

Taxation and the stagnation of cotton exports in Brazil, 1800 – 1860

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Abstract

Brazil's northern region supplied 40 per cent of the cotton imported in Liverpool during the last decade of the eighteenth century. The following decades, however, cotton exports stagnated and Brazil became the only major international cotton producer that decreased its exports to European countries. This paper shows that fiscal policies of the Brazil's central government had a significant role on the decline of cotton exports. The central government set export taxes to increase revenue from higher quality long-staple cotton, decreasing the profitability of short staples, which saw the largest increase in demand during the nineteenth century.

Introduction

Brazil was the most important supplier of raw cotton to the new textile sector of muslins and calicos in Britain during the last decade of the eighteenth century.¹ Even after cotton exports began to increase from the United States to Britain, Brazilian raw cotton remained important into the nineteenth century. Brazilian raw cotton represented 28 per cent of the cotton market in Liverpool between 1800 and 1815, second to the United States, with 43 per cent.² Despite its initial success, cotton production in Brazil stagnated during the 1820s and it did not increase again until the 1860s, when the US Civil War reduced world cotton supply. The decline in Brazilian exports, however, was not an inevitable outcome from the productivity gains in the United States. Exports from other cotton regions that did not see a similar productivity increase, such as the East Indies and Egypt, grew steadily during the nineteenth century.

The reason Brazilian cotton 'wither[ed] away in the face of competition' after decades of increasing exports is considered a central issue to understand the economic decline of Northeast Brazil during the early nineteenth century.³ Indeed, several causes have been identified by the literature for the stagnation of cotton trade in Brazil: declining prices, competition from sugar and coffee plantations

¹Pereira, 'The Rise of the Cotton Trade in Brazil during the Industrial Revolution.'

²Krichtal, 'Liverpool and the Raw Cotton Trade: A Study of the Port and Its Merchant Community, 1770-1815.'

³Alden, 'Late Colonial Brazil, 1750-1808,' 322.

for slaves, high transport costs, and lack of capital to increase productivity.⁴ One limitation of previous research, however, is that studies such as those by Alice Canabrava, Francisco Mesquita, Luiz Barbosa, and Stanley Stein largely rely on data after 1850, when cotton plantations had already been in decline for more than a decade.

To contribute to this debate, this paper provides new data about cotton production for the provinces of Maranhão and Pernambuco – the most important cotton exporters in Brazil at the time – and shows that Brazil’s divergence from other cotton exporters began in the first decades of the nineteenth century, a period when productivity across the Americas was similar. During the early nineteenth century all producers shared high transport costs and declining international prices and, therefore, these conditions are insufficient to explain the stagnation of cotton production in Brazil. Rather than transport costs and international competition, Nathaniel Leff’s argues that the sterling-*milreis* exchange rate from coffee exports made cotton unprofitable in the less productive regions of the Northeast.⁵ The cotton crisis, however, began before the coffee boom, when exchange rates in the Northeast were in fact higher than in the southern regions.⁶ Moreover, recent research shows that the cotton regions did not have a labour supply problem: Maranhão had a slave population comparable to Mississippi and Louisiana, and higher than Alabama and Georgia, until 1840.⁷

I provide evidence that cotton profitability was restricted by the fiscal policy implemented by the Portuguese government after 1808.⁸ Using optimal taxation estimates (following Irwin, 2003), I show that export taxes imposed costs that were much higher than what the average cotton planter could afford and that this explain the ‘profitability paradox’ presented in studies of Brazilian cotton, i.e., even during times of high prices and high demand, ‘something internally already conditioned the depression of the cotton crop,’ restricting cultivation area and volume of production.⁹ Robert Hesketh, a cotton trader and the first British consul in Maranhão, reported already in the 1810s the unusual situation of lower profits during periods of high international prices. He stated that despite ‘very profitable prices’ and ‘overflowing quantity of capital in the market’ at the time, planters did not improve their economic situation, and all that remained from the cotton boom years were debts with slave dealers.¹⁰ The consul also noticed that the ‘chief part of all taxes and duties’ fell on planters, and ‘so long as this system is acted upon, there appears little chance of any steady advance in their wealth.’¹¹

Although excessive taxation was a constant source of dissatisfaction for planters in the Northeast, the impact of the Portuguese fiscal policy on cotton exports is still largely unknown. This issue is even more important because the increased capacity of the Portuguese government to ‘meddle

⁴Barbosa, ‘Cotton in 19th Century Brazil: Dependency and Development’; Stein, *Origens e evolução da indústria têxtil no Brasil*; Mesquita, *Vida e morte da economia algodoeira do Maranhão*; Canabrava, *O Desenvolvimento Da Cultura Do Algodão Na Província de São Paulo, 1861-1875*.

⁵Leff, ‘Economic Development and Regional Inequality.’

⁶Cavalcanti, *O Meio Circulante Nacional: Resenha e Compilação Chronologica de Legislação e de Factos, 1893*, 1:326.

⁷Prices were also similar during this period. See Pereira, ‘Poor Man’s Crop? Slavery in Cotton Regions in Brazil (1800-1850).’

⁸David Denslow was one of the few researchers who noted that high export taxes could be one of the reasons for the stagnation of cotton exports in Brazil, but he did not provide evidence to support this hypothesis. See Denslow, ‘As Origens Da Desigualdade Regional Do Brasil,’ 60.

⁹Mesquita, *Vida e morte da economia algodoeira do Maranhão*, 230.

¹⁰TNA, FO 63/240, p.203

¹¹TNA, FO 63/249, p.74

in provincial affairs' after 1808 is a well-known phenomenon in Brazilian history.¹² For instance, the violent federalist claims in Pernambuco between 1817 and 1824 are associated with the 'fiscal voracity' of Rio de Janeiro and the weight of the royal court on provincial budgets.¹³ In 1810, 40 per cent of Pernambuco's expenditures were attributed to transfers for the 'royal treasure' and, when cotton prices were at their highest in 1816, Pernambuco still transferred 32 per cent of its revenues to Rio de Janeiro.¹⁴ Henry Koster wrote in the 1810s with a hint of indignation that citizens in Recife, whilst living in total darkness, had to pay a tax for lighting the streets of Rio de Janeiro.¹⁵ In Maranhão, withdrawals from the provincial treasury financed the police in Rio de Janeiro and the creation of the Bank of Brazil.¹⁶ Moreover, after Brazil's independence, Maranhão initially remained loyal to Portugal because government opponents argued that the only connection the province had with Rio de Janeiro was with 'its treasury'.¹⁷ At that time, both Maranhão and Pernambuco were willing to favour the Portuguese government because the former ruler now defended a greater administrative decentralization in Brazil.¹⁸ Newspapers criticized the fiscal policy of the imperial government throughout the nineteenth century because Brazil was 'one of the rare countries' that taxed exports.¹⁹

The next section presents a historical background with information about the cotton trade in Maranhão and Pernambuco. Section II present fiscal information for Maranhão to show that taxation levied by the imperial government represented a heavy burden for cotton producers and constrained investment decisions of provincial governments and planters. In addition to export taxes, it highlights that monetary crises in Rio de Janeiro after 1827 increased the premium of gold and silver coins, which were used to pay taxes at custom houses and thus increased the effective tariff rate that exporters faced. Section III discusses cotton production costs in Maranhão and section IV presents estimates for the optimal rate of taxation in Brazil, showing that export taxes were set to maximize revenues from the high-quality staple from Pernambuco and, therefore, were detrimental to planters in Maranhão because they produced a staple that was a close substitute for upland cotton from the United States. Pernambuco, however, exported a longer fibre and therefore, faced a market with less competition and higher profit rates. This explains why Pernambuco managed to maintain some importance in international cotton markets throughout the nineteenth century, especially during the United States Civil War during the 1860s.

I. The rise and fall of Brazilian cotton in British markets

Before the nineteenth century the British cotton market for yarns used in calicoes and other all-cotton textiles relied mostly on exports from South American and, for cloths with lower counts, from the Caribbean. At the turn of the nineteenth century, however, as cotton markets continued to increase, technological improvements and new raw cotton suppliers reduced the natural advantages that the Brazilian long-staple possessed. First, the increased use of mules made it easier to

¹²Barman, *Brazil*, 47.

¹³Mello, *A outra independência*, 30.

¹⁴'Plano Sugerido Para o Effectivo Melhoramento Das Finanças Portuguezas,' *Correio Braziliense*. 1815, Edição 15, p.95. Eisenberg, *The Sugar Industry in Pernambuco*, 30.

¹⁵Koster, *Travels in Brazil*, 32.

¹⁶Viveiros, *História do comércio do Maranhão*, 1954, 1:139.

¹⁷Vieira da Silva, *História da independência da Província do Maranhão, 1822-1828*, 49.

¹⁸Mello, *A outra independência*, 80.

¹⁹'Os Direitos de Exportação,' 1.

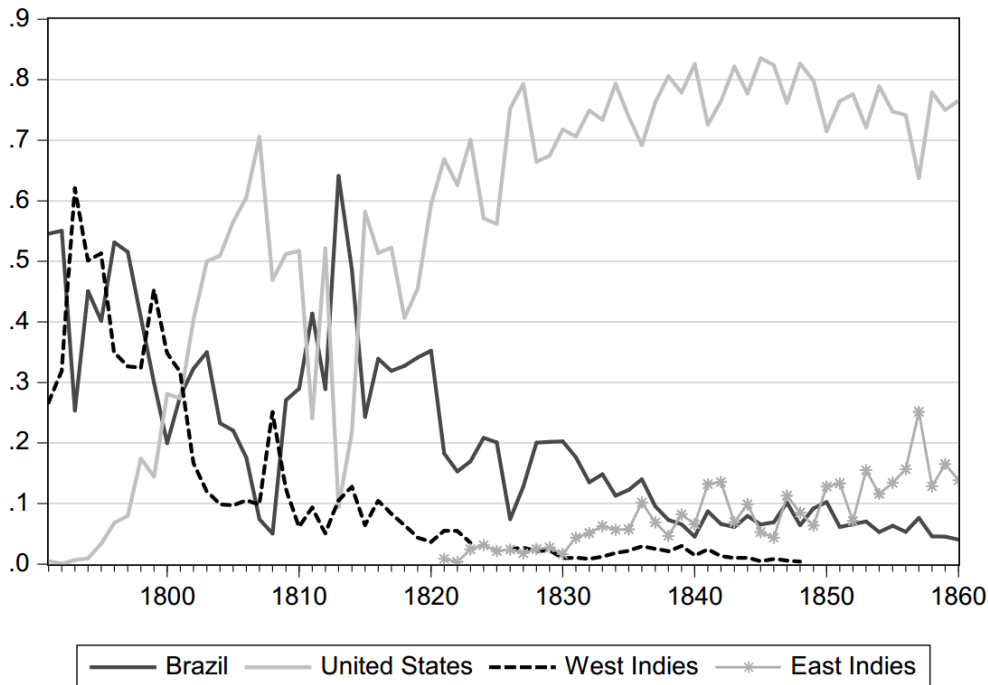


Figure 1: Share of cotton imports in Liverpool, 1791-1860. Sources: Donnell, E. J. *Chronological and Statistical History of Cotton*; Smithers, *Liverpool, Its Commerce, Statistics*; Krichtal, ‘Liverpool and the Raw Cotton Trade’

use mixed staples, something that lowered demand for the more expensive long-staple cotton.²⁰ Second, productivity growth in yarn production created bottlenecks in the following stages of textile production, creating a demand for weaving mechanization.²¹ The growth of power-looms in the first three decades of the nineteenth century slowly displaced hand weavers and accelerated demand for raw cotton.²² Figure 1 shows that, because long-staple cotton had lower yields than shorter varieties, the increased use of saw-gins to process upland cotton allowed the United States to overtake other produces in the British markets at the beginning of the nineteenth century. Brazil’s relative decline after 1800 was only reversed during the United States embargo in 1807 and the war with Britain in 1812, but its decreasing market share continued after 1819.²³

Despite the presence of cotton planting in southern regions, such as São Paulo and Minas Gerais, for the first half of the nineteenth century Maranhão and Pernambuco dominated cotton exports in Brazil.²⁴ During the 1820s, both provinces accounted for 88 per cent of cotton exports in Brazil; and this share was still 63 per cent in the 1840s.²⁵ Maranhão was the largest cotton exporter in Brazil from 1760, when the first exports took place, until the 1840s, when cotton production increased in other provinces.²⁶ Moreover, unlike Pernambuco and other Northeast provinces, cotton was the main commodity in Maranhão, and it represented on average 80 per cent of exports between 1800 and 1821, the ‘golden years’ of export growth. Rice, the second export product in Maranhão,

²⁰Lazonick, ‘Factor Costs and the Diffusion of Ring Spinning in Britain Prior to World War I,’ 95.

²¹Radcliffe, *Origin of the New System of Manufacture*, 12.

²²Harley, ‘Cotton Textile Prices and the Industrial Revolution,’ 51.

²³Irwin, ‘The Welfare Cost of Autarky.’

²⁴Albuquerque, *Capital comercial, indústria têxtil e produção agrícola*, 26.

²⁵TNA, FO 881/1003 – Soares, ‘BRAZIL: Report. Cultivation of Cotton. July 23, 1861

²⁶TNA, FO 881/1003

occupied just 17 per cent of the foreign trade.²⁷

During the 1820s, nonetheless, cotton exports stopped growing and the value of exports decreased as well in view of the declining prices. Between 1812 and 1836 the average annual value of exports from Maranhão was £389,938, while after 1837 it dropped to £186,906. For Maranhão, part of the decrease in 1837 can be explained by the *Balaiada* revolt, in which rebel forces attacked the most important cotton region in the province.²⁸ But despite the revolt, the decline in cotton exports was not a phenomenon restricted to Maranhão: looking at the British ledgers of trade, the annual value of British imports of Brazilian cotton was £1,254,024 before 1837, and £600,850 after this year. Brazilian cotton trade also decreased with France, which was the second cotton export destination, after 1837. From an annual average of 21,700 bales between 1826 and 1837, it declined to 6,165 after that date. Cotton trade with the rest of the European continent also fell by half after 1837 (to 7,970 bales per year), recovering only after 1848, with an annual average of 26,416 bales until 1860.²⁹

The decrease in Brazilian exports, therefore, marks a notable difference from the continuous increase presented by the overall cotton trade. Weekly data for cotton consumption in Liverpool, i.e., sales in the port after importation, shows that British consumption of raw cotton grew continuously until 1860 (see appendix for structural brakes estimates). Trade data for the United States, the East Indies, and Egypt, which were, along with Brazil the most important cotton suppliers to Liverpool, also show increasing exports to Britain. Egypt and the East Indies, however, were not necessarily direct Brazilian competitors, since the cotton market in Liverpool was segmented by staples' quality. Indeed, cotton from the East Indies gained importance in textile production only after 1815, when it began to be mixed with longer staples from other regions. Mixing different staples allowed India's short staple – which could not be previously spun with the machinery used at the time – to be used in the mule and spinning frames.³⁰ During the 1850s, nevertheless, cotton produced in the East Indies was still mainly utilized for counts between 18 and 24, a different market than the average Brazilian cotton.³¹ On the opposite end of the market, Egypt exported long-staple cotton used in high quality fabrics. But despite some exports already in the 1820s, Egypt only increased its exports to Britain by a significant amount during the 1840s.³²

In the early nineteenth century, descriptions of cotton markets in Brazil showed that Pernambuco's long-stapled cotton competed with the United States' Sea Island, while Maranhão's staple, with its shorter fibre, had similar properties to the cotton from Georgia and New Orleans.³³ Therefore, despite some cultivation of longer staples in Maranhão in the region of Alcântara, most exports competed with shorter staples from the US, which had the largest increase in productivity before 1850. Pernambuco, on the other hand, competed in a market in which supply was not elastic: while US exports of fuzzy seed cotton increased from 113 million lb. in 1820 to more than 1.1 billion lb. in 1860, Sea Island cotton exports did not increase in those decades, averaging 9.5 million lb. per year.³⁴ This was not far from the total exports from Pernambuco, with an annual average of 6.3 million lb. between 1800 and 1860. Price information in Figure 2 confirms the difference

²⁷Lago, *Estatística histórico-geográfica da província do Maranhão*.

²⁸Viveiros, *História do comércio do Maranhão*, 1954, 1:154, 203.

²⁹Donnell, *Chronological and Statistical History of Cotton*.

³⁰Donnell, 68.

³¹'O Algodão,' 201.

³²Donnell, *Chronological and Statistical History of Cotton*., 91; Owen, *Cotton and the Egyptian Economy, 1820-1914*.

³³Gayoso, *Compendio Historico-Politico Dos Principios Da Lavoura Do Maranhão*, 266.

³⁴Mann, *The Cotton Trade of Great Britain*, 99.

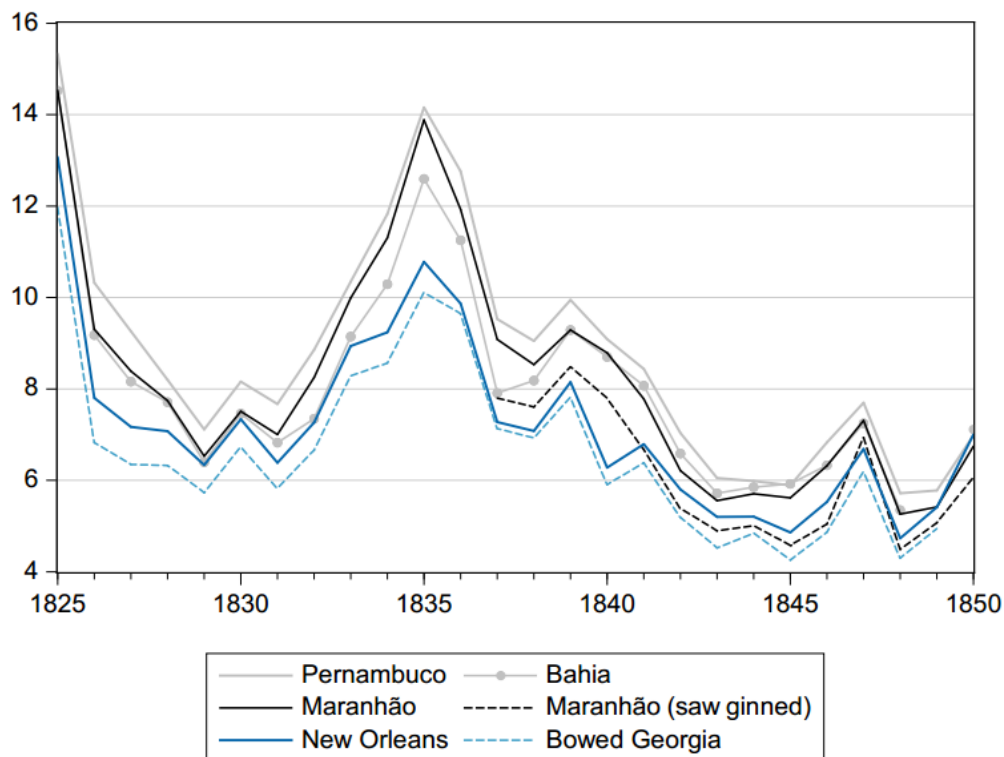


Figure 2: Cotton prices in Liverpool 1825 – 1850. Sources: Liverpool Mercury and The Times newspapers

between the Brazilian types of cotton, showing that Pernambuco’s staple achieved higher prices than Maranhão’s in Liverpool throughout the first half of the nineteenth century.

Maranhão, therefore, faced harsher competition in the market for cotton exports than did Pernambuco. For Maranhão, competition from the US shorter staples inevitably put pressure on planters to increase their productivity: Whitney’s saw-gin was adopted in Maranhão during the early 1830s, and local newspapers began to report prices of saw-ginned cotton in 1834.³⁵ After 1837, newspapers from Liverpool also reported saw-ginned cotton coming from Maranhão, with prices on average 13 per cent lower than the regular cotton from Maranhão.³⁶

As Figure 2 shows, competitive prices in Liverpool do not seem to have been the problem for Brazilian planters. Maranhão’s prices for cotton that was not saw-ginned were on average 1d per lb. (14 per cent) higher than that from New Orleans between 1825 and 1850, but the higher quality of Maranhão cotton can explain most of this difference – as saw-ginned cotton had a difference of 0.36d. Indeed, the problem for Brazilian planters were low prices at departing ports. When price differentials between port of departure and arrival are considered, the price difference for US cotton from the port of New York to Liverpool was on average 0.98d., while between Maranhão and Liverpool it was 2.47d. This shows that cotton sellers in Brazil received proportionally less than exporters in the United States, reducing profit rates.

³⁵Mesquita, *Vida e morte da economia algodoeira do Maranhão*, 113.

³⁶Some reports stated that the green-seed cotton (*herbaceous*) was introduced in Brazil from the United States only around 1840, but other sources suggest that Maranhão’s saw-gins were already using fuzzy seed cotton earlier. See Branner, *Cotton in the Empire of Brazil*, 31; Taunay and Fonseca, *Tratado da cultura do algodoeiro no Brasil ou arte de tirar vantagens dessa plantaço*.

One can assume that a part of the higher price gap between Maranhão and Liverpool is a result of shipping costs, but the difference presented above includes freight rates for departing ports to Liverpool. In fact, freight rates between Maranhão and Liverpool were slightly lower than from New York to Liverpool (see Table A2). Between 1825 and 1850 the average freight rate for a pound of raw cotton from New York was 0.38d., while from Maranhão it was 0.33d. Maranhão had lower freight rates than exports from US ports because almost all cotton that arrived in England from Brazil was carried by British ships.³⁷ Unlike Brazil, data from the British Ledgers of Imports (TNA CUST 4) shows that foreign vessels – that is, US ships – transported 65 per cent of cotton from the United States. Thus, British dominance of the Atlantic before 1850 helped lower shipping costs for Brazilian cotton. Between 1842 and 1850, when there are comparable data, freight rates for cotton between Maranhão and Liverpool were 39 per cent lower than Maranhão to Lisbon, whose commodities were carried by Portuguese ships. In any case, like previous findings for other light but valuable products, freight rates represented a small cost in cotton exports. Freight rates for Maranhão cotton in Liverpool represented 4 per cent of market prices between 1825 and 1850. In New Orleans, freight rates reached 5 per cent of market prices in the same period.³⁸ Pernambuco did not share Maranhão’s maritime trade route, but the higher prices from its cotton staple made it less sensible to transportation costs.³⁹ Maritime freight costs, therefore, did not have a negative impact on cotton production in Brazil because they were similar to the prevailing rates of the much more intense traffic in the North Atlantic.

What remains to be explained, however, is the reason for the greater price difference between Brazilian ports and Liverpool when compared to the United States. The next sections will present evidence that export taxes explain a large part of the price difference between ports: subtracting the cost of export taxes reduces the price gap between Maranhão and Liverpool by 60 per cent.

II. Fiscal policies and cotton exports

The French invasion and the forced transfer of the royal family to Brazil in 1807 represented a substantial increase in the financial needs of the Portuguese government. To pay for the augmented government structure in Brazil and to counteract increasing military expenditures without imposing a very high cost on imports, which were essential with Portugal’s occupation, the government decided to increase taxation on export products.⁴⁰ As sugar and cotton were the most important export products in Brazil at the time, northern captaincies took a disproportionate share of the fiscal burden under the new policies. Cotton exports initially became a more important source of government revenue because sugar faced a steady decline in international prices from 1799 to 1809.⁴¹

The importance of cotton trade around 1808 is evident not only in the accounts of the time, but also from customs data. Custom-house records show that cotton exports for Britain represented 45 per cent of the total value of Pernambuco exports between 1810 and 1815, while sugar represented 25 per cent including all foreign ports.⁴² Even in Bahia, which was historically less associated

³⁷For a discussion on British freight rates, see Harley ‘Ocean Freight Rates and Productivity, 1740–1913.’

³⁸Llorca-Jaña, *The British Textile Trade in South America in the Nineteenth Century*, 217.

³⁹Alencastro, *O Trato dos Viventes*, 62.

⁴⁰Pedreira, *Estrutura industrial e mercado colonial*, 317–19.

⁴¹Johnson Jr, ‘A Preliminary Inquiry into Money, Prices, and Wages in Rio de Janeiro, 1763-1823,’ 254.

⁴²Mapas de Importação e Exportação. Caixa 448, Pac. 1 e 2. Ministério da Justiça, Arquivo Nacional (Rio de Janeiro).

with cotton production, cotton exports represented almost the same value as sugar exports (85 per cent of the total sugar value) between 1808 and 1809. Cotton thus had the highest taxation of any Brazilian commodity during the early nineteenth century. In Bahia, as an example, export taxes for sugar averaged 13 per cent of market prices between 1812 and 1830 while export taxes for cotton averaged 19 per cent.⁴³ Coffee from Rio de Janeiro was in a more comfortable position. Because coffee paid its export taxes at a fixed price, rising prices after the Napoleonic Wars made the effective rate stand at less than four per cent during the late 1810s.⁴⁴

Taxation for cotton producers increased just after the arrival of the royal family in Brazil, in July 1808. The Portuguese government set a new tax on all cotton exported from Pernambuco, Ceará, Pará, and Maranhão. Since those captaincies contained several territories that became separate provinces after 1821 the chart indeed imposed a fiscal cost on all Northeast Brazil. All revenues from the 600 réis on each *arroba* (32 lb.) had – every six months – to be sent ‘imperatively’ to the royal treasury, to maintain the ‘integrity and dignity of the crown’.⁴⁵ In addition to the new tax, the government maintained previous taxes on cotton exports, such as the tithe (*dízimo*).⁴⁶ The importance of export taxes becomes clear with the information that, in Maranhão, the new 600 réis tariff alone yielded almost three times more revenue than import duties in 1809.⁴⁷ In Pernambuco, the tax represented 21.8 per cent of all revenue collected by the *Junta da Real Fazenda* in 1810.⁴⁸

The increase in export taxes would lower prices for Brazilian producers in a competitive market, but at the time the United States Embargo – followed by the war with Britain in 1812 – presented a favourable environment for Brazilian planters. The Portuguese government initially thought it was possible to pass the tariff cost to foreign consumers. This condition, however, did not last, and the French traveller Louis-François de Tollenare, on his visit to Pernambuco in 1816, wrote that cumulative taxes weighed heavily on cotton production. The taxes comprised almost 20 per cent of cotton’s market price. He argued that such ‘unreasonable rate’ was founded on the view by the Portuguese government that Europeans still could not do without cotton from Pernambuco. Tollenare was outraged by the view of ministers in Rio de Janeiro who thought that the tax burden fell on Europeans, and not on Northeast producers.⁴⁹

With the normalization of international commerce after 1815, it became clear to cotton planters that Brazil could not affect international prices and that they would have to pay the tax burden. Foreigners who visited Brazilian cotton regions in the 1810s noticed the problem that the export taxes represented: Henry Koster argued that ‘nothing can be more injudicious, than this double duty upon the chief article of exportation from that country to Europe’.⁵⁰ Raimundo Gayoso, an important cotton planter in Maranhão, worried that constant increases in taxation during the 1810s, contrary to ‘trade practices of the civilized world,’ would ruin the country’s agricultural exports.⁵¹ In 1823, right after independence, José Caetano Gomes, treasury secretary of Rio de Janeiro, advocated the abolition of all export taxes arguing that it was ‘a tribute established

⁴³TNA, FO 63/215, p.10 The rates for sugar are the same in Pernambuco, see Henderson (1821, p.84).

⁴⁴Henderson, *A History of the Brazil*, 84.

⁴⁵*Collecção Das Leis Do Brazil de 1808*, 91.

⁴⁶Between 100 to 160 réis for each bag depending on the captaincy.

⁴⁷Observações sobre o estado da agricultura e população do Brazil. *Correio Braziliense*, ed.6 1811, p.229. Biblioteca Nacional Digital.

⁴⁸Rocha, *Biographia de Manoel Jacintho Nogueira Da Gama*, 37.

⁴⁹Tollenare, *Notas dominicaes tomadas durante uma residencia em Portugal e no Brasil nos annos 1816, 1817 e 1818*, 123–25.

⁵⁰Koster, *Travels in Brazil*, 32.

⁵¹Gayoso, *Compendio Historico-Politico Dos Principios Da Lavoura Do Maranhão*, 284.

against all principles of political economy, in which the most enlightened nations, knowing their true interests, do not have; on the contrary, they encourage exports with prizes'.⁵²

The lack of incentive to reduce taxation during the 1810s, however, was due to the wars in Europe and the Cisplatine. At the same time, much like other regions in the Americas at the time, custom revenues dominated fiscal resources.⁵³ Therefore, with higher cotton prices relative to other export products, the central government began to 'withdraw bills of large amounts' from Northeast provinces to finance expenses of the court.⁵⁴ Fiscal information for Maranhão, presented in Table 1, shows that transfers to Rio de Janeiro amounted to 41 per cent of all revenues during the cotton boom years. For Pernambuco, in 1810, the transfers for Rio de Janeiro amounted to 38 per cent.⁵⁵

Trade represented on average 84 per cent of revenues in Maranhão between 1816 and 1821, the years when detailed data are available. From several different fiscal sources, most of government's revenues in Maranhão came from three sources, two of them related to cotton. In Brazil, all commodities had to pay a 10 per cent tax (*dízimo*) when exported. Cotton, however, had a deduction after 1814 to abate the cost of ginning and transport, which resulted in a taxation of 8 per cent (see Table A1 for details). The different impact between the *dízimo* (an ad valorem tax) and the 600 réis tariff (a specific tax) appears more clearly in 1821, when local cotton prices plummeted. While revenues from the *dízimo* declined as expected the new cotton tax increased the burden of lower prices to planters.

Table 1: **Fiscal revenues and expenditures in Maranhão, 1816-1821 (mil-réis)**

Revenues	1816	1817	1818	1819	1820	1821
<i>Dízimo</i> (tithing)	230,128	238,272	232,276	167,137	127,355	66,012
	37%	34%	31%	23%	18%	17%
600 réis tax	215,295	243,725	230,275	225,272	211,031	153,319
	34%	35%	31%	32%	30%	34%
Custom house	110,636	147,891	221,367	229,353	175,470	122,355
	18%	21%	29%	32%	25%	27%
Total Revenues	626,762	697,896	751,221	714,872	709,295	451,879
Expenditures						
Remittances to RJ	59%	42%	64%	39%	29%	13%
Total Expenditures	581,801	450,048	835,877	1,061,699	852,801	441,552

Sources: Lago, *Estatística histórico-geográfica*. Notes: 'Custom house' refers to twelve other taxes, such as the *dízimo* for rice, administrative fees, and stowage fees.

The cost of export taxes was evident and, in 1822, a politician from Maranhão publicly stated 'everyone knew that [...] before his majesty came to establish his throne and his court in Rio de Janeiro, [the province] was not burdened with taxes'.⁵⁶ Nonetheless, fiscal policy did not change

⁵²Viveiros de Castro, 'Historia Tributaria Do Brasil,' 34.

⁵³Wallis, 'The National Era,' 151.

⁵⁴Viveiros, *História do comércio do Maranhão*, 1954, 1:138.

⁵⁵Rocha, *Biographia de Manoel Jacintho Nogueira Da Gama*, 38.

⁵⁶Pereira, *Advertencias Interessantes a' Provincia Do Maranhão*, 4.

after cotton prices declined in the early 1820s: the provincial treasuries (*Juntas da Fazenda*) of Bahia, Pernambuco, and Maranhão were tasked to help the central government's first loan with London after the independence in 1824.⁵⁷ Much of the money from the loans, however, was spent with military operations such as the one organized to fight the 1824 Northeast rebellions and, later, the second war in the Cisplatina. In 1829, with low cotton prices in Liverpool, Maranhão's president declared that the economic condition demanded the reduction of the 'disproportionate taxes' on cotton. The president argued that 'with a 10,000 or the [current] 2,300 prices' planters had to pay the same unfair rate.⁵⁸

During the 1820s, therefore, political dissatisfaction with Rio de Janeiro's fiscal policy grew as prices in European markets declined. In 1830, when cotton prices at Brazilian ports achieved very low levels, newspapers reported that taxation made cotton production unprofitable 'everywhere,' and changes had to be made to help northern provinces, 'so oppressed by government abuses and public unrest.'⁵⁹ In fact, people began to abandon cotton production in Pernambuco, depopulating certain parts of the hinterland (*sertões*).⁶⁰ Senator Nicolau Vergueiro publicly argued in 1830 that the Brazilian tax system hindered exports and was the 'cause of misery among people.'⁶¹ In a debate on the effects of taxes on cotton production at the Chamber of Deputies, Carneiro da Cunha (from Paraíba) complained about the 'perverse destiny' of northern provinces given that they had to contribute more than southern provinces to the imperial treasury. Cunha argued that if the central government did not reduce its taxation on cotton production the culture would cease to exist.⁶²

With shrinking fiscal revenues from northern provinces, the imperial government had to acknowledge in 1830 that the 600 réis tariff made the crop unprofitable. With such low prices, planters were abandoning cultivation.⁶³ Brazil's finance minister warned that the system of creating additional taxes to cover the costs of public administration had reached a limit: sugar and tobacco were taxed five times, and cotton three.⁶⁴ With the paramount necessity for a broad fiscal reform the government abolished the 600 réis tariff in 1831 and started a general reform in the provincial treasuries.⁶⁵ The reforms, culminating in the 1834 Additional Act, presented for the first time a legislation that specified resources to fund local governments.⁶⁶ Most of these changes, however, would be implemented only at the end of the 1830s. Moreover, provinces remained prohibited to tax imports, leaving exports as the main source of revenue from foreign trade.⁶⁷

Figure 3 presents the average tax rate using short-staple cotton prices from Maranhão. The existence of a nominal and an effective tax rate is due to the fact that custom duties had to be paid (mostly) with hard currency throughout the nineteenth century.⁶⁸ Both lines diverge because, while silver premiums were low before 1827, they increased considerably during the 1830s with the

⁵⁷Summerhill, *Inglorious Revolution*, 56.

⁵⁸'Discurso [...] Recitou Sr. Candido Joze de Araujo Vianna, Presidente d'esta Provincia,' 621.

⁵⁹'Rio de Janeiro.'

⁶⁰'Correspondência,' 4.

⁶¹*Anais Do Senado Do Império Do Brasil. 1823-1888*, bk. 1830 (3) p.587.

⁶²Annaes do Parlamento Brasileiro, *Camara Dos Srs. Deputados, 1830*, 2:154.

⁶³*Anais Do Senado Do Império Do Brasil. 1823-1888*, bks. 1830, 3, p.586.

⁶⁴Brasil. Ministério da Fazenda, 'Ministro José Ignacio Borges. Relatório... Do Anno de 1830 Apresentado Na Sessão de 1831,' 13.

⁶⁵Viveiros de Castro, 'Historia Tributaria Do Brasil,' 34.

⁶⁶Oliveira, *Systema financial do Brasil*, 35.

⁶⁷Viveiros, *História do comércio do Maranhão*, 1954, 2:320.

⁶⁸Obligations to the custom-house had to be paid $\frac{3}{4}$ in silver and $\frac{1}{4}$ in paper money after 1834: 'Maranhão.'

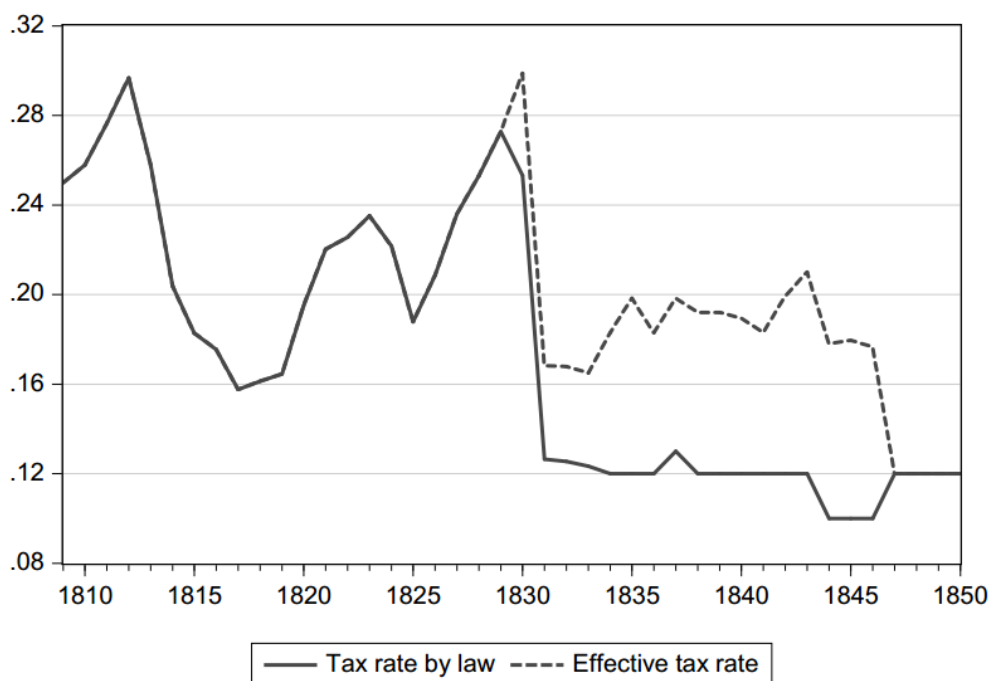


Figure 3: Rate of Cotton Export Tariffs, 1809-1850. Sources: *Coleção de Leis do Império Brasil* (1808-1889).

financial crisis that led to the extinction of the first Bank of Brazil, something that deserves a brief explanation. During the 1820s, foreign loans and the Cisplatine War (1825-28) led to an increase in printing of paper money and coinage of copper, devaluating the exchange rate in Rio de Janeiro.⁶⁹ Between 1827 and 1831 the exchange rate in Rio de Janeiro was on average 28.3d (per *milréis*), while it reached 46d in Maranhão, and 50.5d in Pernambuco.⁷⁰ At the height of the monetary crisis in January 1830 the premium for silver reached 98 per cent in Rio de Janeiro, while in Pernambuco it was still between 10 and 24 per cent.⁷¹ Pernambuco and Maranhão were not affected initially by Rio de Janeiro's economic crisis because paper money did not circulate in northern provinces and because the central government prohibited copper coin exports from Rio de Janeiro and Bahia to other provinces between 1827 and 1830.⁷²

With the end of the copper exports restriction from Rio de Janeiro and Bahia in 1831, the silver premium in the Northeast increased rapidly, virtually nullifying the positive effects brought by the end of the 600 *réis* tariff. During the 1830s, Maranhão's newspapers started to report cotton prices in silver and paper money because of the high discount on the latter.⁷³ Destabilization also affected foreign traders and a representation by British merchants to the provincial government in 1833 argued that 'the premium on silver has attained such a high rate (and even with difficulty to be got) that all commercial transactions are nearly suspended, upwards of a hundred per cent has

⁶⁹Peláez and Suzigan, *História monetária do Brasil*, 46.

⁷⁰Cavalcanti, *O Meio Circulante Nacional: Resenha e Compilação Chronologica de Legislação e de Factos*, 1893, 1:321.

⁷¹'Carta Ao Editor,' 1198.

⁷²*Collecção Das Leis Do Imperio Do Brazil*, bk. 1831 V.2 p.13; Oliveira, *Systema financial do Brasil*, 56-59.

⁷³Moreover, merchants began to accept paper money from their debtors only in exchange for a large premium. 'Sobre a Lei Monetaria de 3 de Outubro Proximo Passado,' 2.

been paid, and even more has been asked'.⁷⁴

The problem with the scarcity of specie and the payment of custom duties persisted until the monetary reform of 1846.⁷⁵ With the reform, the government expanded the supply of metal coins and foreign silver coins began to be accepted at customhouses.⁷⁶ The measures reduced the silver premium and attenuated the distortions in the export tax. Cotton exports taxes decreased in northern provinces after four decades, but the impact of fiscal policies had taken their toll.

III. Production costs

To measure the impact of export taxes on cotton profitability, this section gathers scattered evidence to compare the productivity of Brazilian plantations relative to its international competitors. Descriptions of the profitability of cotton plantations around 1800 suggest similarities across the Americas, with cotton acreage yielding equivalent production in the United States, the West Indies, and Brazil.⁷⁷ Reported plantation expenses during the first decade of the nineteenth century in Guyana were 7d per lb. of cotton, and 6d for U.S. planters.⁷⁸ Crops in Demerara also cost 7d per lb. to raise in 1815.⁷⁹ Records show that each working hand in South Carolina produced between £45 and £85 of Sea Island cotton, while in the hinterland region of Brazil a slave produced £70 of short staple cotton, which had lower prices.⁸⁰ For long staple cotton, Tollenare argued in 1816 that despite the difficulty in obtaining detailed information, it was reasonable to assume that each slave picked around 600 pounds of cleaned cotton.⁸¹ This amount was comparable to that picked in South Carolina, where each slave produced 1,000 pounds of short staple cotton, or 600 of long staple. In Cayenne, another producer of long staple, production amounted to 600 pounds for each slave as well.⁸²

Other reports broaden the range of productivity between Brazil and the United States, but do not present large differences. Records from a Louisiana plantation in 1817 show that slaves picked between 500 and 800 pounds of seed cotton in a harvesting season.⁸³ Daily averages ranged from 45 to 67 pounds of seed cotton, while in Brazil the amount was between 32 and 65 pounds.⁸⁴ During the 1790s, Manuel Camara wrote that on his Paraíba farm a slave could prepare 1,065 pounds of seed cotton, which meant around 272 pounds of cleaned cotton.⁸⁵ Raimundo Gayoso, a planter in

⁷⁴TNA FO 13/104, pp. 72-3

⁷⁵Peláez and Suzigan, *História monetária do Brasil*, 67; Levy and Andrade, "Fundamentos Do Sistema Bancário No Brasil: 1834-1860."

⁷⁶Cavalcanti, *O Meio Circulante Nacional.: Resenha e Compilação Chronologica de Legislação e de Factos*, 1893, 2:188.

⁷⁷Edwards, *The History, Civil and Commercial, of the British West Indies*, 2:319; Moore, *The Emergence of the Cotton Kingdom in the Old Southwest*, 132; Camara, *Memoria Sobre a Cultura Dos Algodoeiros e Sobre o Methodo de o Escolher, e Ensacar*.

⁷⁸Mackenzie, *Facts, Relative to the Present State of the British Cotton Colonies*, 21.

⁷⁹Treasure Department, *Letter from the Secretary of the Treasury, Transmitting Tables and Notes on the Cultivation, Manufacture, and Foreign Trade of Cotton.*, 33.

⁸⁰Phillips and Smith, *Life and Labor in the Old South*, 93; Thorpe, 'Sea Island Cotton'; Bettencourt, *Memoria sobre a plantação dos algodões*, 34.

⁸¹Tollenare, *Notas dominicaes tomadas durante uma residencia em Portugal e no Brasil nos annos 1816, 1817 e 1818*, 118.

⁸²Tollenare, 115.

⁸³Moore, *The Emergence of the Cotton Kingdom in the Old Southwest*, 9.

⁸⁴Edwards, *The History, Civil and Commercial, of the British West Indies*, 2:313; 'O Algodão,' 205.

⁸⁵Camara, *Memoria Sobre a Cultura Dos Algodoeiros e Sobre o Methodo de o Escolher, e Ensacar*, 35.

the largest cotton region in Maranhão, documented in 1813 that on an average cotton plantation a slave prepared 1,280 pounds of cotton (384 pounds cleaned).⁸⁶

Even with differences in ginning technology – Maranhão used only roller gins before 1830 – the ratio between seed and cleaned cotton was also similar. An advertisement for the famous Whitney cotton gin in 1794 stated that five pounds of seed cotton yielded close to one and one-half pounds of fibre.⁸⁷ While older varieties of cotton yielded lint-to-seed ratios of 0.25 the new varieties at the beginning of the nineteenth century yielded ratios of up to 0.33, close to the ratio observed in Maranhão.⁸⁸ Before the 1820s, even if slaves could cultivate more cotton, picking capacity was the main constraint to the amount produced in the United States.⁸⁹ In Maranhão, there is also evidence that farmers could not take full advantage of ‘superabundant crops’ because slaves could only ‘pick between 32 and 64 pounds a day’.⁹⁰

Biological improvements after the 1820s reduced picking restrictions in the United States, and the average daily upland cotton picking rate increased fourfold between 1801 and 1862.⁹¹ In the new cotton states slaves managed to pick 200 to 300 pounds per day when the plants were fully mature, in late summer.⁹² In 1834, slaves could already produce 2,000 pounds of cleaned cotton.⁹³ This was much higher than reports from Brazil: a manual for farmers in the Northeast stated that during the 1830s, each slave could produce only 640 pounds of cleaned cotton.⁹⁴ The growth in productivity through several decades widened output differences between the United States and other producing countries prior to the 1861 Civil War. In the preface of a translated version of A. Turner’s ‘The Cotton Planter’s Manual’ (translated and distributed in Maranhão two years after its release) a comparison between cotton production in Brazil and the United States shows that the same area in the US cotton south produced five times more cotton than in Maranhão in 1857.⁹⁵ In Maranhão, an area of one hectare produced on average 1460 pounds of seed cotton, while in the United States the same area produced 6550 pounds.⁹⁶ In addition, each worker with the ploughing system was able to work in more than one area, increasing output differences even more.⁹⁷

Even with the substantial productivity divergence with the United States, it is difficult to agree with the view put forward by some authors that productivity in Brazilian cotton plantations did not increase during the whole nineteenth century.⁹⁸ In fact, there is evidence of technology adoption already in the 1790s, with improved cotton gins and presses used to prepare the cotton bags in the

⁸⁶Gayoso, *Compendio Historico-Politico Dos Principios Da Lavoura Do Maranhão*, 264.

⁸⁷Lakwete, *Inventing the Cotton Gin*, 57.

⁸⁸Olmstead and Rhode, ‘Biological Innovation and Productivity Growth in the Antebellum Cotton Economy,’ 1133.

⁸⁹Olmstead and Rhode, 1142.

⁹⁰‘O Algodão,’ 205.

⁹¹Olmstead and Rhode, ‘Biological Innovation and Productivity Growth in the Antebellum Cotton Economy,’ 1150.

⁹²Britton, *Bale O’ Cotton*, 24.

⁹³Treasure Department, *Letter from the Secretary of the Treasury, Transmitting Tables and Notes on the Cultivation, Manufacture, and Foreign Trade of Cotton.*, 20.

⁹⁴Taunay and Riedel, *Manual do Agricultor Brasileiro*, 44.

⁹⁵Turner, *Manual Do Plantador d’algodão.*

⁹⁶Maranhão, ‘Relatorio Do Presidente Da Provincia Do Maranhão, o Doutor João Lustosa Da Cunha Paranaguá, Na Abertura Da Assembléa Legislativa Provincial No Dia 3 de Maio de 1859,’ 29.

⁹⁷Slaves’ picking capacity per acre is a limited measure of productivity, since slaves managed to work in multiple fields. See Wright ‘River of Dark Dreams.’

⁹⁸Mesquita, *Vida e morte da economia algodoeira do Maranhão*, 71.

Paraíba region, then part of Pernambuco.⁹⁹ A planter from one of the richest families in Maranhão brought from Portugal in 1799 ploughs and reapers to produce rice and cotton and stated that cotton output tripled with the new tools.¹⁰⁰ In the same way the use of different ginning machines during the early nineteenth century suggests that a lack of capital or technological know-how cannot be considered a central explanatory variable for the persistent differences in productivity. There is ample evidence of roller gins' use to process long-staple cotton in the Northeast during the 1830s.¹⁰¹ Similarly, saw-gins were implemented in Maranhão in the 1830s to increase productivity on plantations that used short-staple seeds from the United States¹⁰². For the United States, Olmstead and Rodhe argued that one of the 'neglected signs' of productivity growth in cotton plantations was that output expanded faster than the workforce during the antebellum period, and slaves' real prices increased at a time when real cotton prices were falling.¹⁰³ That was the case in Maranhão between 1800 and 1820, when cotton exports grew by 3.8 per cent per annum while the slave population, with increasing prices, expanded by 3.5 per cent.¹⁰⁴

Except for Rui de Albuquerque, who attempted to estimate the profitability of cotton plantations in Maranhão between 1812 and 1821, there is no quantitative analysis of production costs and their relation to international cotton prices for Brazil.¹⁰⁵ Low prices are not sufficient for explaining the stagnation of cotton exports without considering productivity growth or the decline in prices of other relevant input factors. Therefore, some baseline information is necessary to estimate how price variations and taxation pressured profits and might have affected cotton planters in Brazil. The most detailed information on cotton production for the early nineteenth century is provided by Gayoso, a planter from Maranhão. Table 2 presents his calculation of 'all expenditures for a cotton plantation' in the 1810s after the end of the harvest and processing period, but before the payment of taxes.¹⁰⁶ The freight cost is the average of what was charged in Maranhão's main cotton region to the port of São Luís. Each slave had an average cost of 200 réis per day, but as they also worked on others crops for their own needs, food costs were taken out. The total cost of cleaned cotton in Maranhão around 1813 was estimated at 3,279 réis per *arroba*, out of which 91 per cent consisted of labour costs. Other authors suggested that with additional costs, such as commissions and insurance, costs reached up to 4\$000, a value comparable to reports concerning cotton production in Bahia.¹⁰⁷

⁹⁹Camara, *Memória Sobre a Cultura Dos Algodoeiros e Sobre o Methodo de o Escolher, e Ensacar*, 73.

¹⁰⁰'Memória Do Lavrador José Joaquim Vieira Belford,' 3.

¹⁰¹Taunay and Riedel, *Manual do Agricultor Brasileiro*, 43.

¹⁰²Mesquita, *Vida e morte da economia algodoeira do Maranhão*, 113.

¹⁰³Olmstead and Rhode, 'Biological Innovation and Productivity Growth in the Antebellum Cotton Economy,' 1127.

¹⁰⁴Pereira, 'Poor Man's Crop? Slavery in Cotton Regions in Brazil (1800-1850).'

¹⁰⁵Albuquerque, *Capital comercial, indústria têxtil e produção agrícola*, 70.

¹⁰⁶Gayoso, *Compendio Historico-Politico Dos Principios Da Lavoura Do Maranhão*, 264.

¹⁰⁷'O Algodão,' 206.

Table 2: Cotton production costs in Maranhão
c.1813

50 slaves, 300 days of work, 120 réis per slave per day	1,800,000 réis	£642,85
Freight of 109 bags (600 <i>arrobas</i> of clean cotton), 465 réis each	50,685 réis	£18,10
3.5 varas of coarse cottons for each bag (4 rolls, 18,000 réis each)	72,000 réis	£25.71
2 rolls of coarse cotton to dress the slaves	45,000 réis	£16.07
Total	1,967,685 réis	£702.74
Cost to produce an arroba (32 lb.) of cotton	3,279 réis	8.64 d. (1 lb.)

Source: Gayoso, *Compendio Historico-Politico*, 264.

The low cost of freight presented by Gayoso can be surprising at first hand, since these costs are always highlighted as one of the obstacles to the expansion of Brazilian commodities during the nineteenth century. Other sources, however, confirm that inland transportation costs were not high for cotton. The cost to move cotton in mules from the hinterlands in Pernambuco to the coast in 1817 was between 200 to 300 *réis* per *arroba*, when the price of cotton was 6\$500.¹⁰⁸ In Maranhão, in 1854, when agricultural production had already expanded far inland, it was reported that transportation costs of various products to São Luís ranged between 10 and 30 per cent.¹⁰⁹ Other sources, nonetheless, show that transportation costs represented between 2.8 and 5.5 per cent of market cotton prices during the 1850s.¹¹⁰ Including additional costs (such as brokers, inspectors, and middlemen), the transport of cotton bags to the port probably did not surpass 10 per cent of market prices.

To calculate the changes in production costs across time, presented in the equation below, the baseline is Gayoso's figures that each slave produced 384 pounds of cleaned cotton by 1813, as well as the estimate that there was a productivity gap with the United States of about five times in 1859. To estimate the potential of productivity increases in Maranhão, it is possible to combine the latter information with Olmstead and Rhode's result that cotton picking increased 2.3 per cent per annum between 1800 and 1862. Such conditions yield a 0.25 per cent annual growth for slave productivity in Maranhão. Just as in the United States, slaves were a major input in Brazil's cotton plantations and, therefore, price changes in the labour force had a significant impact on production costs.¹¹¹ In addition to slave prices the estimation considers changes in the size of cotton bags across time, freight prices, and variations in cotton prices on the cost of each bag and slave clothing.¹¹²

¹⁰⁸Tollenare, *Notas dominicaes tomadas durante uma residencia em Portugal e no Brasil nos annos 1816, 1817 e 1818*, 116.

¹⁰⁹Maranhão, 'Relatorio Do Presidente Da Provincia Do Maranhão, o Doutor Eduardo Olimpio Machado, Na Abertura Da Assembléa Legislativa Provincial No Dia 3 de Maio de 1854, Acompanhado Do Orçamento Da Receita e Despeza Para o Anno de 1855.'

¹¹⁰Mesquita, *Vida e morte da economia algodoeira do Maranhão*, 204.

¹¹¹For slave prices in Brazilian cotton regions, see Pereira, 'Poor Man's Crop? Slavery in Cotton Regions in Brazil (1800-1850)'; Olmstead and Rhode, 'Biological Innovation and Productivity Growth in the Antebellum Cotton Economy,' 1127.

¹¹²Freights for 1854, see Mesquita *Vida e morte da economia algodoeira do Maranhão*, 204. The amount that each cotton bag carried increased on average 0.27 per cent annually between 1809 and 1860.

$$\text{Cost}_{\text{pence per lb.}} = \frac{\text{Slave Price} + \text{Freight} + \text{Cost of Bag} + \text{Cost Slave Clothing}}{\text{Slave Productivity}}$$

Some caveats should be acknowledged here: as mentioned before, productivity growth in Maranhão was not constant across six decades, and it was probably higher before 1820 because cotton plantations in the 1840s were already in a deep crisis. Gayoso’s estimation is lower than other reports at the time and must be taken as a conservative baseline. Moreover, Olmstead and Rhode’s result of an increase of 2.3 per cent in picking is their upper bound estimation, which accounts for the best seed in the best land. With these limitations in mind, Figure 4 presents the estimated costs along with Maranhão’s cotton prices in the ports of São Luís and Liverpool. In addition, there is also a counterfactual price in São Luís without export taxes (presented in Figure 3). Reports from the British consul in Maranhão during the 1820s attest that planters payed duties on their produce ‘in kind on all articles except cotton,’ which duty was deducted from the ‘amount by the purchasers, and they pay it into the treasury’.¹¹³ The cost for cotton plantations in Maranhão presented in Figure 4 is consistent with international comparisons. For instance, while the cost in Maranhão was 5.7d. on average during the 1830s, in Mississippi and Alabama a value of 4d. ‘would pay expenses’ for a pound of cleaned cotton around 1830.¹¹⁴ In the Southwestern states, 5d. per pound was regarded as a profitable crop for the same period. According to Edward Baines, planters in the Mississippi valley could make a profit with prices as low as 3d. in 1833, indicating the higher productivity of the new cotton areas in the United States.¹¹⁵

Even without a precise estimate, production costs for Maranhão show that, during the 1840s, low international prices made cotton production unprofitable. During the 1820s, however, a higher profit margin could have been appropriated by planters if the government had not imposed prohibitive export taxes. Different from Brazil, lower prices during the 1820s stimulated the search for productivity increases in the United States, with seed experimentation and the use of steamboats to lower production costs.¹¹⁶ At the same time the government of Maranhão recognized that the province missed the opportunity to improve cotton production during the period of higher demand by British textile factories after the end of the Napoleonic Wars.¹¹⁷ Another indication for the low profitability during the 1820s is that some foreign commercial houses left Maranhão at the time. In a list of ‘British subjects’ resident in Maranhão in 1826, there were half the number from the previous decade.¹¹⁸ This was remarkable because, at the time, British merchants had almost no competition in Maranhão.¹¹⁹

IV. Optimal export taxes

Evidence suggests that high taxation and fiscal centralization reduced profits for cotton planters in the Northeast and created disincentives to expand production. But what was the optimal

¹¹³TNA FO 13/12, p.204

¹¹⁴Treasure Department, *Letter from the Secretary of the Treasury, Transmitting Tables and Notes on the Cultivation, Manufacture, and Foreign Trade of Cotton.*, 28.

¹¹⁵Baines, *History of the Cotton Manufacture in Great Britain*, 316.

¹¹⁶Moore, *The Emergence of the Cotton Kingdom in the Old Southwest*; Gudmestad, *Steamboats and the Rise of the Cotton Kingdom*.

¹¹⁷Maranhão, ‘Falla Que Recitou o Presidente Da Provincia Do Maranhão, Antonio Joaquim Alvares Do Amaral, Na Abertura Da Assembléa Da Mesma Provincia Em 28 de Julho de 1848,’ 32.

¹¹⁸TNA, FO 13/30, p.208

¹¹⁹TNA, FO 63/240, p.201

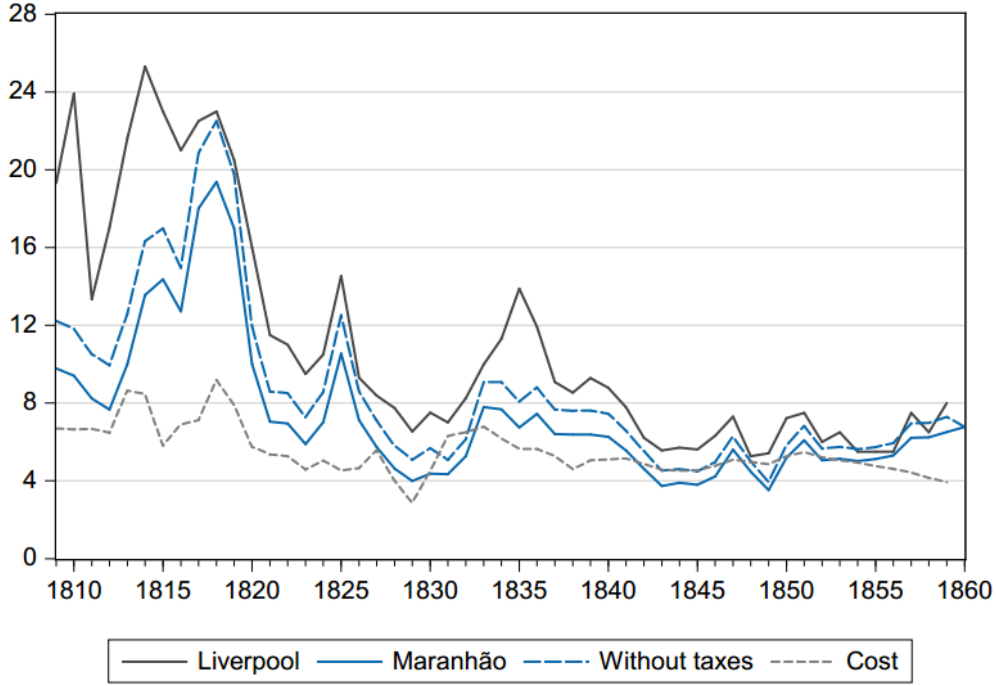


Figure 4: Prices of Maranhão cotton and production cost, 1809-1860. Sources: Prices in Liverpool – Liverpool Mercury; prices in Maranhão – Lago, *Estatística histórico-geográfica*, Soares, ‘BRAZIL: Report. Cultivation of Cotton’; Cost - Gayoso, *Compendio Historico-Politico*.

export tax for cotton? If the export tax imposed by the central government was lower than the optimal level, exporters would still have incentives to continue producing cotton, even with low international prices. Following Douglas Irwin’s analysis for the optimal tax in the United States, first is necessary to calculate the elasticity of export demand for Brazilian cotton (η_{BR}), where ε is the elasticity of export supply from other cotton producers, s is the Brazilian share of the British market, σ is the elasticity of substitution between Brazilian and foreign varieties of cotton, and η is the price elasticity of British demand for Brazilian cotton.¹²⁰ When products are homogenous, i.e., the Brazilian and the US varieties are perfect substitutes, the elasticity of substitution approaches infinity and the equation simplifies:

$$\eta_{BR} = \frac{\varepsilon [(1-s)\sigma + s\eta] + \sigma\eta}{s(\sigma - \eta) + \eta + \varepsilon}, \text{ when } \sigma \rightarrow \infty, \eta_{BR} = \frac{\eta}{s} + \frac{(1-s)}{s}\varepsilon$$

With the price elasticity of export demand for Brazilian cotton the optimal export tax $\tau = 1/\eta_{BR}$ is the equilibrium between the marginal revenue for cotton exports $P^{UK} = (1 - \frac{1}{\eta_{BR}})$ and the domestic price of cotton $P = P^{UK}(1 - \tau)$, with ‘world’ cotton prices equivalent to prices in the Britain. The elasticity of export demand for Brazilian cotton, therefore, depends on the elasticity of substitution with cotton from the United States, given by the following equation:

$$\sigma_{ij} = 1 + \frac{\gamma_{ij}}{w_i w_j}$$

The Hicksian elasticity of demand for the i th good with respect to the price j th is:

¹²⁰Irwin, ‘The Optimal Tax on Antebellum US Cotton Exports.’

$$\eta_{ij} = \frac{\gamma_{ij}}{w_i} - \frac{\beta_i}{w_i} w_j - \delta_{ij}$$

where δ_{ij} is the Kronecker delta, with $\delta_{ij} = 1$ for $i = j$ and $\delta_{ij} = 0$ for $i \neq j$.

Both equations depend on parameters that are estimated with an Almost Ideal Demand System, developed by Angus Deaton and John Muellbauer.¹²¹

$$w_{it} = \alpha_i + \sum_{j=1}^n \gamma_{ij} \ln p_{jt} + \beta_i \ln \left(\frac{x_t}{P_t} \right) + u_t$$

Where t is the index of time, w_{it} is the British expenditure share of cotton from country i , p_{jt} is the price of cotton from different countries (index by j), x_t is total expenditures on cotton by Britain, u_{it} is a random disturbance, and P is a price index defined by the following linear approximation:

$$\ln P_t = \sum_{k=1}^n w_{kt} \ln(p_{kt})$$

One known problem with the parameters in this model is that the elasticity estimates have a downward bias.¹²² Irwin explains that the bias results from the assumption that export supply from different countries is perfectly elastic when in fact they are upward sloping.¹²³ One way to solve the parameters' biases is to apply instrumental variables that are related to supply conditions for the exporting countries. Thomas Wahl and Dermot Hayes find that the calculated elasticities are twice as large after correcting for endogeneity in prices.¹²⁴

Table 3: Estimation of demand for Brazilian cotton in UK, 1820–1859

	SUR	OLS	IV
α	2.19* (0.22)	2.10* (0.24)	2.10* (0.26)
β	-0.10* (0.01)	-0.10* (0.01)	-0.09* (0.01)
γ_{BR-BR}	-0.13* (0.06)	-0.13* (0.06)	-0.28* (0.10)
γ_{BR-US}	0.23* (0.06)	0.24* (0.08)	0.33* (0.10)
γ_{BR-EI}	-0.03 (0.04)	-0.03 (0.05)	-0.04 (0.05)
<i>Tax</i>			0.06* (0.02)
R^2	0.85	0.85	0.86

Note: Standard errors in parenthesis. * Significance at the 5% level. See appendix for full regression.

Given the endogeneity problem, I use the cost for cotton production in Maranhão presented before as an instrumental variable to correct the estimates for Brazilian elasticities. To check if the results

¹²¹'An Almost Ideal Demand System.'

¹²²Henneberry and Hwang, 'Meat Demand in South Korea.'

¹²³Irwin, 'The Optimal Tax on Antebellum US Cotton Exports,' 283.

¹²⁴Wahl and Hayes, 'Demand System Estimation with Upward-Sloping Supply.'

are consistent, I estimate an iterative seemingly unrelated regression (SUR) using the same data from Irwin: quantities and prices for cotton from the United States, Brazil, East Indies, and Egypt between 1820 and 1859. Since information on production costs is available only for Brazil, the estimation with instrumental variables (IV) does not consider the entire system. One important fact for the estimation of the optimal tax is that Brazil, different from the United States, had an export tax in place during the entire period. As the domestic price is the international price minus the tariff (ignoring transport costs), not considering the presence of the Brazilian export tax will overstate the price that planters in the Northeast received for their product. This is important because with higher domestic prices export taxes would have been bearable to planters. To consider this difference I add the variable *Tax* to the IV regression as a control, which is the average amount that cotton exporters in Maranhão paid each year in taxes (see Table A1). Table 3 shows that, consistent with other studies, controlling for endogeneity doubles the estimates of γ for Brazil, while also increasing the parameter estimates for the United States. The OLS estimation for the demand equation of Brazilian cotton does not show any significant changes in the parameters from the SUR estimation.

With the estimated parameters, Table 4 shows price elasticities for Brazil and the United States, along with the calculated optimal tax for Brazilian cotton. I assume the elasticity of export supply from the United States (ε) equal to 1.¹²⁵ Positive price elasticities for the United States confirm what British market reports at the time described: short staple cotton from the US was a substitute for Brazilian cotton. The calculation for the optimal tax uses two different values for the Brazilian share in the British market (s): 11 per cent, which is the average market share between 1820 and 1859, and 5 per cent, which is the average share after 1840.

The last parameter, which is the elasticity of substitution between Brazilian and other varieties of cotton (σ), deserves some clarification since the cotton market structure in Brazil had differences compared to other countries. The data Irwin used to estimate the elasticities, from James Mann (1860), does not separate prices and quantities of different staples exported by the same country. This does not represent an issue for the East Indies and Egypt, which exported mainly one kind of cotton. For the United States, exports of Sea Island represented a small share of total exports and, therefore, did not affect average prices. For Brazil, however, while Pernambuco and Maranhão had comparable market shares, they exported different types of cotton that attended separate segments of the British textile sector. As argued before, Pernambuco mostly exported long-staple cotton while Maranhão exported short-staple, which competed with the high productivity regions of the United States. The elasticity of substitution σ for Maranhão, therefore, was considerably higher than for Pernambuco.

¹²⁵It was probably greater than 1, but changing the magnitude does not alter the results significantly, see Wright ‘An Econometric Study of Cotton Production and Trade, 1830-1860.’

Table 4: **Implied price elasticities of UK demand for Brazilian cotton**

	SUR	OLS	IV
Price elasticities BR	-2.08	-1.99	-3.46
Price elasticities US	2.80	2.89	3.61
σ	3.68	3.80	4.82
η_{BR}	3.42	3.49	4.63
tariff (τ), $s = 0.11$	29	29	22
τ , with $\sigma = \infty$	4	4	2
tariff (τ), $s = 0.05$			11
τ , with $\sigma = \infty$			1.5
ϵ	1	1	1

Moreover, Mann’s book describes Brazilian cotton prices as ‘Brazil & Pernambuco,’ but comparing his information with prices from newspapers in Liverpool shows that prices are only for Pernambuco.¹²⁶ The optimal export tariff of 22 per cent (with the estimated σ of 4.82), therefore, is under the assumption that the entire market share of Brazil was from Pernambuco’s long-staple cotton. Under this assumption the optimal tax for Pernambuco exports was the same as the average rate for the period. Nonetheless, the market for long-staple cotton had less competitors and was much smaller than for shorter varieties. Cotton from Maranhão, however, faced a different market, especially after the 1830s when Maranhão also exported saw-ginned cotton. Saw-ginned cotton from Maranhão competed with the new cotton regions of the United States and, therefore, its elasticity is closer to the assumption when products are homogenous ($\sigma = \infty$). With homogeneity the optimal export tariff was much lower than the actual tariff planters had to pay to the central government between 1820 and 1860.

V. Conclusions

The decline of cotton exports in Brazil while international demand was increasing in the first half of the nineteenth century is a central issue in Brazilian economic history. It is also important in a global perspective because Brazil was the only major cotton exporter where production declined in absolute terms during this era. The decline also has further implications for understanding regional divergence in Brazil. The Northeast had a comparative advantage in two of the most important agricultural commodities of the nineteenth century, cotton and sugar, and still had no growth in income per capita.

This paper argues that previous interpretations for the stagnation of cotton production in Brazil, such as new foreign producers, declining prices, and competition for productive resources from other Brazilian regions are not an adequate explanation. Cotton production stagnated before the coffee boom and, therefore, planters did not face competition for slaves and were not harmed by an overvalued exchange rate, as other hypotheses suggest. Productivity in the Americas was similar during the early nineteenth century, but declining prices and the appearance of new cotton exporters after 1815 implied that Brazilian cotton producers would have to increase productivity to

¹²⁶Mann, *The Cotton Trade of Great Britain*.

remain competitive. Indeed, experiences with saw-ginned cotton in Maranhão show that planters attempted to improve production, but the attempts failed because they were not profitable with high export taxes.

The impact of export taxes, however, was not the same for all northern provinces. Planters in Pernambuco could bear higher taxation because they exported high-quality cotton. Planters from Maranhão, on the other hand, had to compete with short staples from the US, which had lower profit margins. Estimates of the optimal tax rate show that the costs of the export taxes increased as the share of Brazilian cotton in British markets declined. During the 1840s, when prices were so low that even planters in the United States declared that they were losing money, cotton exports in Brazil faced a major economic crisis, ending the cotton cycle in most northern regions. Optimal export tax rates differences between Maranhão and Pernambuco also explains why the cotton crisis had a lower impact on Pernambuco. During the US civil war, when British markets were in need for alternative sources of cotton, Pernambuco managed to increase its exports to Britain while Maranhão did not.

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APPENDIX

Table A1: Cotton taxes in Maranhão per arroba, 1809-1850

Year	Dízimo	1808 tax	1809 réis tax (A)	silver premium	Rate	Effective rate
1809	0.10	X			0.25	0.25
1810	0.10	X			0.26	0.26
1811	0.10	X			0.28	0.28
1812	0.10	X			0.30	0.30
1813	0.10	X			0.26	0.26
1814	0.07	X			0.20	0.20
1815	0.08	X			0.18	0.18
1816	0.08	X	X		0.18	0.18
1817	0.08	X	X		0.16	0.16
1818	0.08	X	X		0.16	0.16
1819	0.08	X	X		0.16	0.16
1820	0.08	X	X		0.20	0.20
1821	0.07	X	X		0.22	0.22
1822	0.07	X	X		0.23	0.23
1823	0.06	X	X		0.24	0.24
1824	0.07	X	X		0.22	0.22

Year	Dízimo	1808 tax	1809 réis tax (A)	silver premium	Rate	Effective rate
1825	0.08	X	X		0.19	0.19
1826	0.07	X	X		0.21	0.21
1827	0.06	X	X		0.24	0.24
1828	0.06	X	X		0.25	0.25
1829	0.05	X	X	24.00	0.27	0.27
1830	0.06	X	X	44.00	0.25	0.25
1831	0.12		X	45.00	0.13	0.18
1832	0.12		X	45.00	0.12	0.18
1833	0.12		X	70.00	0.12	0.18
1834	0.12			87.27	0.12	0.20
1835	0.12			70.00	0.12	0.22
1836	0.05			70.15	0.12	0.16
1837	0.06			80.70	0.13	0.17
1838	0.05			80.21	0.12	0.16
1839	0.05			77.46	0.12	0.16
1840	0.05			69.67	0.12	0.16
1841	0.05			88.04	0.12	0.15
1842	0.05			100.77	0.12	0.16
1843	0.05			104.82	0.12	0.17
1844	0.03			106.23	0.10	0.13
1845	0.03			102.69	0.10	0.13
1846	0.03			24.00	0.10	0.13
1847	0.05				0.12	0.12
1848	0.05				0.12	0.12
1849	0.05				0.12	0.12
1850	0.05				0.12	0.12

Notes: (A) 100 réis per bag. Between 1814 and 1830, the *dízimo* had a deduction to account for transport costs. In the ‘silver premium’ series there is no data for 1831 and 1832. The effective tax rate adds the silver premium.

Table A2: Freight rates between MA, NY, and Liverpool, 1818-1850 (pence per pound)

Year	New York to Liverpool	São Luís do Maranhão to Liverpool
1818		0.78
1819		0.47
1820		0.52
1821		0.50
1822	0.50	
1823	0.67	
1824	0.44	0.45
1825	0.59	0.38
1826	0.51	0.45
1827	0.56	0.52
1828	0.38	0.36
1829	0.38	0.35
1830	0.45	0.36
1831	0.46	0.32
1832	0.37	0.35
1833	0.37	
1834	0.34	0.28
1835	0.36	0.35
1836	0.37	0.34
1837	0.48	0.39
1838	0.48	0.41
1839	0.41	0.30
1840	0.53	0.34
1841	0.32	0.36
1842	0.28	0.34
1843	0.37	0.23
1844	0.36	0.27
1845	0.31	0.27
1846	0.30	0.28
1847	0.35	0.33
1848	0.18	0.26
1849	0.21	0.24
1850	0.16	0.24

Sources: Freight rates information between 1818 and 1837 are from the British consuls in Maranhão (TNA, FO 13). Between 1838 and 1850 from newspapers in Maranhão, especially *O Publicador Maranhense*, and Mesquita, *Vida e morte da economia algodoeira do Maranhão*, 215. For New York, see Donnell, E. J. *Chronological and Statistical History of Cotton*.

Table A3: Break Points in weekly cotton receipts (bales) in Liverpool, 1821-1860

omitted table

Table A4: IV (2SLS) estimation

First-stage regression				
Y = lpbr (price of cotton from BR)	Coef.	Std.Err.	t	P>
Cost to produce cotton in Brazil	0.40	0.10	3.96	0.00
lpUS = (price of cotton from US)	0.51	0.16	3.19	0.00
ltax = (level of taxation of BR cotton)	-0.06	0.05	-1.11	0.27
lpEI = (price of cotton from East Indies)	-0.09	0.13	0.75	0.46
β	-0.10	0.03	-3.44	0.00
constant	2.55	0.60	4.26	0.00
Observations = 40				

F test of excluded instruments	F (1, 34) = 15.65
Sanderson-Windmeijer F test of excluded instruments	F (1, 34) = 15.65

Underidentification test:

Ho: matrix of reduced form coefficients has rank=K1-1 (underidentified)

Ha: matrix has rank=K1 (identified)

Anderson canon. corr. LM statistic Chi-sq(1)=12.61 P-val=0.0004

Weak identification test

Ho: equation is weakly identified.

Cragg-Donald Wald F statistic: 15.65

2SLS regression, IV = Cost

Y = shBR	Coef.	Std.Err.	Z	P > Z
lpBR	-0.28	0.10	-2.70	0.00
lpUS	0.32	0.10	3.21	0.00
ltax	0.06	0.02	3.01	0.00
lpEI	-0.04	0.05	-0.77	0.44
β	-0.09	0.01	-8.03	0.00
constant	2.10	0.26	8.03	0.00
Observations = 40				
Centered $R^2 = 0.86$, Uncen. $R^2 = 0.94$				
Underidentification test: (Anderson canon. corr. LM statistic) 12.60				
Chi-sq(1) P-val = 0.0004				