industry was stricken by a substitution effect which came in the form of the development of European beet production throughout the century.

In such a context, we now explore whether the Dutch Disease effects described in the literature served to contribute to the competitive disadvantage of Brazil’s export commodities. Firstly, we seek to confirm the influence of coffee export revenues on the nominal effective exchange rate. As mentioned previously, Cardoso found strong evidence of a negative correlation between the nominal exchange rate and coffee export revenues, defined in terms of constant values. We attempt to reproduce these results for the period from independence to mid-century. Cardoso defined a model that predicted that the nominal exchange rate was a function of wages, monetary policy, coffee export revenues and international prices. Using an instrumental variables approach, she regressed the log of the nominal exchange rate (E) over the logs of food prices (the Lobo et al index, W), monetary policy (a rough estimate of M1, H), British import prices (P*), and the export quantities of coffee and rubber (X). We have followed this methodology, with a few modifications. To begin with, instead of using export quantities, we use the value of coffee exported in current prices from our corrected series (lnV). This is important given that we are interested in the price effects of the NEER. Furthermore, for best fit purposes we use the lag of monetary policy. For international prices we use our new import price index. Additionally, we examine two periods: one which includes the turbulent period of the 1860s and another which omits it.

The results, as displayed in Table 4, confirm the direction and significance of Cardoso’s results for the later period. The strength of the coefficient of V is slightly smaller than later in the century, however, perhaps due to the fact that the coffee export sector occupied a lesser share of Brazil’s export composition during the earlier period. Furthermore, the impact of the 1860s only seems to marginally affect the size of the coefficients. Still, it’s clear that coffee exports were associated with nominal exchange rate appreciation in the post-independence period.

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41 Brazil, Collecção de mappas, pp. 377.
44 Cardoso, ‘Exchange rates,’ p. 175.
Table 4: Determinants of the nominal exchange rate, 1821-1870.

\[
\text{LnE} = \alpha_0 + \alpha_1 \ln W + \alpha_2 \ln H + \alpha_3 \ln V + \alpha_4 \ln P^* 
\]

<table>
<thead>
<tr>
<th></th>
<th>(\alpha_0)</th>
<th>(\alpha_1)</th>
<th>(\alpha_2)</th>
<th>(\alpha_3)</th>
<th>(\alpha_4)</th>
<th>(R^2)</th>
<th>DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1821-1860</td>
<td>5.47</td>
<td>0.26</td>
<td>0.38</td>
<td>-0.41</td>
<td>-0.58</td>
<td>0.75</td>
<td>1.10</td>
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<tr>
<td></td>
<td>(3.86)</td>
<td>(2.57)</td>
<td>(3.68)</td>
<td>(-4.68)</td>
<td>(-2.89)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1821-1870</td>
<td>4.95</td>
<td>0.28</td>
<td>0.33</td>
<td>-0.36</td>
<td>-0.46</td>
<td>0.79</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>(4.95)</td>
<td>(2.99)</td>
<td>(3.61)</td>
<td>(-4.82)</td>
<td>(-3.36)</td>
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</tbody>
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Given this observation, how did the nominal exchange rate, heavily influenced by the growth of the coffee sector, affect Brazil’s other export commodities? There are two relevant questions to be asked here. The first, most obviously, is did the Dutch Disease actually occur during this earlier period? The second is, if so, when did it begin? Beginning with the second question, we posit that the process emerged from the institutional turmoil of the post-independence period in the Caribbean and the subsequent definition of Brazil’s competitive advantage in coffee. It is precisely during this period that one observes a heightening of the accumulation of factors of production in Brazil.\(^{45}\) Furthermore, as the differential between the NEER and REER demonstrates, the considerable depreciation of 1826-1829 would have served to increase the competitiveness of Brazil’s exports in trading partner markets. Although this competitiveness declined during the decade of slave emancipation, perhaps due to the impact of emancipation on the prices of tropical agricultural commodities, it would return in 1840 and remain a characteristic of Brazil’s export performance until the 1860s. In fact, although the price hikes generated by the slave abolition shock served to reduce competitiveness, Brazil remained competitive relative to its principal tropical competitors. Figure 4 shows the prices of a select number of commodities of Brazil’s principal tropical competitors from 1830-1850, encompassing the slave abolition shock and its aftermath. While British West Indies producers, represented here by Jamaica and British Guiana, experienced steep and enduring price increases after slave abolition, the stubborn slave economies of Brazil and Cuba remained relatively unscathed.\(^{46}\) As

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shown by the trend of the REER, these relative price changes translated into increased competitiveness, driving export growth and resulting in a greater export market share.

*Figure 4: Price of coffee, cotton and sugar, various countries, 1830-1850.*

Assuming that this period provides the catalyst for the definition of Brazil’s competitive advantage in coffee, we posit that one should observe signs of the Dutch Disease after full emancipation occurred in the British West Indies in 1833. Figures 5.1 and 5.2 lend descriptive support to these hypotheses. The first shows Brazil’s NEER (left hand axis) graphed alongside the world export share of four of Brazil’s products: cacao, coffee, cotton, and sugar. In the cases of sugar and cotton we see a clear negative trend after the great depreciation of 1826-1829. Beforehand, however, sugar showed a slightly positive trend; it is not until the late 1830s that sugar’s share in world exports began to decline. Similarly for cotton, although we only possess decennial estimations, we see a one percentage point decline between 1830 and 1840 to a level that was maintained during the rest of the period, with the brief interlude of the American Civil War. The trend of cacao is ambiguous; even though, like cotton, it only occupied a minor share of world exports, unlike cotton this share increased slightly over the period. The second figure again shows the NEER (left hand axis) graphed alongside the shares of each product in the commodity composition of Brazil’s exports. This Figure perhaps gives a clearer indication of the conditions surrounding the development of the Dutch Disease in Brazil. After the sharp depreciation of 1826-1829, both sugar and cotton show signs of declining shares. Sugar, however, manages to maintain its share until the later 1840s when it shows a clear decline. Again the case of cacao is difficult to include in the narrative of Dutch Disease, as it more or less maintained its possession in the composition of Brazil’s exports during the period under consideration.

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Conclusions

Although the descriptive evidence points to the development of Dutch Disease and its dissemination throughout the export sector, such evidence is not conclusive. While it is evident that the shock of British West Indies slave emancipation led to the
development of Brazil’s comparative advantage in coffee, it is not certain whether the resulting relationship between coffee exports and the trend of the effective exchange rate were the principal determinant of the decline of Brazil’s other export sectors. Certain aspects of the Dutch Disease argument don’t square up. What about the case of cacao? Why did it not follow the decline of Brazil’s other dominant export sectors? Was the decline of sugar really due to Dutch Disease effects, or was it simply because cane producers couldn’t compete with more innovative tropical agricultural producers and European beet production? We aim to address these questions in the second version of this paper.