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Título de la comunicación: BRAZILIAN EXPORT GROWTH AND DIVERGENCE IN THE TROPICS, 1821-1913

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Brazilian export growth and divergence in the tropics, 1821-1913

Abstract

The objective of this paper is to reappraise both the accuracy of the official export statistics and the conventional narrative of Brazilian export growth during the long nineteenth century. We undertake an accuracy test of the official values of Brazilian export statistics and find evidence of considerable under-valuation. Once corrected, Brazil's export growth during the post-independence decades is found to be more dynamic than the official series and conventional narrative suggests. We argue that this dynamism was driven by exogenous institutional shocks that afforded Brazil a temporary competitive advantage over other tropical agricultural producers and a subsequent endogenous response that took the form of rapid factor endowment expansion.

Introduction

While the export sectors of many Latin American and Caribbean countries languished during the lost decades of post-independence institutional turmoil, conventional wisdom suggests that Brazil emerged from this period relatively unscathed. As Leandro Prados de la Escosura noted, in the context of Latin American independence, Brazil provided '… a counterpoint of stability and gradual institutional transition while opening up to international commodity and factor markets.'[1] This exceptional performance has been attributed to two principal factors. The first is the relatively smooth transition from colonial dependency to independent nation: Brazil was not subjected to the institutional shocks that bombarded other countries. The second is the richness and relative superiority of Brazil's factor endowment: in the context of the primary product-producing periphery, Brazil was a clear winner of the commodity lottery. Add to this steadily improving terms of trade across the century and an expanding market for its tropical agricultural commodities in industrialising Europe and its richer offshoots, and the recipe for Brazil's relative success seems unambiguous.

Such a perspective, however, is somewhat at odds with the traditional narrative of Brazil's export performance. Although the process of independence was not overwhelmingly detrimental to export growth, the first few decades of independence were anything but dynamic.[2] As classic studies by Caio Prado Júnior and Celso Furtado both indicated, this was largely due to the stagnation and decadence of the previously dominant sugar and cotton export industries. Furthermore, according to this narrative, export growth was impeded by other factors including seemingly insurmountable internal trade costs, political and institutional instability, technological backwardness and the profound scarcity of factors of production.[3] This panorama would change during the second half of the century, when Brazil entered a "novo equilíbrio econômico" in which coffee was the principal protagonist in the growth of the quantum and value of the country's exports.[4] Yet export growth during the post-independence decades leading to mid-century is perceived as anything but the halcyon days of the 1890s.

This paper puts into question the equivocal pessimism of the traditional narrative. When reappraised and put into comparative perspective, it becomes apparent that Brazilian export growth was anything but stagnant. The fault lies not in the literature's interpretation of Brazil's export performance, but rather in a bias that is apparent in the official statistics. While the analysis of Brazilian export growth during this period has been based on the official export statistics, the accuracy of these statistics has not been definitively assessed. As we shall see, the

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1 Leandro Prados de la Escosura, 'Lost Decades? Economic Performance in Post-Independence Latin America,' *Journal of Latin American Studies* 41 (2009), p. 281. Although independence has been recognised as a costly process in terms of the temporary loss of fiscal sovereignty due to the payment of indemnities to Portugal and the continuation of a tariff agreement with Great Britain, this was offset by preferential access to the markets of its principal trading partners. On the fiscal impact of independence, see Marcelo de Paiva Abreu and Luiz Aranha Correa do Lago. (1997). Property rights and the fiscal and financial systems in Brazil: colonial heritage and the imperial period. Texto para Discussão No. 370. Departamento de Economia PUC-Rio. pp. 16-18. For the case of Great Britain see Manchester, A. (1933) British Preeminence in Brazil, its Rise and Decline: A study in European Expansion. Chapel Hill: University of North Carolina Press, pp. 70-98. United States import duties for coffee also declined considerably during the decades following independence, dropping from five cents a pound in 1814 to exemption after 1832. See Steven Topik, 'The World Coffee Market in the Eighteenth And Nineteenth Centuries, from Colonial To National Regimes,' London School of Economics, Department of Economic History, Working Papers of the Global Economic History Network, No. 04/04, 2004, p. 23.

2 Stephen Haber and Herbert S. Klein. (1997). 'The economic consequences of Brazilian independence.' In Stephen Haber (ed.) *How Latin America Fell Behind: Essays on the Economic Histories of Brazil and Mexico, 1800-1914*. Stanford: Stanford University Press, p. 249.

3 Celso Furtado. (1962). *Formación económica del Brasil.* México D. F.: Fondo de Cultura Económica. pp. 113-123.

4 Caio Prado Júnior. (1990). *História Econômica do Brasil, 38ª edição.* São Paulo: Editora Brasiliense. pp. 192-204.

official values of Brazilian export statistics demonstrate a bias that distorts our understanding of Brazil's export performance during the first half of the nineteenth century. This performance was indeed exceptional, although it was driven by factors that would impede the long-term development of the rest of Brazil's economy. We argue that the institutional shock of slave emancipation provided Brazil a competitive advantage that incentivised producers to expand the country's factor endowment. This initial dynamism would be offset by endogenous factors that led to increased specialisation, much to the detriment of Brazil's long-run growth prospects.

The paper is structured as follows. The next section focuses on the reconstruction of Brazil's export statistics and the reappraisal of the country's export performance. We then place this performance in comparative perspective and explore the institutional shock and factor endowment hypotheses. The fourth section applies these hypotheses to the empirical findings of our study. The final section concludes.

The reconstruction of Brazil's export statistics

Foreign trade statistics are perhaps unique in the statistical universe for being a useful case of double accounting: the quantity and value of imported and exported commodities appear in records of differing nationalities. This allows for a comparison of these records in order to ascertain the accuracy of origin or destination statistical sources. Unfortunately, at least for the period under examination, there existed no homogeneous international classification system regulating foreign trade statistics. The absence of such regulation engendered a debate regarding the reliability of these statistics.[5] Oskar Morgenstern's observation that 'Writers on all phases of foreign trade will have to assume the burden of proof that the figures on commodity movements are good enough...'[6] has since led to a substantial amount of quantitative soul-searching by economic historians and students of international trade. Although D .C. M. Platt was slightly less pessimistic about Latin American trade statistics, his conclusions were still disheartening.[7] Over the last few years the countries of Latin America and the Caribbean have been subjected to an audit of their historical foreign trade statistics.[8] Much of this work has contradicted Morgenstern and Platt's pessimistic view of the reliability of these statistics.

Brazil's historical foreign trade statistics, while being included in a number of these studies, have not been conclusively evaluated. Certainly a number of scholars have recognised and attempted to correct the limitations of these statistics. This work includes the correction of the inclusion of bullion in the official series of exports and imports[9] and the examination of the

5 The pessimistic perspective is most eloquently articulated in Oskar Morgenstern. *On the Accuracy of Economic Observations*. (Princeton: Princeton University Press, 1963); for the optimistic perspective, see Giovanni Federico and Antonio Tena-Junguito. 'On the Accuracy of Foreign Trade Statistics (1909-1935): Morgenstern Revisited,' *Explorations in Economic History*, 28 (1991), pp. 259-273.

6 Morgenstern, *op. cit.,* p. 180.

7 D. C. M. Platt, 'Problems in the Interpretation of Foreign Trade Statistics before 1914,' *Journal of Latin American Studies,* 3: 2 (1971), pp. 119-130.

8 For example, see Sandra Kuntz Ficker. 'Nuevas series del comercio exterior de México, 1870–1929.' R*evista de Historia Económica/Journal of Iberian and Latin American Economic History*, 20 (2002), pp. 213-270; Maria del Mar Rubio and Mauricio Folchi. 'On the Accuracy of Latin American Trade Statistics: a Nonparametric Test for 1925,' Universitat Pompeu Fabra. Departament d'Economia i Empresa Working Paper, 2005; Anna Carreras-Marín and Marc Badia-Miró. 'La fiabilidad de la asignación geográfica en las estadísticas de comercio exterior: América Latina y el Caribe (1908–1930),' *Revista de Historia Económica/Journal of Iberian and Latin American Economic History*, 26: 3 (2008), pp. 355-373; Antonio Tena-Junguito and Henry Willebald. 'On the accuracy of export growth in Argentina, 1870-1913,' *Economic History of Developing Regions*, 28: 1 (2013), pp. 28-68.

9 Luiz Aranha Correa do Lago. 'Balança comercial, balanço de pagamentos e meio circulante no Brasil no Segundo Império: uma nota para uma revisão,' *Revista Brasileira de Economia*, 36: 4 (1982), pp. 489-508; *O comércio exterior do Brasil no Segundo Império: uma reavaliação*. (Rio de Janeiro: Fundação Getulio Vargas, 1986); Gustavo Henrique Barroso Franco. 'O balanço de pagamentos do Brasil, 1870-1896: novas estimativas,' Texto para Discussão No. 201. Departamento de Economia PUC-Rio, 1988.

accuracy of the official value of exports.[10] These studies, however, have only focused on certain periods, and have not definitively addressed problems involving the value and destination of official export statistics. Here we focus primarily on the accuracy of the official values.

During the period under study, the official values of exports were fixed by the *pauta semanal*, a price schedule issued on a weekly basis by a government committee in consultation with local commodity brokers and commercial associations. The average weekly market prices of each commodity included in the nomenclature of the *pauta* were 'verified' in the market before being published and sent to the Ministry of Finance, provincial customs houses and major periodicals.[11] Export duties were collected at the port of shipment by applying the values listed in the *pauta* to the quantities given in the manifests of the ocean going vessels.[12] Until the end of the nineteenth century the values used to calculate export statistics were those fixed by the *pauta*.[13] Any bias in the official price schedule would thus be reflected in the statistics. In 1900, after publishing his landmark study of 1896, *Brazilian Exchange: The Study of an Inconvertible Currency*, the British civil engineer J.P. Wileman was contracted by the Brazilian Ministry of Finance to assist in the modernisation of the state's statistical apparatus and the creation of the *Serviço de Estatística Comercial*.[14] From 1901 onwards, the official trade statistics were published annually by the *Serviço* in a publication that would assume the title *Comércio Exterior do Brasil*. The values listed in this publication were calculated using the market price given at the port of departure.[15] These values included export duties and other transaction costs (such as the cost of cartage, packing and loading) but not freight, insurance or landing costs.[16]

Due to the reliance upon official values for the calculation of export statistics during the nineteenth century, the veracity of these values was sensitive to the fiscal exigencies of the government, the influence of the brokers and commercial associations and the competencies of the statistical apparatus of the state. Apart from the recognition of the possible inaccuracy of the official values of Brazilian export statistics,[17] however, the veracity of these values has been the subject of little attention in the literature. Wileman included in *Brazilian Exchange* an examination of the accuracy of official valuations for the period 1861 to 1888. He concluded that the official statistics were marginally under-valued.[18] Wileman assumed somewhat arbitrarily that trade and transaction costs accounted for 15 per cent of the official value which included "...all expenditure from date of purchase to delivery on board..." but excluded the cost of freight rates.[19] This assumption is difficult to sustain for the periods preceding (when freights weighed heavily on total export value) and succeeding (when export duties for certain

10 J. P. Wileman. *Brazilian Exchange: The Study of an Inconvertible Currency*. (Buenos Aires: Galli Bros, 1896).

11 Brazil. *Regulamento das Alfandegas e Mesas de Rendas*. (Rio de Janeiro: Typographia Nacional, 1866, p. 242).

12 Brazil. *Commercio Exterior do Brasil, 1910 a 1914, Vol. 1*. (Rio de Janeiro: Directoria de Estatistica Commercial, 1915), p. XXI.

13 Wileman, *Brazilian Exchange,* p. 83.

14 Franco, 'O balanço de pagamentos do Brasil,' p. 2.

15 Although occasionally reference was made to the *pauta*. For example see Brazil. *Importação e Exportação, Movimento maritimo, cambial e do café da Republica dos Estados Unidos do Brazil*. (Rio de Janeiro: Imprensa Nacional, 1905), pp. 208-209.

16 Brazil, *Commercio Exterior do Brasil, 1910 a 1914, Vol. 1,* p. XXI.

17 Franco, 'O balanço de pagamentos do Brasil,' p. 2; 'Setor Externo.' In *Estatísticas Históricas do Brasil, Series Econômicas, Demográficas e Sociais de 1550 a 1988, 2ª edição*. (Rio de Janeiro: IBGE, 1990), p. 561.

18 Summarising his conclusions over three periods, Wileman estimated the ratio of local to foreign valuations as 97 per cent for the period 1865 to 1878, 88.3 per cent for the period 1879 to 1886, and 98 per cent for the period 1886 to 1888. Wileman's sample of trading partners included Great Britain, France, Belgium, Germany (Hamburg), the United States, Portugal, Austria, Uruguay and Argentina. To the total valuation of imports from Brazil to these countries was added 10 per cent for "unspecified countries" and 15 per cent was subtracted to cover the freight factor. See Wileman, *Brazilian Exchange, pp.* 122-123.

19 *Op. cit.*, p. 124.

commodities sometimes exceeded 15 per cent) Wileman's study.

Here we confirm and extend Wileman's findings by way of the construction of a price accuracy index for Brazilian exports during the period 1821 to 1913. Following the methodology commonly employed in the literature to test for price accuracy,[20] we collect the prices[21] of a representative sample of export commodities including cacao, coffee, cotton, hides, rubber and sugar. These prices are then contrasted with their corresponding international prices.[22]

As a proxy for the average level of international prices, we have used two sources. For the period 1850 to 1913, we use the prices derived from the United Kingdom's import statistics. We assume that the latter reflect the international price of these commodities, an assumption that is supported by a comparison of the U.K. data with Augustus Sauerbeck's series of international prices of selected commodities.[23] The period before 1850 is more problematic due to the absence of a common point of reference such as the Sauerbeck series. As we shall see, the official export statistics during this period evince a considerable bias. In order to confirm the accuracy of this period and achieve the most representative series possible, we have constructed a weighted average of prices from different origins to the U.K. and Philadelphia for the commodities in the sample.[24] An important consideration when choosing which price series to include in the weighted average is the quality of the commodity in question. Coffee is a particularly difficult commodity in this regard as quality is largely dependent upon the singular characteristics of each producer.[25] To account for this somewhat heterogeneous nature, we have included a wide range of series. Sugar, however, is a different story. The majority of Brazilian exports of cane sugar during this period were of the muscovado variety.[26] We have thus excluded other qualities, such as white or beet varieties, from the sugar series. While it is impossible to perfectly homogenise each weighted average by quality given the limited information available, we have taken the utmost care to include only the price series of certain qualities that, where possible, reflect those qualities exported from Brazil.

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20 Federico and Tena-Junguito, 'On the Accuracy of Foreign Trade Statistics;' Tena-Junguito and Willebald, 'On the accuracy of export growth in Argentina;' Antonio Tena-Junguito, *Las estadísticas históricas del comercio internacional (1890-1960): fiabilidad y comparabilidad*. (Madrid: Banco de España, Estudios de Historia Económica, no. 24), 1992.

21 This "price," as well as those derived from the U.K. import statistics, is effectively the computed unit value; that is, total value over total quantity. We take the official prices of these commodities from Brazil, *Anuário Estatístico do Brasil de 1939/1940.* (Rio de Janeiro: IBGE), 1941, pp. 1374-1378.

22 Tobacco and herva mate, while also occupying lesser but still important portions of Brazil's exports, have been dropped due to the absence of data on international prices. Even in the absence of these commodities, the sample covers an average of 88 per cent of the value of exports during the period in question, ranging from a minimum of 66.6 per cent in 1844/45 and a maximum of 93.9 per cent in 1895 according to official statistics.

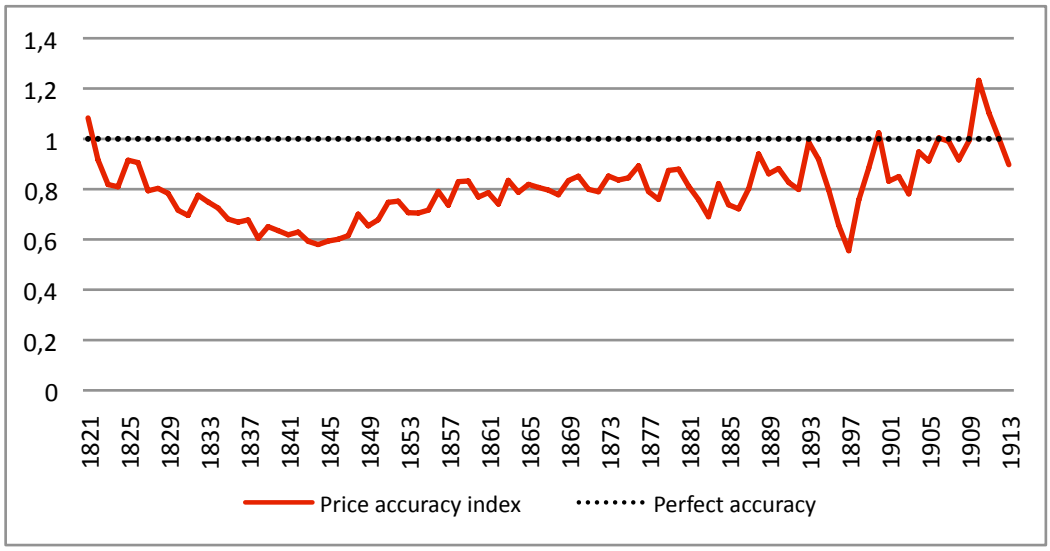
23 The correlation coefficients of the selected commodities during the period 1854-1912 are as follows: coffee = 0.91, sugar =0.98, cotton = 0.99, hides = 0.84.

24 As weights we use the distribution of each origin in the sum of the quantum of exports of all origin countries for each commodity. For this period we are obliged to drop rubber from the sample due to the lack of international price data. This is not such a problem, however, as rubber occupied a marginal portion of Brazil's total exports.

25 See Steven Topik, 'The World Coffee Market in the Eighteenth And Nineteenth Centuries,' pp. 5-6. An additional consideration is the quality of Brazilian coffee included in the export statistics. These statistics do not disaggregate by quality. Prior to the 1890s, the nomenclature ranged from "*superior*" to "*segunda ordinaria*." The prices of the qualities ranged from 6$950 to 2$200 per 10 kilograms in 1878. The official mil-réis unit value for 10 kilograms quoted in the *Anuario Estatistico* of 1939/40 is 4$555. In the early 1890s, the nomenclature used to classify Brazilian exports of coffee changed to reflect those qualities listed in the New York market. This nomenclature ranged from N. 4 to N. 9 in descending order of quality. The prices ranged from 8$6 to 15$1 per 10 kilograms in 1891, while the official statistic for this year is 8$814. The official unit values for 1878 and 1891 thus correspond with the quality "segunda boa" and its equivalent in the revised nomenclature, N. 6. See *Retrospecto Commercial*, various years.

26 For the period 1910 to 1913 it accounted for 57.73 per cent of total sugar exports. Brazil, *Commercio Exterior do Brasil, 1910 a 1914, Vol. 1,* pp. 72-75.

Fig.1. Price Accuracy Index, Brazil, 1821-1913



Sources: see appendix.

The international series represents the c.i.f. (cost, insurance and freight) values of Brazilian exports or their value at the Brazilian border plus insurance, freight and other associated trade costs. From 1821 to 1900 official Brazilian statistics are presented as f.o.b. (free on board) values, representing the value of exports at the Brazilian border and not including trade costs. As mentioned previously, from 1901 onwards these statistics include the value of export taxes but not freight or insurance costs. In order to make any meaningful comparison with the Brazilian data, the international series must therefore be converted to f.o.b. values. With this in mind, we have constructed a new series of freight rates and export taxes and we have used these costs, together with data on the insurance cost, to adjust the international series from the c.i.f. values to the f.o.b. values reflected in the Brazilian statistics.[27]

Figure 1 shows the general price accuracy index of the commodity sample for the years 1821 to 1913. If perfectly accurate, the adjusted international series should reflect the official Brazilian f.o.b. export values. However the index clearly confirms Wileman's findings of under-valuation. This under-valuation is particularly acute during the first half of the century. Furthermore, as predicted, the series tends towards perfect accuracy after the institution of the *Serviço de Estatística Comercial* in the early 1900s. Disaggregation by commodity reveals the drivers of this general under-valuation. Each commodity was consistently under-valued with the exception of a few notable periods. Most notably, cotton and sugar tended towards over-valuation immediately after the founding of the Republic in 1889, a tendency that continued into the twentieth century. Given the weight of coffee in the export economy, however, this over-valuation is not reflected in the general price accuracy index.

27 The weight of trade costs depends largely on the commodity in question. Generally, this factor ranged between 4.37 per cent (sugar, 1857) to 23.46 per cent (rubber, 1898) of the c.i.f. value. Such variability was due not to freight rates, which generally tended to decline during the period, nor to insurance costs, but rather to export taxes which differed quite drastically between commodities, particularly during the Republican period. Unlike other Latin American countries, Brazilian export taxes did not decline during the latter half of the century. Instead, provincial governments took advantage of the opportunity to define export taxes awarded to them by the Republican Constitution of 1891. This resulted in a sharp increase in the weight of taxation during the last decade of the nineteenth century which, in the case of the taxation of rubber exports in the state of Pará, saw ad valorem taxes rise as high as 22 per cent. For the case of Amazonia, see Felipe Tâmega Fernandes, 'Stretching the Inelastic Rubber: Taxation, Welfare and Lobbies in Amazonia, 1870-1910,' Harvard Business School Working Paper 10-032 (2009).

Indeed, the timing of the over-valuation of sugar and cotton raises a pertinent question: How might one explain these trends in the price accuracy of Brazilian export statistics? Was it driven by the exigencies of political economy, or rather by other factors that created a differential between the sterling value of the official series and the sterling value of the international series? Given that distortions in the international series in the form of trade costs have been largely accounted for, the explanation of this differential must therefore be found in the behaviour of the sterling value of the official series. Here we assess the accuracy of the official series in sterling prices, principally due to its use in the literature for comparative purposes. The *pauta*, however, was defined in terms of mil-réis prices. The sterling value depended on the trend of the mil-réis values of the official series and the réis-sterling exchange rate. Any observed covariance between the mil-réis and sterling values of the official series would thus be explained by movements in the exchange rate. Effectively, the periods that demonstrate the greatest degree of under-valuation (such as the 1830s and 1890s) are those that also demonstrate the greatest covariance between the mil-réis and sterling values of the official series. These exchange rate movements were principally driven by variations in the income derived from coffee export revenues.[28] Export revenues, however, were not the only influential factor, and other elements of the country's balance of payments also served to influence the movement of the exchange rate.[29] Moreover, it is likely that other factors unrelated to the exchange rate also contributed to this under-valuation. It is possible that the competencies of the statistical apparatus of the state could not provide up-to-date price schedules under such conditions. Effective lobbying by powerful Commercial Associations may also have a contributing factor. As Eugene Ridings observed, it was in the interest of export lobbies to reduce as much as possible the elasticity of the official price schedule with relation to ascending price movements in order to avoid an increased tax burden. If prices were descending, however, they would lobby for the frequent adjustment of official prices in order to avoid paying more taxes.[30] Periods of over-valuation would thus be fleeting, an observation confirmed by the price accuracy index with the exception of the cases already mentioned.

In sum, an examination of the accuracy of the values of Brazil's export statistics reveals a clear bias towards under-valuation. In order to correct this bias, we reconstruct the series using international prices. We then elaborate a Fisher export price index using the corrected prices of the commodities in the sample. This index is used to deflate the series from current to constant prices, from which the growth rates are calculated. We compare the new growth rates to those calculated using a number of other export price indices based on the official unit values. The first is a Fisher export price index for the period from 1850 to 1913 which was elaborated by Reinaldo Gonçalves using the unit values given in the official Brazilian statistics.[31] To gain an insight into the period before 1850 we construct a second Fisher export price index using the same sample of commodities as Gonçalves but encompassing the period from 1821 to 1913. Furthermore, we compare the reconstructed series to a third export price index commonly used in the literature on export growth constructed by Christopher Blattman, Jason Hwang and Jeffrey Williamson (hereinafter BHW) using the same commodity sample and spanning the

28 Eliana A. Cardoso, 'Exchange rates in nineteenth□century Brazil: An econometric model,' *The Journal of Development Studies*, 19 (2) (1983), pp. 170-178.

29 Gustavo Henrique Barroso Franco, *Reforma Monetária e Instabilidade Durante a Transição Republicana*. (Rio de Janeiro: BNDES), 1987.

30 Eugene Ridings, *Business interest groups in nineteenth-century Brazil*. (Cambridge: Cambridge University Press), 1994, p. 199.

31 Reinaldo Gonçalves, 'Índices de Comércio Exterior do Brasil,' *Revista Brasileira de Estatística,* 42: 168 (1981) pp. 331-362. This index uses a sample of eight commodities (cacao, coffee, cotton, herva mate, hides, rubber, sugar and tobacco) with 1880 as the base year, the unit values of which are taken from the *Anuário Estatístico* of 1939/40. This index was later reproduced in *Estatísticas Históricas do Brasil, Séries Econômicas, Demográficas e Sociais de 1550 a 1988, second edition* (Rio de Janiero: IBGE, 1990), p. 597.

period from 1860 to 1913.[32]

Table 1. Export growth rates, Brazil, 1821-1913.

	Corrected	Official	Gonçalves	BHW
1821-1849	6,2	5,4		
1821-1870	4,8	4,2		
1821-1889	4,0	3,5		
1821-1913	3,9	3,4		
1850-1870	2,9	2,8	2,4	
1850-1889	2,4	2,3	2,3	
1850-1913	2,8	3,0	2,9	
1870-1890	1,6	1,4	1,9	0,9
1870-1913	2,8	2,7	3,1	3,2
1890-1913	4,0	3,9	4,2	5,3

Sources: see appendix.

Table 1 displays the growth rates of exports derived from the new series at constant prices alongside the official, Gonçalves and BHW series. The period as a whole appears only marginally more dynamic than the official series (3.85 to 3.45 per cent per annum, respectively), with growth rates of the corrected series for the period from mid-century onwards lying between the official and Gonçalves series and the dynamism of the BHW series. The period from 1821 to 1850, however, reveals a much more dynamic panorama. Exports grew faster than any other period of the nineteenth century at a rate of 6.17 per cent per annum. Further disaggregation of this period into decades is even more revealing. The export growth of this period to a large degree took place during the decade immediately following independence. Indeed, the differential shown here between the corrected and official series is the most notable of the entire period under examination (10.16 to 7.51 per cent per annum, respectively). Disaggregation by commodity reveals the drivers of this initial dynamism. Coffee was the principal protagonist of this period, exhibiting a growth rate of 9.72 per cent per annum. Sugar, although showing considerably less dynamism at 4.57 per cent per annum, was far from the stagnation and decadence that would characterise its experience in the latter half of the century. On the other hand, cotton, which had occupied such a central role in the export growth of the north-east during the late eighteenth century, was clearly showing signs of stagnation at 1.26 per cent per annum. This panorama is further highlighted by an examination of the growth in the quantum of exports, showing growth rates for sugar and coffee during the period from 1821 to 1850 that were unparalleled during the rest of the period under study. The following two sections examine the drivers of this early dynamism.

Brazilian dynamism and divergence in the tropics

Any reappraisal of Brazilian export growth must contend not only with the traditional narrative, but also with two common arguments that focus upon the determinants of export growth in general. The first is that propounded by the lost decades argument, which emphasises the importance of institutional shocks to long-run export performance. In the case of Brazil, the transition from colony to independent nation was relatively painless.[33] Unlike most of Spanish

32 Christopher Blattman, Jason Hwang and Jeffrey G. Williamson, 'Winners and losers in the commodity lottery: The impact of terms of trade growth and volatility in the Periphery 1870–1939,' *Journal of Development Economics,* 82 (2004), pp. 156-179. The BHW index is a chained Laspeyres index that uses the British c.i.f. unit values.

33 Robert H. Bates, John H. Coatsworth, and Jeffrey G. Williamson, 'Lost Decades: Postindependence Performance in

America, imperial collapse did not come with the baggage of balkanisation or anti-trade policy that characterised other countries of the region. Independence, in the Brazilian sense, was transition rather than revolution.[34] Furthermore, and perhaps most important for our argument, Brazil did not experience the institutional turmoil derived from slave abolition until much later in the century and only after suffering from a prolonged series of restrictions to its Atlantic slave trade. The second explanation advances geography as a determining factor. Brazil was 'gifted' in the sense that it was endowed with a seemingly endless fertile frontier that was capable of cultivating a wide range of tropical and temperate agricultural products, from sugar, cotton and cacao in the north-east, through rubber in the Amazon, to coffee and hides in the southern regions. Furthermore, during the nineteenth century it was fortunate in the sense that many of these products were in great demand by industrialising European markets. The luck of the draw of the commodity lottery, however, was tempered by the volatile nature of these commodities.[35] Here we explore Brazil's export performance from a comparative perspective and outline how these explanations might form the descriptive basis of our account of Brazil's long-run export performance.

Such a comparison is offered in Table 2, showing the export growth rates for the Americas and the World during the long nineteenth century based on the World Trade series constructed by Giovanni Federico and Antonio Tena-Junguito.[36] These export growth figures confirm Brazil's dynamic export performance during the post-independence years. Brazilian export growth from independence to mid-century more than doubled the South American average and was comparable to that of the United States. Despite the regional disparities in export growth derived from the success of coffee in the south-east and the relative failure of cotton and, to a lesser extent, sugar in the north-east, it is clear that the country's overall rate of export growth was comparatively quite high. While we divide the Americas into four sub-regions (mineral producers, non-mineral producers, tropical agricultural producers and temperate agricultural producers), here we focus primarily on the tropics. This group includes the British, French, Dutch and Danish colonies of the West Indies and the Guianas, as well as the Spanish Caribbean (Santo Domingo, Puerto Rico and Cuba), Spanish Central America (Guatemala, Honduras, Costa Rica, Nicaragua y Panama) and, of course, Brazil. Amongst this group can be found most of Brazil's principal coffee- and sugar-producing competitors.[37] While the export growth of this region generally stagnated over the century, disaggregation by country reveals a fascinating panorama. During the first half of the nineteenth century these tropical agricultural producers would be torn between countervailing tendencies. On the one hand, Cuba (which became increasingly specialised in sugar production), Puerto Rico and Brazil showed high export growth rates, comparable only to North America on a continental level. On the other hand, the other tropical agricultural producing countries experienced a (in some cases violent) contraction of exports. The British tropical colonies experienced the most severe contraction, Jamaica being the extreme case. The export economies of the French tropical colonies, particularly French Guyana, also contracted. It is clear, therefore, that there was considerable

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Latin America and Africa,' *The Journal of Economic History*, 67: 4 (December 2007), p. 921; Alan Dye, 'The Institutional Framework.' In Victor Bulmer-Thomas, John Coatsworth, and Roberto Cortés Conde, eds., *The Cambridge Economic History of Latin America. Volume II: The Long Twentieth Century*. (Cambridge: Cambridge University Press, 2006). Leandro Prados de la Escosura, 'Lost Decades?'

34 However, Brazil was be no means immune from border disputes or secessionist revolts during the post-independence period. See Bulmer-Thomas, *Economic History of Latin America*, p. 20.

35 Blattman, Hwang and Williamson, 'Winners and losers in the commodity lottery,' p. 176.

36 Giovanni Federico and Antonio Tena-Junguito, A New Wold Trade Series 1800-1938 (2014 unpublished document) and "*The American Divergence. Independence versus Emancipation in Latin American and the Caribbean 1820-1870.*" Paper presented in CLADHE IV July 23th- 25th 2014, Bogotá.

37 Another Asian competitor and Dutch colony, Java, would also occupy a leading role in the international coffee (and later, rubber) market, although it is not included here for geographical reasons.

divergence in the export performance of the tropical agricultural producers during the post-independence decades. The determinants of this divergence and its effect on Brazil's export performance, however, remain to be explained. Here we offer a set of hypotheses related to the two arguments explored above.

Table 2. Export growth rates, the Americas, 1821-1913

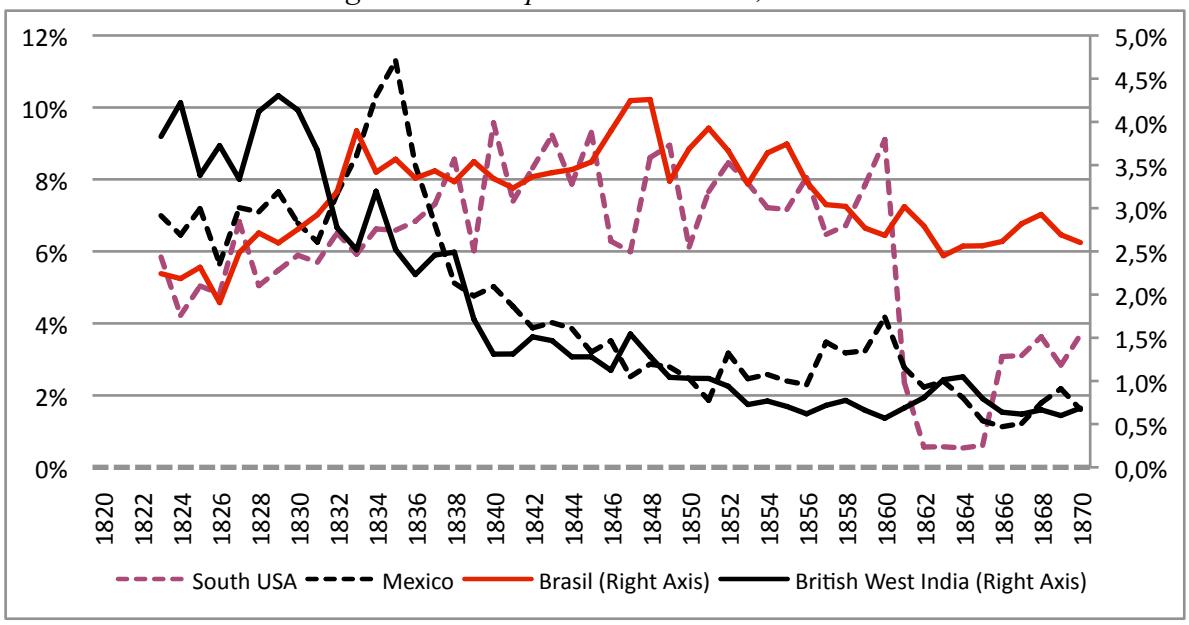
	1821/25-1851/55	1831/35-1851-55	1851/55-1871/75	1871/75-1891/95	1891/95-1911/14	1831/35-1871/75	1821/25-1871/75	1871/75-1911/13
0. North America	4,5	4,7	3,5	3,7	4,0	4,1	4,1	3,7
Canada	2,9	3,1	4,8	1,6	5,2	4,0	3,7	3,2
United States	5,2	5,3	3,4	4,0	3,9	4,4	4,5	3,8
Southern USA	5,5	5,1	1,2	3,8	2,6	3,1	3,8	3,1
Northern USA	4,9	5,5	5,2	4,1	4,4	5,4	5,0	4,2
1.1 Mineral Producing	1,8	-0,4	3,3	2,0	3,2	1,4	2,4	2,5
Chile	6,5	5,5	5,1	5,3	3,0	5,3	5,9	4,1
Mexico	0,7	-2,4	1,5	0,5	4,4	-0,5	1,0	2,3
Peru	6,7	7,9	3,2	-3,7	7,9	5,5	5,3	1,7
Venezuela	2,4	3,0	7,6	2,2	-0,1	5,3	4,5	1,1
1.2 No Mineral Producing	5,1	5,7	1,6	3,5	3,9	3,6	3,7	3,6
2. Tropical Agricultural	2,8	2,1	2,3	1,9	3,3	2,2	2,6	2,5
Brazil	5,8	4,4	2,3	2,1	3,4	3,3	4,4	2,7
Cuba	4,6	5,2	4,0	0,8	5,6	4,6	4,4	3,0
Puerto Rico	5,8	3,3	1,7	0,8		2,5	4,1	
Jamaica	-3,4	-5,6	0,9	3,1	2,2	-2,4	-1,7	2,6
Leeward Island	2,9	-0,2	-0,8	0,4	1,6	-0,5	1,4	1,0
French Guyana	0,9	-3,3	-4,1	9,1	1,3	-3,7	-1,2	5,1
Martinica	0,2	-0,2	3,1	0,4	1,6	1,4	1,3	1,0
Iberian Tropical	5,4	4,2	2,6	1,9	3,7	3,4	4,3	2,7
British Tropical	-1,3	-2,3	1,8	2,3	1,3	-0,3	0,0	1,8
French Tropical	0,8	-0,4	0,9	1,0	1,0	0,3	0,8	1,0
3. Temperate Agriculture	4,0	3,8	5,9	4,7	4,9	4,8	4,8	4,7
Argentina	3,6	3,6	6,9	4,9	5,5	5,2	4,9	5,1
Uruguay	4,9	4,2	3,5	4,1	1,6	3,8	4,3	2,8
South America	2,5	1,3	3,2	2,6	3,8	2,2	2,8	3,1
Iberian South America	3,4	1,9	3,4	2,7	4,0	2,6	3,4	3,2
TOTAL AMERICAS	3,5	2,9	3,4	3,2	3,9	3,1	3,4	3,5

Sources: *see appendix.*

The first is the institutional shock hypothesis. This states that institutional shocks in the tropics afforded Brazil a competitive advantage in the production of certain export commodities. The catalyst of the divergence in the tropics was thus institutional. Those countries that did not suffer from institutional shocks were able to increase their world export shares at the expense of those countries that did. Aside from the previously mentioned export growth rates, further descriptive evidence of this hypothesis is provided in figure 2. We compare the world export

shares of the Southern United States (separated from the North for comparative purposes), Brazil, Mexico and the British West Indies. During the Latin American post-independence period both Brazil and the Southern United States were slave plantation societies that did not suffer from the institutional shocks related to independence or slave abolition. Indeed, the trend

Fig. 2. World export market share, 1820-1870.



Sources: see appendix.

of the world export shares of both countries is positive until mid-century, when the abolition of the slave trade would affect Brazil's export industries and the Southern United States would be torn asunder by the effect of the Civil War. Mexico and the British West Indies, on the other hand, suffered from severe institutional turmoil during this early period. Mexico is a classic example of the negative effect of independence on the export economy. The post-independence period was characterised by political instability, violence, and foreign invasion, all of which had a profoundly negative impact on its export performance.[38] The British West Indies provide a clear example of the negative effect of the slave abolition shock. As can be seen, the world export share of the region declined steadily after abolition. The shock affected the British colonies in a number of ways. Those colonies with relatively small land to labour ratios were affected by the cost of the transition between labour regimes, but did not suffer the loss of much of the work force. Those countries with a greater and unexploited endowment of land suffered not only from an increase in the cost of labour, but also a reduction of supply as many former slaves moved to subsistence farming. A good example of the latter case is British Jamaica that, as we have seen, suffered a violent contraction of exports after abolition. Faced with an exodus of former slaves, the government was forced to source indentured labour from Asia.[39]

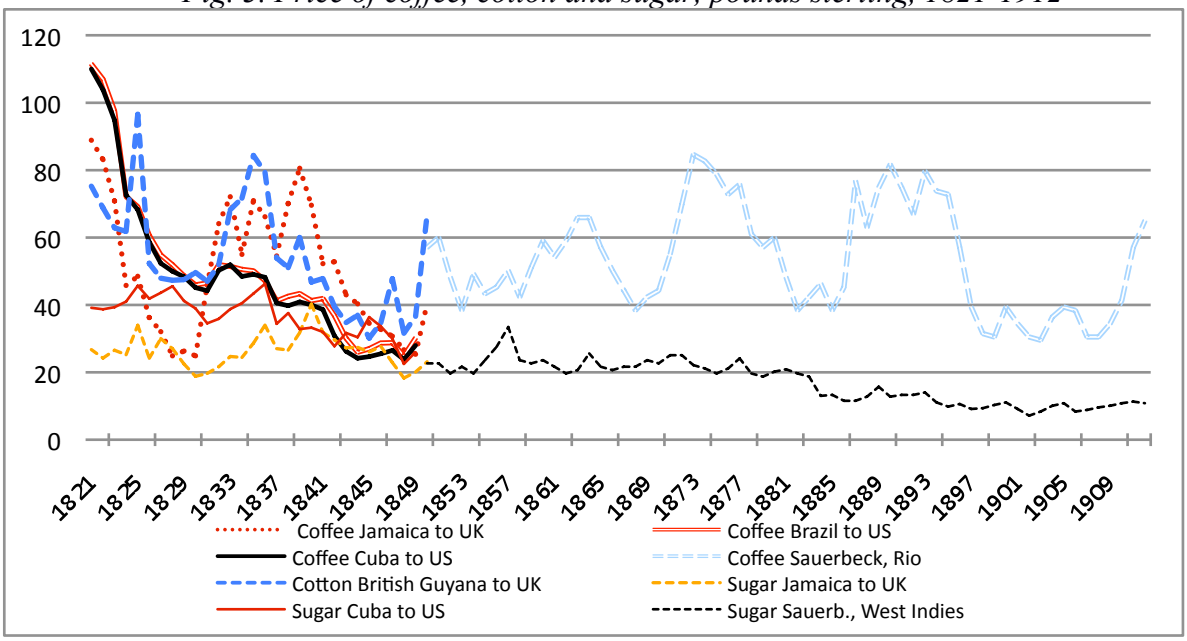
Further evidence of the relative effect of the slave abolition shock during the 1830s is clearly discernible in the trends of the international prices of these commodities as shown in figure 3. In the first panel, the prices of British colonial exports (in this case Jamaican coffee and Guyanese cotton) clearly responded to the slave abolition shock. Meanwhile, the prices of Brazilian and Cuban coffee did not show the same response. The resilience of Cuban slavery,

38 Carlos A. Ponzio, 'Looking at the Dark Side of Things: Political Instability and Economic Growth in Post-Independence Mexico' (unpublished manuscript, 2005); Bates, Coatsworth, and Williamson, 'Lost decades;'

39 The effect of slave abolition on the sugar plantations of the British and French colonies of the Caribbean is described in J.H. Galloway, *The sugar cane industry: an historical geography from its origins to 1914 (*Cambridge University Press: Cambridge, 1989), pp. 123-130.

however, did not prevent its sugar prices from shooting up alongside British Jamaican prices in response to abolition. Despite the convergence of trends in coffee and sugar prices during this decade, over the long-run these prices displayed very different tendencies. Unlike coffee, sugar prices showed a decreasing secular trend at least from the 1840s onwards, the result of increased

Fig. 3. Price of coffee, cotton and sugar, pounds sterling, 1821-1912



Sources: see appendix.

competition in the international market and the expansion of European sugar beet production.[40] Coffee prices, on the other hand, after experiencing rather dramatic fluctuations following the Napoleonic Wars and the slave abolition shock, generally responded to Brazil's supply schedule until the crisis and government intervention of the 1890s, due largely to the strength of Brazil's market power.[41]

The second hypothesis focuses on the nature of Brazil's factor endowment. In terms of the wide-range of tropical agricultural products that could be produced in its fertile soils, Brazil was clearly a winner of the commodity lottery. Its status as a predominately tropical producer, however, meant that Brazil's agricultural commodities were liable to considerable price volatility in the international market.[42] Yet Brazil's export performance cannot be explained by geographic or climatic factors alone: if geography were the determining factor of Brazil's export growth, one would expect to see a similar tendency in the export performance of other tropical agricultural producers with similar primary product specialisations and market access conditions. In light of the divergence described above and the further proof provided in figure 4, it is evident that this was not the case. We compare the world export shares of Argentina, Brazil, Chile, Cuba and the Non-Iberian tropical agricultural producers (including British, French, Dutch and Danish Caribbean colonies). As can be seen in figure 4, the world export share performance of Brazil (and, to a lesser extent, Cuba) appears closer to that of the temperate (Argentina) and mineral-producing (Chile) countries than that of the other tropical agricultural

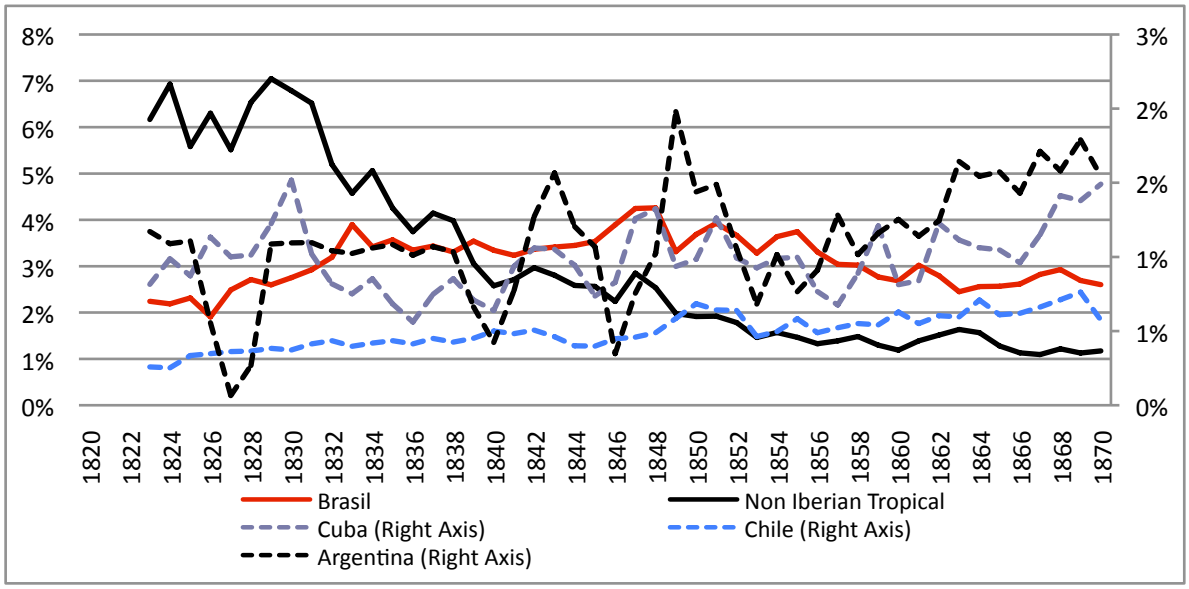
40 Galloway, *The sugar cane industry,* pp. 130-134.

41 On the coffee crisis and subsequent intervention see Antonio Delfim Netto, *O problema do café no Brasil*. (São Paulo: Instituto de Pesquisas Econômicas), (1981); Lincoln Hutchinson, 'Coffee "Valorization" in Brazil,' *The Quarterly Journal of Economics*, 23: 3 (May, 1909), pp. 528-535. For a study on the extent of Brazil's market power, see Marcelo de Paiva Abreu and Felipe Tâmega Fernandes, 'Market power and commodity prices: Brazil, Chile and the United States, 1820s-1930,' Texto para Discussão No. 511. Departamento de Economia PUC-Rio, (2005), p. 8.

42 Blattman, Hwang, Williamson, 'Winners and losers.'

producers. Like Argentina and Chile, Brazil possessed a larger land to labour ratio than most other tropical producers. Thus an explanation of Brazil's export performance lies not in the nature of its geography but rather in the characteristics of its factor endowment. Brazil certainly

Fig. 4. World export market share, 1820-1870.



Sources: see appendix.

possessed a superior endowment of cultivable land. What it did not possess, however, was an adequate supply of labour. Brazil's dynamic post-independence export growth performance must therefore have been driven in part by factor endowment expansion. We examine the evidence supporting the institutional shock and factor endowment hypotheses in the next section.

The determinants of Brazilian export growth

As we shall see, these two factors – institutional shocks and factor endowments – do indeed serve to explain Brazil's dynamic export growth in the post-independence decades. Our explanation, however, deviates somewhat from the traditional narrative. While domestic institutional shocks were largely absent during this period, institutional change in the tropics was ever-present. Moreover, while Brazil's factor endowment in terms of available land and labour was scarce, the accumulation of these factors was considerably dynamic. Thus we argue that Brazil's export performance was determined in part by exogenous institutional shocks that prompted an endogenous response in the form of factor endowment expansion.

Before delving into this argument, however, it is pertinent to ascertain how much of this growth was attributable to factors related to Brazil's international competitiveness, and how much was due merely to the shift in world demand for Brazil's commodities. In order to untangle the effects of these determinants, we undertake a constant market share analysis of Brazilian export growth. The underlying assumption of constant market share analysis is essentially counter-factual; we assume that Brazil's export share in the world market remains unchanged over time. Any differentials that arise between our constant-share assumption and observed export performance are attributable to a residual factor, commonly interpreted as a competitiveness effect.[43] Here we perform a simple disaggregation of Brazil's export growth

43 For a theoretical discussion of constant market share analysis, see Edward E. Leamer and Robert M. Stern, *Quantitative International Economics,* New Jersey: Transaction Publishers, 1970, Chapter 7; J.D. Richardson, Constant market shares analysis of export growth, *Journal of International Economics,* 1 (1971), pp. 227-239. For an example of its application to economic history, see Antonio Tena-Junguito, 'Protección y competitividad en

into two factors.[44] The first, the demand effect, uses the growth of world exports as a proxy for

Table 3. Constant market share analysis, 1821-1913
[Millions of 1913 U.S. Dollars]

			1821-1850	1850-1870	1870-1890	1890-1913	1821-1913
World	Brazil Export Increase	ΔX_B	6,7	7,7	10,5	36,3	61,2
	World Demand	rV	9,7	14,6	17,0	30,4	125,9
	Competitiveness Effect	V'-V-rV	-3,0	-6,9	-6,5	6,0	-64,7
Partners	Brazil Export Increase	rV	9,4	13,2	18,0	24,9	107,7
	World Demand	V'-V-rV	-2,7	-5,5	-7,5	11,4	-46,4
Cacao	Brazil Export Increase	Δ	3,0	0,5	1,7	23,5	28,7
	World Demand	rV	1,1	2,2	6,5	20,6	40,4
	Competitiveness Effect	V'-V-rV	1,9	-1,7	-4,8	2,9	-34,9
Coffee	Brazil Export Increase	Δ	114,8	80,3	53,4	564,0	812,4
	World Demand	rV	21,9	83,8	68,0	256,5	142,5
	Competitiveness Effect	V'-V-rV	92,8	-3,5	-14,6	307,6	669,9
Cotton	Brazil Export Increase	Δ	4,3	28,8	-31,2	8,0	10,1
	World Demand	rV	15,2	19,2	31,4	3,7	118,5
	Competitiveness Effect	V'-V-rV	-10,6	9,6	-62,7	4,3	-108,4
Sugar	Brazil Export Increase	Δ	85,5	3,0	6,8	36,1	134,8
	World Demand	rV	66,9	143,5	179,8	94,2	854,6
	Competitiveness Effect	V'-V-rV	18,6	-140,5	-173,0	-58,1	-719,7

Sources: see appendix.

world demand, and reports how much of Brazil's market share is explained by the increase (or decrease) of this demand. The second, the competitiveness effect, reveals how much is explained by the increase (or decrease) of a country's competitiveness vis-à-vis other suppliers. We present an aggregate (which includes 55 countries) and disaggregate (which includes France, the Netherlands, Portugal, Sweden, the United Kingdom and the United States) world in order to control for the growth of world demand unrelated to Brazil's principal export markets. Table 3 displays the results.

España e Italia, 1890-1960,' in Leandro Prados de la Escosura (ed.), *El desarrollo económico en la Europa del Sur: España e Italia en perspectiva histórica*, (Madrid: Alianza Editorial, 1992), pp. 342-350.

44 Although it is customary to further disaggregate export growth into market distribution and commodity composition effects, we are restricted by the questionable quality and paucity of official bilateral data. A test of the accuracy of the geographical distribution of bilateral statistics by value and quantity highlights a number of serious problems. To begin with, the series is incomplete. Data are only available for the years 1842/43, 1852/53, 1862/63, 1872/73, and the period from 1901 onwards. Furthermore, the Brazilian export records are found to be considerably and consistently overvalued when compared to trading partner import records. This incorrect geographic assignment of exports might have been driven by differing conceptions of origin and destination and in some cases by smuggling or fraudulent practices by government officials in customs houses. See Platt, 'Problems in the Interpretation of Foreign Trade Statistics before 1914,' p. 121; Brazil, *Relatorio do Ministerio da Fazenda*. (Rio de Janeiro: Typographia Nacional, 1876), pp. 66-67; Mariana Flores da Cunha Thompson Flores, 'Contrabando na fronteira meridional do Brasil – por fora e por dentro da Alfândega (1845-1889),' *Revista Brasileira de História & Ciências Sociais*, 4: 7 (2012), pp. 122-142.

Constant market share analysis reveals that world demand was the principal determinant of Brazil's export growth during the post-independence decades and the first globalisation. The negative sign of the competitiveness effect indicates that Brazil's response to the expansion of world demand was negatively affected by the loss of competitiveness. This does not change when the world is reduced to its principal trading partners. The implication of these results is that, at least on an aggregate level, Brazil consistently lost market share for its exports across the long nineteenth century. As we have seen, however, the nuances of Brazil's long-run export performance were commodity-specific and thus will only be detected by way of a disaggregated analysis.

Indeed, such an analysis confirms our revision of Brazil's export growth performance. The initial dynamism was driven principally by the relative gains of competitiveness of the coffee sector. From mid-century this competitiveness disappeared only to return during the period 1890-1913, perhaps due to the influence of government intervention. In the case of Brazil's other principal export commodities, we observe a different tendency. Sugar expanded faster than world demand in the initial period, due in part to increased competitiveness. After 1850, however, Brazil's sugar export sector lost competitiveness and growing international demand for the commodity buoyed the observed export growth. Cacao evinced a similar tendency. While cotton gained a competitive advantage due to the institutional shock of the American Civil War and its effect on Southern Big Cotton, this advantage was largely ephemeral, and in the long-run the sector lost competitiveness over the century. In short, the rapid expansion of world demand for Brazil's products, coupled with an increase in competitiveness for coffee and, initially, for sugar and cacao, determined the observed export growth pattern.

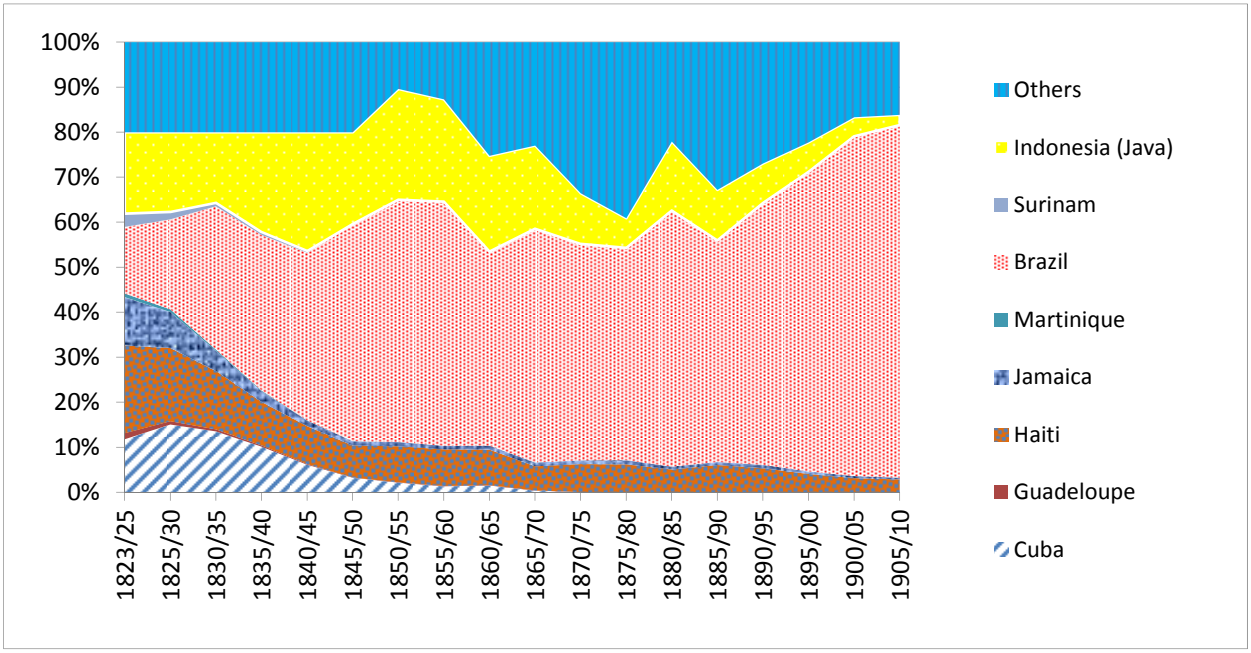
Here we focus our analysis on the determinants of the competitiveness effect that were clearly differentiated across commodities. To begin with, we explore the effect of institutional shocks on Brazil's market share of coffee and sugar. To ascertain the nature of the evolution of Brazil's market share of world coffee exports, we take a sample of the principal coffee exporting countries for which there are data available from around the time of Brazil's independence, and calculate their relative shares of the world market.[45] The results can be seen in figure 5. It is clear that Brazil's market share of coffee gradually widened over the nineteenth century at the expense of all of its major competitors. Furthermore, it is evident that most of this market share was gained before 1850. This gain was due to exogenous shocks that temporarily afforded Brazil a competitive advantage. An important precursor to this market share expansion in the early decades of the nineteenth century was the slave rebellion in Saint Domingue. The rebellion and subsequent battle for independence would wrack havoc on the export economy and precipitate its decline as one of Brazil's principal competitors.[46] The effect of the slave abolition shock of the 1830s on the British colonies impacted considerably on their market shares. British Jamaica moved from being the fourth largest exporter to holding a relatively

45 This sample includes Cuba, Guadalupe, Haiti, Indonesia (Java), Jamaica, Martinique, and Suriname. Together with Brazil this sample represented 81.63 per cent of the quantum of world exports in the period 1851-1855. Unfortunately, data for total world exports is only available from 1851-1855 onwards, calculated by five-year averages. To provide estimates for the decades up until mid-century, we assume that our sample represents 80 per cent of world exports during the period 1823-1850, and estimate world exports based on the sum of the sample countries. This is by no means an unrealistic assumption. At the beginning of the nineteenth century nearly all coffee exported to the world market was apparently produced by European colonies, including, most notably, the ex-colony of Haiti (previously Saint Domingue), the world's leading coffee exporter at the turn of the nineteenth century, followed by other French colonies such as Martinique, Dominica, Guadalupe, the Dutch and British colonies in the Guianas and Jamaica. Once estimated, we use the world exports estimate to calculate five-year average country shares. On the world market for coffee, see Topik, 'The World Coffee Market in the Eighteenth And Nineteenth Centuries,' p. 16.

46 Klein and Luna, *Slavery in Brazil*, pp. 78-79.

minuscule share by the end of the 1830s. After the Napoleonic Wars many French Caribbean coffee-exporting colonies suffered an involution. Indeed, many of the French colonies all but disappeared from the market by the 1850s. The only competitor that did not experience a

Fig. 5. Coffee export market shares, 1823-1910.



Sources: see appendix.

considerable reduction of its market share during the post-independence decades was Java. Like certain Spanish colonies of the Caribbean, Java was not subjected to the institutional shocks associated with independence or slave abolition.[47] Thus it also responded to the competitive advantage afforded by the slave abolition shock by expanding its market share of coffee during the post-independence decades. Javanese expansion was brought to a halt, however, by the spread of *Hemileia vastatrix*, a coffee-leaf blight that would devastate Javanese and other Asian and African producers late in the century, effectively permitting Brazil to consolidate its world market share.[48]

In the case of sugar, we obtain data on the world production of both cane and beet sugar and examine the market share of a sample of tropical agricultural countries for the period 1820-1900.[49] Figure 6 displays the results. It is clear that Cuba's market share of sugar expanded substantially during the first half of the nineteenth century. This expansion came at the expense of the British colonies and, to a lesser extent, Brazil. Unlike Brazil's hold over the international coffee market, however, the sugar market would remain sufficiently diversified to prevent Cuban supply from dictating the price trend of the market. Furthermore, the substitution of cane for beet sugar in Western Europe would serve to undermine the market power of tropical

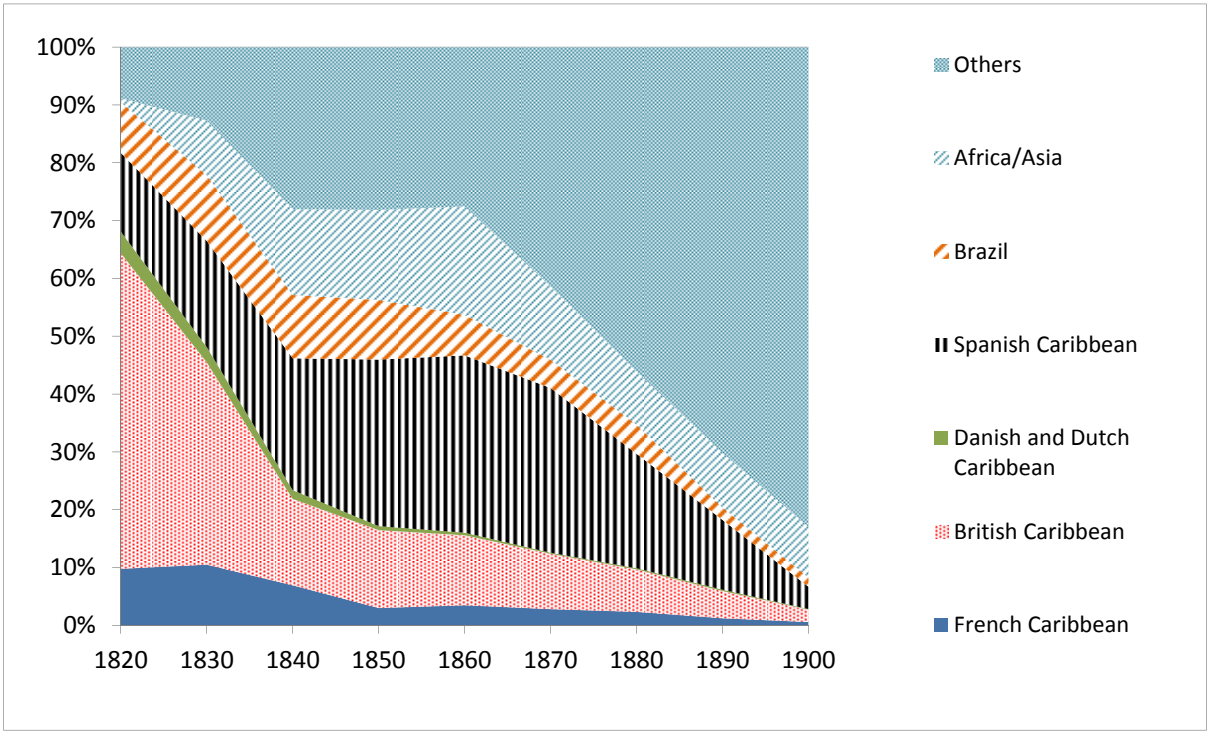
47 In fact, Java was not a slave plantation economy, although coffee cultivation was imposed upon the peasantry by a strict system of state control. See M. R. Fernando, 'Coffee cultivation in Java, 1830-1917,' in William Gervase Clarence-Smith and Steven Topik (eds.), *The Global Coffee Economy in Africa, Asia, and Latin America, 1500–1989*. Cambridge: Cambridge University Press, pp. 157-158.

48 Clarence-Smith, William Gervase. (2004). The Coffee Crisis in Asia, Africa, and the Pacific, 1870–1914. In William Gervase Clarence-Smith and Steven Topik (eds.), *The Global Coffee Economy in Africa, Asia, and Latin America, 1500–1989*. Cambridge: Cambridge University Press, pp. 101-105.

49 This sample includes the British (Trinidad and Tobago, St. Lucia, St. Kitts, Nevis, Monserrat, Jamaica, Guyana, Grenada, Dominica, Barbados and Antigua), French (French Guyana, Guadeloupe, Martinique), Danish (Danish Virgin Islands), Dutch (Dutch Antilles, Suriname) and Spanish (Dominican Republic, Puerto Rico, Cuba) colonies of the Caribbean, as well as a number of African and Asian producers (Mauritius, Rèunion, Indonesia).

agricultural producers.[50] Still, as the export growth rates indicate, the export performance of both Brazil and Cuba diverged quite considerably from that of the other tropical agricultural producers.

Fig. 6. Sugar export market shares, 1820-1900.



Sources: see appendix.

As we have seen, the slave abolition shock and subsequent divergence in the tropics provided Brazil an initial competitive advantage vis-à-vis other tropical agricultural producers that allowed it to quickly increase its share of the world market of coffee and to maintain its share of sugar in the face of Cuban competition. But how did Brazilian export producers respond to this advantage in order to generate the comparatively high growth rates described above? If we assume that technological change was not a factor in productivity growth during the decades following independence,[51] then our analysis must centre upon the fluctuations of the land to labour ratio. All indications point to a disproportional ratio of land to labour during the nineteenth century; Celso Furtado referred to the scarcity of labour as Brazil's 'basic national problem.'[52] However, there are also indications that the propitious circumstances afforded Brazil by the turmoil of other tropical agricultural producers in the region stimulated a voracious appetite for slave labour which, when combined with the expansion of the agricultural frontier, drove the observed initial dynamism of export growth. Indeed, the market share expansion of coffee and sugar was accompanied by the large-scale importation of African slaves. In particular, the decade immediately following independence was characterised by an unprecedented number of slave arrivals. During the period from 1821 to 1830, more slaves were imported into Brazilian ports than any other destination during any decade in the recorded history of the Atlantic slave trade.[53] While the anti-slave trade law of 1831, the product of

50 Galloway, *The sugar cane industry*, pp. 130-134.

51 In fact there was very little technological change in export industries, for sugar, see Klein and Luna, *Slavery in Brazil*, p. 82; for coffee, see Prado Junior, *Historia econômica*, pp. 227-118; Topik, 'Integration of World Coffee Market,' p. 32.

52 Furtado, *Formación Económica*, p. 117.

53 See Klein, *The Atlantic slave trade*, pp. 210-211, appendix Table A.2, which gives the following figures for Brazil (in thousands of slaves):

unyielding political pressure from the British, curtailed importations for a number of years, the illicit trade continued and expanded considerably after 1837 until final abolition in 1850.[54] Although the ports and, after 1831, clandestine disembarkation sites in the south-east received the largest share of imports, a similar trend is observed in the north-east, effectively feeding the expansion of sugar plantations.[55] The demand for labour was apparently so high that a considerable rise in slave prices – which began in the late 1820s, seemingly in anticipation of abolition – did not curtail importations.[56] After 1850 and the closure of the slave trade, an internal redistribution of the slave population from the north-east to the south-east took place, until eventual abolition and government subsidised immigration later in the century.[57]

The unprecedented demand for labour and its long-run appreciative price trend after 1830,[58] coupled with the land-intensive nature of Brazil's export industries, implies a concurrent expansion of the agricultural frontier. To be sure, the country possessed a relatively superior endowment of fertile land in the south-east that – due to climatic conditions – favoured the cultivation of coffee.[59] In the north-eastern regions – particularly around the Recôncavo in Bahia but also in Pernambuco – large swathes of uncultivated land allowed for the gradual expansion of sugar, tobacco and cocoa plantations.[60] Moreover, there are clear indications of frontier expansion during the decades following independence. The years from 1830 to 1834 recorded the highest number of new sugar *engenho* registrations in Bahia during the nineteenth century.[61] There are also indications of a similar trend in the number of *fazendas* in the south-east.[62] This frontier expansion, however, was hindered by unfavourable geography and a high incidence of transport costs. Infrastructure was rudimentary at best; before the introduction of rail, the common mode of transport was the mule.[63] Such costs affected not only the profit margin of producers but also the productivity of plantations. In the case of coffee, Herbert Klein estimated that one-third of a *fazenda*'s slave labour force was dedicated to the transportation of coffee sacks to market.[64] Thus the expansion of the agricultural frontier was limited until the

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1801-1810	241.3	1831-1840	334.3
1811-1820	327.7	1841-1850	378.4
1821-1830	431.4	1851-1860	6.4

54 Bethell, *The Abolition of the Brazilian slave trade*, chapters 3, 12 and appendix.

55 Klein and Luna, *Slavery in Brazil*, p. 153. For Bahia see Barickman, *A Bahian Counterpoint*, p. 137; Schwartz, *Sugar plantations*, p. 343. For Pernambuco, see J. H. Galloway, 'The Sugar Industry of Pernambuco during the Nineteenth Century,' *Annals of the Association of American Geographers,* 58: 2 (June, 1968), pp. ?

56 On slave prices in Bahia, see Barickman, *A Bahian Counterpoint*, p. 139.

57 On internal slave trade: Herbert S. Klein, 'The Internal Slave Trade in Nineteenth-Century Brazil: A Study of Slave Importations into Rio de Janeiro in 1852', *The Hispanic American Historical Review*, 51: 4 (Nov., 1971), pp. 567-585. On abolition see Robert Edgar Conrad, *The Destruction of Brazilian Slavery, 1850-1888,* (University of California Press: California), 1972; Bethell, *The Abolition of the Brazilian slave trade*; Klein and Luna, *Slavery in Brazil*, chapter 10. On immigration see Nathaniel H. Leff, 'Economic Retardation in Nineteenth-Century Brazil,' *The Economic History Review*, 25: 3 (Aug., 1972), p. 494.

58 For long-run slave price trends in Minas Gerais and Rio de Janeiro, see Klein and Luna,*lavery in* Brazil, pp. 98-299.

59 Stein, *Vassouras*; Delfim Netto, *O problema do café no Brasil*; Warren Dean, *With Broadax and Firebrand: The Destruction of the Brazilian Atlantic Forest*, (University of California Press: California), 1995.

60 For Bahia, see Barickman, *A Bahian Counterpoint*, chapter 5. For Pernambuco, Galloway, 'The Sugar Industry in Pernambuco, p. ?

61 Barickman, *A Bahian Counterpoint,* p. 36; for the number of mills in Pernambuco, see Peter L. Eisenberg, *The Sugar Industry in Pernambuco: Modernization Without Change, 1840-1910*, University of California Press: California), 1974, Appendix 3.

62 For the case of São Paulo, see Francisco Vidal Luna and Herbert S. Klein, *Slavery and the Economy of São Paulo, 1750-1850, (*Stanford University Press: Stanford), 2003, pp. 56-57.

63 Herbert S. Klein, 'The Supply of Mules to Central Brazil: The Sorocaba Market, 1825-1880,' A*gricultural History,* 64: 4 (Fall 1990), pp. 1-25; William R. Summerhill, *Order against progress: government, foreign investment and railroads in Brazil 1854-1913*. (Stanford: Stanford University Press, 2003).

64 Klein, 'The Supply of Mules'

development of the rail network that took place after the 1860s.[65]

While the slave emancipation shock and accompanying expansion of the slave labour force and the area of cultivable land may explain Brazil's initial export growth dynamism and the rapid expansion of its market share, these factors do not explain the loss of competitiveness in certain export industries from 1850 onwards and the divergent export performance across commodities. As we have seen, the rapid increase in the availability of factors of production was characteristic of both the north- and south-east regions. Yet after the closure of the slave trade in 1850 the sugar and cotton plantations of the north-east lost most of its slave population to coffee *fazendas* in the south-east.[66] 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?

An explanation can be found in the long-run behaviour of the real exchange rate and its relationship to the commodity market shares previously examined. During the long 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,[67] in the case of 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...[68]

The effect of this Dutch disease was the loss of competitiveness of these industries, declining growth rates, and the selling off of slave labour to the coffee *fazendas* in the south-east. 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.[69] It is possible, however, to verify the veracity of this argument. As we have seen, a useful indicator of the competitiveness of each of Brazil's export commodities is its relative share in the world market. It is conjectured that there exists an observable correlation between changes in each commodity's market share and variations in the exchange rate. We hypothesise that the milréis-sterling exchange rate is positively correlated with Brazil's market share for coffee and negatively correlated with its market share for cacao, cotton and sugar. In order to capture the mechanism of this curious case of Dutch disease, we have calculated the trade-weighted effective exchange rate for Brazil over the period in question. This is displayed,

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65 For the expansion of the railway and associated social savings costs see William R. Summerhill, 'Big Social Savings in a Small Laggard Economy: Railroad-Led Growth in Brazil,' *The Journal of Economic History*, 65: 1 (Mar., 2005), pp. 74-75.

66 Klein, 'Internal slave trade,'

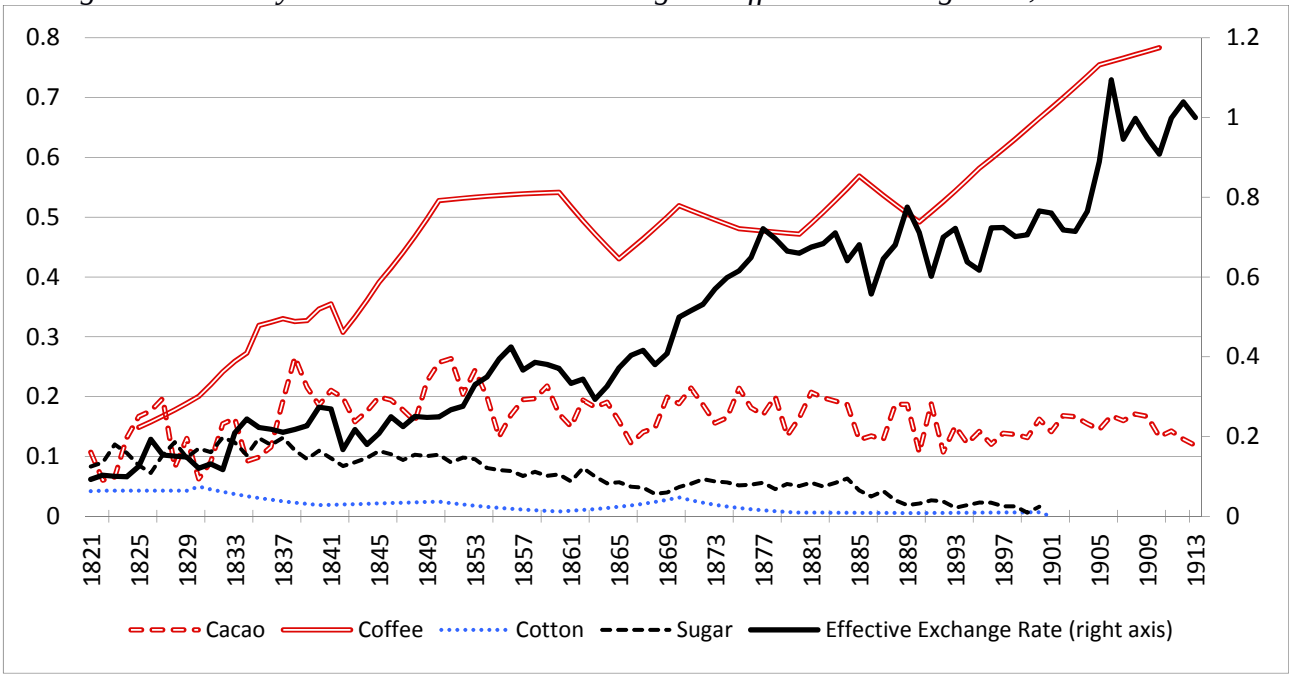
67 For a survey of the economics of the Dutch disease, see Jeffrey G. Williamson, *Trade and Poverty: When the Third World Fell Behind*, (MIT Press: Massachusetts, 2011), Chapter 4.

68 Nathaniel H. Leff, 'Economic Development and Regional Inequality: Origins of the Brazilian Case,' *The Quarterly Journal of Economics*, 86: 2 (1972), pp. 256-257. Also on this point see Luis Catão, 'The Failure of Export-Led Growth in Brazil and Mexico, c. 1870-1930,' University of London, Institute of Latin American Studies Research Papers No. 31, 1991, pp. 14-15. For an econometric study of the determinants of the exchange rate, see Cardoso, 'Exchange rates in nineteenth□century Brazil.'

69 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 op cit, p. 257.

alongside the market shares of each commodity, in figure 7. As predicted, the real exchange rate is positively correlated with Brazil's coffee market share and negatively correlated with its sugar, cotton, and cacao market shares. With the exception of cacao, these correlations are

Fig. 7. Commodity market share and trade-weighted effective exchange rate, 1821-1913.



Sources: see appendix.

significant.[70] While an in-depth analysis of this mechanism is outside the scope of this paper, our findings effectively provide a descriptive basis for Leff's observation. The initial competitive advantage afforded to these industries by the slave abolition shock and institutional turmoil of other tropical agricultural producers was infected by this coffee-led Dutch disease. As a result, the growth of these industries stagnated and Brazilian coffee came to dominate not only the domestic export economy but also the world market.

Concluding remarks

The objective of this article has been to re-evaluate both the statistical basis and traditional narrative of Brazil's export performance during the long nineteenth century. Our conclusions provide the groundwork for not only a reappraisal of Brazil's export growth during the post-independence period, but also for a re-examination of the export performance of the tropical agricultural producing periphery as a whole. The implications of our findings transcend the pessimistic perspective of the lost decades argument and reveal a region rift by countervailing tendencies. As we have seen, the basis for this pessimism laid in the interpretation of official statistics that were largely inaccurate. These statistics were in fact undervalued, thus misrepresenting the true dynamism of Brazil's export growth during the post-independence decades. A cross-country comparison shows that Brazil was one of the most dynamic countries in the region. Furthermore, there is clear evidence of divergence within the tropical agricultural producers of the Americas. The catalyst for this divergence was an institutional shock that gave Brazil an initial competitive advantage vis-à-vis other producers of the region. Brazilian producers, both in the north-east and south-east, responded to the incentives provided by the shock by expanding both the agricultural frontier and imported slave

70 The correlation coefficients are as follows: cacao -0.05, coffee 0.85, cotton -0.76, sugar -0.87.

labour. Output expanded rapidly and Brazil increased its market share. This initial competitive advantage, however, was checked by a classic mechanism. As the century wore on, a different divergence developed between the export performances of Brazil's commodities. Effectively, the country's export performance was hindered by a form of Dutch disease whereby the exchange rate, largely determined by the appreciative pressures of coffee exports, priced other commodities out of the international market. Thus sugar gradually lost its competitiveness over the century while coffee rose to dominate the world market.

The implications of our findings also suggest a reappraisal of the arguments propounded by the lost decades and commodity lottery literature. In regards to the lost decades perspective, emphasis must be placed not only on the importance and relevance of a comparative perspective,[71] but also upon the ways in which divergent economic experiences were interrelated. In the case of Brazil, the focus on the exceptional nature of independence has overlooked the importance of the impact of exogenous institutional shocks on the country's export performance. Only by adopting a regional comparative perspective do we comprehend that the story of Brazil's exceptional post-independence export performance *was* a story of institutional shocks. What's more, the explanatory power of the commodity lottery argument is shown to be limited when applied to a comparative setting. Brazil's world export share performance was closer to that of land-abundant temperate and mineral-producing countries of the region than that of other tropical agricultural producers. Thus the luck of the draw was not as important as the manner in which each country responded to the institutional demands of their relative factor endowments.

Together these conclusions indicate a direction for future research. To begin with, the divergence that took place in the tropics during the post-independence decades is deserving of more attention. Further study of the mechanisms underlying this divergence will surely help to understand not only the diversity of short-run economic outcomes but also the long-run development trends of these countries. In respect to Brazilian economic historiography, greater attention should be paid to the post-independence decades in order to further elucidate the drivers and subtleties of the country's dynamic export performance. Finally, an examination of the long-run impact of the Dutch disease on both export performance and regional income growth would provide a greater understanding of Brazil's economic development during the long nineteenth century.

71 Which effectively lies at the heart of Prados de la Escosura's critique of the lost decades argument. See Prados de la Escosura, 'Lost Decades,' p. 305.

Appendix

1.1. Price accuracy index: The price accuracy index for Brazilian exports takes the form

$$PAI_{it} = \sum_{j=1}^{n} \left(\frac{P_{ijt} * Q_{ijt}}{P_{mjt} * Q_{ijt}} \right)$$

where PAI_{it} is the price accuracy index of country *i* at time *t*, P_{ij} the unit value of commodity *j* in country *i* at time *t*, P_{mj} the unit value of commodity *j* in country *m* at time *t*, and Q_{ij} the quantity in metric tons of commodity *j* in country *i* at time *t*. The results are given in the text.

1.2. Export price index: We construct a Fisher index of Brazilian export prices, calculated as the geometric mean of the product of the Paasche and Laspeyres indices:

$$EPI_{it} = \sqrt{\frac{\sum P_{jt} * Q_{jt}}{\sum P_{j,1880-82} * Q_{jt}} * \frac{\sum P_{jt} * Q_{j,1880-82}}{\sum P_{j,1880-82} * Q_{j,1880-82}}}$$

where EPI_{it} is the export price index of country *i* at time *t*, P_{jt} is the unit value of commodity *j* at time *t*, and Q_{jt} is the quantity in metric tons of commodity *j* at time *t*. We have used the average of the years 1880-82 as a reference period because it represents the complete cross section of Brazil's export commodity structure.

1.3. Constant market share analysis: The constant market share analysis for exports on the aggregate- and commodity-level takes the form

$$V_{j,t+1} - V_{j,t} = (R_{j,t-t+1} V_{j,t}) + [V_{j,t+1} - V_{j,t} - (R_{j,t-t+1} V_{j,t})],$$

where $V_{j,t+1}$ is Brazil's exports of commodity *j* in period *t+1*, $V_{j,t}$ is Brazil's exports of commodity *j* in period *t*, and $R_{j,t-t+1}$ is the percentage increase of total world exports of commodity *j* from period *t* to period *t+1*. For the aggregate-level we use total export values in constant prices and for the commodity-level we use total quantities. Data sources are given below.

1.4. Trade-weighted effective exchange rate: The trade-weighted effective exchange rate takes the form

$$EER_{jt} = \sum_{i=1}^{n} \alpha_{ijt} \left(\frac{(CPI_{jt} * R_{ijt} / CPI_{it})}{(CPI_{j} * R_{ij} / CPI_{j})_{1913}} * 100 \right)$$

where EER_{jt} is the trade-weighted effective exchange rate of country *j* at time *t*, CPI_{jt} is the consumer price index of in country *j* at time *t*, CPI_{it} is the consumer price index in country *I* at time *t*, R_{ijt} is the nominal bilateral exchange rate between country *i* and *j* at time *t*, α_{ijt} is the share of country *i*'s exports from country *j* at time *t,* and *n* is the number of trading partners. In the case of France we have used a wholesale price index. Data of consumer and wholesale price indices for France, the United Kingdom and the United States from Brian Mitchell, *International Historical Statistics: Americas, 1750-2005*, (London: Palgrave Macmillan), 2007; for Brazil we use an inflation index for Rio de Janeiro from Lobo, Eulália

Maria Lahmeyer (1978), *História do Rio de Janeiro (do capital comercial ao capital industrial e financeiro)*, IBMEC, Rio de Janeiro, 2º vol. pp. 748-751. Data for exchange rates come from Federico and Tena-Junguito, 'Independence and emancipation.'

2. Data sources

2.1. International Prices

1821-1849: We have computed a weighted average of the monthly prices from different origins to the United Kingdom and Philadelphia. As weights we use the distribution of each origin in a sample of total quantum exports. Price data for the United Kingdom comes from Gayer, A.D., W.W. Rostow, and A.J. Schwartz (1953), *Microfilmed Supplement to Volumes I and II of The Growth and Fluctuation of the British Economy 1790-1850*. Oxford: Clarendon Press. Data from Philadelphia from Bezanson, Anne, Robert D. Gray and Miriam Hussey. (1936-37). *Wholesale prices in Philadelphia, 1784-1861*. Philadelphia: University of Pennsylvania Press.

Coffee: Prices: Cuba, St. Domingo, Brazil Rio 7 and Java to Philadelphia and Jamaica Ordinary to the United Kingdom. Quantities: exports, Samper, Mario and Radin Fernando. (2004). Appendix: Historical Statistics of Coffee Production and Trade from 1700 to 1960. In William Gervase Clarence-Smith and Steven Topik (eds.), *The Global Coffee Economy in Africa, Asia, and Latin America, 1500–1989*. Cambridge: Cambridge University Press, pp. 411-463, Tables A12, A13, A14, A15.
Sugar: Prices: Jamaica Brown to the United Kingdom, Cuba Brown and Muscovado to Philadelphia. Quantities: exports, Bulmer-Thomas, Victor. (2012). *The Economic History of the Caribbean from the Napoleonic Wars*. Cambridge: Cambridge University Press, Table A10; world production, Manuel Moreno Fraginals, *El ingenio: Complejo económico social cubano del azúcar*, Havana: Editorial de Ciencias Sociales, 1978.
Hides: Prices: Buenos Aires to the United Kingdom, Buenos Aires Ox hides to Philadelphia. We have taken the arithmetic average of the two series.
Cotton: Prices: Guyana Raw (Berbice or Demerara) to the United Kingdom, Middling Uplands from the United States to the United Kingdom, from M. B. Hammond, *The cotton industry; an essay in American economic history*, New York: Macmillon, 1897, p. 898. Quantities: exports, Bulmer-Thomas, *The Economic History of the Caribbean*, Table A10; exports, Hammond, T*he cotton industry,* p. 898; world production, Harry Hammond, 'Production and Consumption of Cotton in bales of 400 lb. weight by the countries contributing to the world's supply and demand for a series of years from 1790 to 1895.' In *The Cotton Plant: its history, botany, chemistry, culture, enemies and uses*, Washington: Government Printing Office, 1896, p. 42, Plate II.
Cocoa: Prices: Granada to the United Kingdom, Caracas to Philadelphia, "Island" (includes Guayaquil, St. Domingo, Caracas and Trinidad) to Philadelphia. Quantities: Clarence-Smith, William Gervase. (2000). *Cocoa & Chocolate, 1765-1914*. London: Routledge, Appendix 2.

1850-1853: As computed values are not listed in the official British statistics for this period, we have taken the prices for four commodities (sugar, hides, coffee, cotton) from Sauerbeck, Augustus. (1886). Prices of Commodities and the Precious Metals. *Journal of the Statistical Society of London*, 49 (3), pp. 581-648, and multiplied them by the quantities from the British series. 1850 quantities come from United Kingdom. (1854). *British produce and manufactures. Accounts of exports to and imports from the British West India colonies, the East Indies, Ceylon, China, & c., for the seven years*

ending 5 January 1853; also the number of ships that have entered and cleared for the above places during each year of the period. House of Commons Parliamentary Papers, pp. 20-21. Cacao and rubber prices for the period 1850-1853 are taken as the average cacao price during the period 1847-1851 and the average price for Caoutchouc in 1850, respectively. These figures are taken from Poole, B. (1852). *Statistics of British Commerce: Being a Compendium of the Productions, Manufactures, Imports, and Exports, of the United Kingdom*. London: McCorquodale and Co, pp. 52, 75.
1854-1913: Imports from Brazil to the United Kingdom, taken from United Kingdom. (Various years). *Annual statement of the trade of the United Kingdom with foreign countries and British possessions*. House of Commons Parliamentary Papers.

2.2. Trade costs

2.2.1. Export duties

Given the diverse nature of the origins of the international price series for the period 1821-1849, we have deducted an "additional" trade cost - which does not include freight or insurance costs - equivalent to the Brazilian export tax. This additional cost falls in the range of 1 to 7 per cent of the value of exports. For the Imperial period, we have used the effective duty on exports (the ratio between the total quantity of export duties collected and the total value of exports) in an attempt to obviate the problems associated with the application of the official ad valorem rates to the *pauta*. During the Republican period the issue is somewhat more complicated. The Republican Constitution devolved the right to earn export duties to the regional governments. The size of the export duty on a single commodity could thus differ across regions; for example, the export duty on cacao from Bahia in 1913 was 14 per cent while that from Pará was 6 per cent. Where possible, we use the duties applied by the principal exporting regions, as these duties would have fallen heaviest on the values of exports. Thus it must be kept in mind that the rate used for the calculation of the price accuracy index is most likely under-valued by a number of percentage points. The sources used for each commodity are listed below.

Cacao: 1821-1869: Brazil. (1914). *Finanças, Quadros synopticos da receita e despeza do Brasil, Periodo de 1822 a 1913*. Rio de Janeiro: Typographia do Ministerio da Agricultura, pp. 14-17; 1870-1871: Brazil. (1878). *Estatistica do Commercio Maritimo do Brazil do Exercicio de 1871-1872, 2.ª Parte, Commercio Geral*. Rio de Janeiro: Typographia Nacional, pp. 220-221; 1881-1913: Pará. (1915). *Mensagem dirigida em 1 de agosto de 1915 ao Congreso Legislativo do Pará pelo Dr. Enéas Martins*. Belém: Imprensa Official do Estado do Pará, p. 91. The years 1872 to 1880 have been assumed using the general trend of national duties.

Coffee: 1821-1849: Brazil, *Finanças,* pp. 14-17; 1850-1890: Annex "Impostos de exportação, 1850-1930" from Abreu and Fernandes, 'Market power and commodity prices,' available from http://www.economia.puc-rio.br/mpabreu/projeto%20cnpq.html; 1891-1913: São Paulo. (1915). *Annuario Estatistico de São Paulo 1913*. São Paulo: Typographia do Diario Official, p. 124.

Cotton: 1821-1869: Brazil, *Finanças,* pp. 14-17; 1870-1881: Pernambuco. (1884). *Projecto de receita provincial organisado por ordem do exm. sr. desembargador José Manoel de Freitas, dignissimo presidente desta provincia, pelo*

administrador do Consulado Provincial, bacharel Francisco Amynthas de Carvalho Moura. Pernambuco: Typographia de Manoel Figueiroa de Faria and Filhos, Mapa 5; 1881-1886: Rio de Janeiro. (Various years). *Mappas estatisticos do commercio e navegação do Porto do Rio de Janeiro*. Rio de Janeiro: Typographia da Alfandega; 1891-1899: Rio Grande do Norte. (Various years). *Mensagem dirigida ao Congresso Constituinte do Estado do Rio Grande do Norte*. Typographia do Rio Grande do Norte.; 1902-1913: Pernambuco. (Various years). *Mensagem do Governador do Estado*. Recife: Typgraphia do Diario de Pernambuco. The years 1883, 1887 to 1890, 1899 to 1901, 1905 to 1907 have been assumed using the general trend of national and regional duties.

Hides: 1821-1869: Brazil, *Finanças,* pp. 14-17; 1870-1882: Pernambuco, *Projecto de receita,* Mapa 5; 1884-1888: Rio de Janeiro, *Mappas estatisticos*; 1900-1906: Pará. (1911). *Mensagem dirigida em 7 de Setembro de 1911 ao Congresso Legislativo do Pará pelo Dr. João Antonio Luiz Coelho*. Belém: Imprensa Official do Estado do Pará, pp. 233-234; 1890-1891, 1907-1913: Bahia. (Various years). *Mensagem apresentada a Assembléa Geral Legislativa do Estado da Bahia*. Bahia: Typographia do Diario da Bahia. The years 1883, 1889, 1892 to 1899 have been assumed using the general trend of national and regional duties.

Rubber: 1850-1869: Brazil, *Finanças,* pp. 14-17; 1870-1871: Brazil, *Estatistica do Commercio Maritimo,* pp. 234-235; 1878-1884: Rio de Janeiro, *Mappas estatisticos*; 1885-1913: Pará, *Mensagem dirigida em 1 de agosto,* p. 91. The years 1875 to 1877, 1883 have been assumed using the general trend of national duties.

Sugar: 1821-1869: Brazil, *Finanças,* pp. 14-17; 1870-1871: Brazil, *Estatistica do Commercio Maritimo,* pp. 218-219; 1884-1887: Rio de Janeiro, *Mappas estatisticos*; 1870-1882, 1902-1904, 1908-1913: Pernambuco, *Mensagem do Governador do Estado*. The years 1883, 1888 to 1901, 1905 to 1907 have been assumed using the general trend of national and regional duties.

2.2.2. Freight rates

Cacao: We use the freight rates for coffee.

Coffee: 1821-1847: Schöller, Paul. (1951). L'évolution séculaire des taux de fret et d'assurance maritimes 1819-1940. *Bulletin de l'Institut de Recherches Économiques et Sociales*, 17 (5), pp. 519-557. Rio de Janeiro to Antwerp, “bulky” freight index, interpolated for the periods 1831-1841 and 1843-1848 to extend backwards Klovland's 1848 figure.
1848-1856: Klovland, J. T. (2006). A Repeat Sailings Index of Ocean Freight Rates for the 1850s. Discussion paper SAM 40 2006, Department of Economics, Norwegian School of Economics and Business Administration. Rio de Janeiro to the British Channel.
1857-1875, 1877-1878: Harley, C. Knick. (1989). Coal Exports and British Shipping, 1850-1913. *Explorations in Economic History*, 26, pp. 311-338. Rio to Britain.
1876: we take the arithmetic mean of monthly rates from Rio de Janeiro to the British Channel as found in the *Retrospectivo Commercial* (various years) of the *Jornal do Commercio* (various years).
1879-1892: we take the arithmetic mean of monthly freight rates from Rio de Janeiro to

London as found in the *Retrospectivo Commercial* of the *Jornal do Commercio.*
1893-1897: we extend the series using the East Latin American nominal freight index for grain from Mohammed, Saif I. Shah and Jeffrey G. Williamson. (2004). Freight rates and productivity gains in British tramp shipping 1869–1950, *Explorations in Economic History,* 41, pp. 172–203.
1898-1913: we take the arithmetic mean of monthly freight rates from Rio de Janeiro and Santos to London as found in *Wileman's Brazilian Review* (various years).

Cotton: 1821-1849: Harley, C. Knick. (1988). Ocean Freight Rates and Productivity, 1740-1913: The Primacy of Mechanical Invention Reaffirmed. *The Journal of Economic History*, 48 (4), pp. 851-876. New Orleans to Liverpool. The period 1821-1824 has been interpolated using the 1820 and 1825 values.
1850-1868: Schöller, 'L'évolution séculaire.' Rio de Janeiro to Antwerp, "light" freight index.
1869-1877: we extend the series backwards using the East North American nominal freight index of grain from Mohammed and Williamson, 'Freight rates and productivity gains.'
1878-1897: we extend the series backwards using the North American Gulf Coast cotton nominal freight index of cotton from Mohammed and Williamson, 'Freight rates and productivity gains.'
1885: we cover this year using the East Latin American nominal freight index of grain from Mohammed and Williamson, 'Freight rates and productivity gains.'
1898-1913: we take the arithmetic mean of monthly freight rates from Pernambuco to Liverpool as found in *Wileman's Brazilian Review*.

Hides: 1821-1847: Schöller, 'L'évolution séculaire.' Rio de Janeiro to Antwerp, "bulky" freight index, interpolated for the periods 1831-1841 and 1843-1848 to match Klovland's 1848 figure.
1848-1861: Klovland, 'A Repeat Sailings Index.' Rio-Grande to the United Kingdom.
1862-1868: we have extended Klovland's series using Schöller's Rio de Janeiro to Antwerp, "bulky" freight index.
1869: we take the arithmetic mean of 1868 and 1870.
1870-1872: we take the arithmetic mean of the minimum and maximum rates from Rio Grande do Sul to the United Kingdom from Angier, E. A. V. (1920). *Fifty year' freights*. London: Fairplay.
1874, 1876-1892: we take the arithmetic mean of monthly rates from Rio de Janeiro to the British Channel as found in the *Retrospectivo Commercial* of the *Jornal do Commercio.* These rates are not explicitly denoted as Hides (Couros) until 1891.
1875: Harley, 'Coal Exports and British Shipping,' coffee, Rio to Britain.
1893-1897: we extend the series using the East Latin American nominal freight index of grain from Mohammed and Williamson, 'Freight rates and productivity gains.'
1898-1900, 1902-1903: we take the arithmetic mean of monthly freight rates from Rio de Janeiro to the British Channel as found in *Wileman's Brazilian Review*.
1901: we take the arithmetic mean of 1900 and 1902.
1904-1913: we extend using the East Latin American nominal freight index of grain from Mohammed and Williamson, 'Freight rates and productivity gains.'

Rubber: We use the freight rates for coffee.

Sugar: 1821-1868: Schöller, 'L'évolution séculaire.' Rio de Janeiro to Antwerp, "bulky"

freight index, interpolated for the periods 1831-1841 and 1843-1850.
1869-1897: we extend the series backwards using the East Latin American nominal freight index of grain from Mohammed and Williamson, 'Freight rates and productivity gains.'
1898-1913: we take the arithmetic mean of monthly freight rates from Pernambuco to Liverpool as found in *Wileman's Brazilian Review*.

2.2.3. Insurance

Schöller, 'L'évolution séculaire,' Statistical appendix. We use the insurance quotes for Brazil from 1821-1867 and for Rio de la Plata from 1880-1910. The intervening period, 1868-1879, has been interpolated.