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Abstract

As late as 1750, Portugal had an output per head considerably higher than those of France or Spain. Yet just a century later, Portugal was Western Europe's poorest country. In this paper we show that the discovery of massive quantities of gold in Brazil over the eighteenth century played a key role for the long-run development of Portugal's economy. We focus on the economic resource curse: the loss of competitiveness of the tradables sector manifested in the rise of the price of non-traded goods relative to traded imports. Using original price data from archives for four Portuguese regions between 1650 and 1800, we show that a real exchange rate appreciation of about 30 percent occurred during the eighteenth century, which led to a loss of the competitiveness of national industry from which the country did not recover until considerably later.

Keywords: Dutch Disease; resource curse; early modern Portugal; the Little Divergence

JEL Codes: N10, N13, N50, N53, N73

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1. Introduction

The "Little Divergence" in early modern Europe is a well-documented phase of economic history, but the causes of Northwestern Europe's surge ahead remain controversial (Broadberry, 2020). An influential tradition, dating back to the work of North and Weingast (1989), attributes English success to institutional change: the development of a semi-representative democracy and constrained executive. Acemoglu et al. (2005) also foreground the state, showing how initial government types interacted with the rise of Atlantic trade to produce a growth-favorable political environment. Limited Anglo-Dutch polities are contrasted with the "Absolutist States" of Iberia and France, whose despotic rulers purportedly intervened arbitrarily in commercial activity. Recent research by Henriques and Palma (2019), however, has cast doubt on the start-date of the institutional divergence: until the mid-seventeenth century, Spain and Portugal both compare favorably with England in the frequency of their Parliamentary meetings, currency debasements, extraordinary taxes, and sovereign risk. Reconstruction of Portugal's national accounts, moreover, reveals a dynamic economy until well into the eighteenth century, boasting a growth rate often in excess of England's (Palma and Reis, 2019). The period of Portuguese reversal corresponds to the second half of the 1700s, when gross domestic product and real wages collapsed as those of England rose in the early stages of the Industrial Revolution.

We show that eighteenth-century Portugal was beset by Dutch Disease as a consequence of gold inflows from Brazil, whose outer provinces were remitting over 70 percent of global output to Lisbon by 1730. Treasure imports were a sudden addition to real incomes, which would consequently be spent on domestic products, driving up prices and wages in the non-traded sector, as had previously happened in Spain (Drelichman, 2005). This attracted productive factors from the increasingly uncompetitive traded sector, lowering output and raising costs to the point that—assuming diminishing returns to scale—Portuguese consumers found imports cheaper and began to substitute these for home goods. Dutch Disease manifested itself in relative prices: traded prices were internationally-determined and remained stagnant by comparison with inflation in the non-traded sector; and there was an appreciation of the real exchange rate. By constructing relative price indices for four Portuguese cities using archival data, we show that such movements did, in fact, take place during and in the wake of the gold shock. We further explore the temporal relationship between persistent real exchange rate fluctuations and various indicators of national economic development—non-agricultural population share, real GDP and wages, and the trade balance—to suggest possible tests for

long-term structural consequences.[1]

The doyen of Portuguese economic history, Vitorino M. Godinho, argued that commercial crises related to a poorer export sector performance led to surges of successful industrial policy. In contrast, when colonial booms returned the former were abandoned (Godinho, 1955, p.258, 292). In turn, Macedo (1982a, p.200) argues that once the gold inflows diminished in the last quarter of the eighteenth century, the economy largely recovered.[2] However, this viewpoint is not confirmed by the most recent data that we now have on structural change and growth: in fact, Portugal's economy never recovered from the industrial decline which took place over the century (Palma and Reis, 2019; Palma, 2019).

Contrary to views foregrounding the supposed long-run neutrality of money, Dutch Disease can have persistently negative effects on developing economies. In the case of eighteenth century Portugal, the gold inflows encouraged the substitution of foreign imports, and caused a severe contraction in the export sector, diminishing employment across a range of critical industries. These included both manufacturing and agriculture (Fisher, 1963; Costa and Reis, 2017). Worse yet, if technological progress (or the potential thereof) depends on the lagging traded sector—which, given the scalability of newly-industrialized textiles, was likely in early modern European economies—the contraction of these industries could retard per capita income growth (Van Wijnbergen, 1984). Matsuyama (1992) similarly suggests that the reorientation of activity away from a manufacturing sector characterized by externalities in production could have negative growth effects in a dual sector open economy. The effects of Dutch Disease on economic dynamism can be deep and persistent.[3]

In each of the four regions under study, significant real exchange rate appreciations can be easily observed during the first half of the eighteenth century. The price of traded in terms of non-traded goods declined precipitously in all cases after 1700, reaching around 80 percent of the previous level by 1750. Lisbon's exchange rate became increasingly over-valued, as non-traded good prices rose by nearly 40 percent compared with traded values. This coincided with the peak of gold output, which exceeded 140,000 kilograms in the decade 1741-1751 (TePaske, 2010). Notably, the price movements coincided with a period of general price inflation, and were driven primarily by accelerated increases in the non-traded sector. All of these developments are as predicted by the standard Dutch Disease model, and would tend to encourage diminished production of traded goods as imports

[1] We hence here focus on measuring and testing for the economic aspects of the resource curse, although there was also a complementary institutional element (Henriques and Palma, 2019; Palma, 2019).

[2] For similar arguments, see Macedo (1982b, p.122, 125, 127).

[3] Sachs and Warner (1995), generalizing Matsuyama's framework to apply to traded- and non-traded goods, document depressed growth rates in countries for two decades after a year of elevated natural resource exports.

increased and factors flowed into the non-traded sector.

As real exchange rates turned against Portuguese exports, the burgeoning expansion of the early eighteenth century stalled. Urbanization fell from 17.3 to 16.2 percent between 1750 and 1800, while the rural non-agricultural share—representing much of the nation's handicrafts—remained static at around 29 percent (Palma and Reis, 2019). Real GDP and wages both declined during the same period, only starting to recover after the Napoleonic Wars. At a time when urbanization, wages, and per capita production were rising synchronously across a fast-commercializing Western Europe, Portugal's decades of outright depression stand in particularly stark relief. Neither the loss of the colonial trades to the Anglo-Dutch joint-stock companies nor the French invasion in 1807 wrought such a dramatic collapse in the nation's fortunes. A concerted effort at resuscitating industry through aggressive import substitution and public educational reforms under the Marquis de Pombal was powerless in the face of Portugal's increasing economic involution.[4]

This paper contributes to the literature in both economics and economic history. Corden and Neary (1982) and Corden (1984)) present the basic formulation of Dutch Disease theory, but the model is limited by the fact that the distortion ends with the monetary stimulus; in Portugal, GDP continued to decline after gold imports all but ended. Van Wijnbergen (1984), Krugman (1987), Matsuyama (1992), and Sachs and Warner (1995) to varying degrees link resource abundance with reduced economic growth through a decline in the size of the traded sector, and Gylfason et al. (1999) explicitly tie real exchange rate appreciation to a contraction of skill-intensive manufacturing. Asea and Lahiri (1999) show that the increased marginal product of unskilled labor slows human capital accumulation by making education costlier. Forsyth and Nicholas (1983) and Drelichman (2005) have applied the Dutch Disease model to the case of early modern Spain.[5] In this paper we provide evidence which supports Drelichman's interpretation through the analysis of eighteenth-century Portugal, which to a large extent repeated the story of sixteenth-century Spain.[6] As Figure 1 illustrates, Spain had an economic

[4] Pombal's educational reforms associated with the expulsion of the Jesuits in fact considerably reduced the number of students, and the industrialization effort was also not successful (Madureira, 1997). As far as human capital formation is concerned, there had been around 20,000 students in pre-university education until 1759, a figure which Pombal's reforms from 1759 reduced sharply (Leitão, 2007, p.88). The same absolute number of pre-university students was only reached again in the 1930s (Romeiras, 2019; Leitão and Romeiras, 2015), when the overall population was also considerably larger. Being a Catholic country, Portugal in fact still had a numeracy rate close to the most advanced countries in Europe during much of the eighteenth century (Stolz et al., 2013, pp. 562-4), but this comparative situation was to change drastically in the nineteenth century, and the catch-up only started in the twentieth (Palma and Reis, 2021). The fact that the Catholic religion does not seem to have been, by itself, an important factor preventing industrialization is also suggested by the fact that the second European country to industrialize was Belgium.

[5] Drelichman notes that while Corden and Neary must assume a temporary distortion, his general equilibrium result shows a persistent effect if consumers believe the windfall to be permanent.

[6] Costa et al. (2015) find a positive effect of colonial trade on the Portuguese economy during the

boom during much of the sixteenth century and then declined, just as happened in Portugal in the eighteenth.

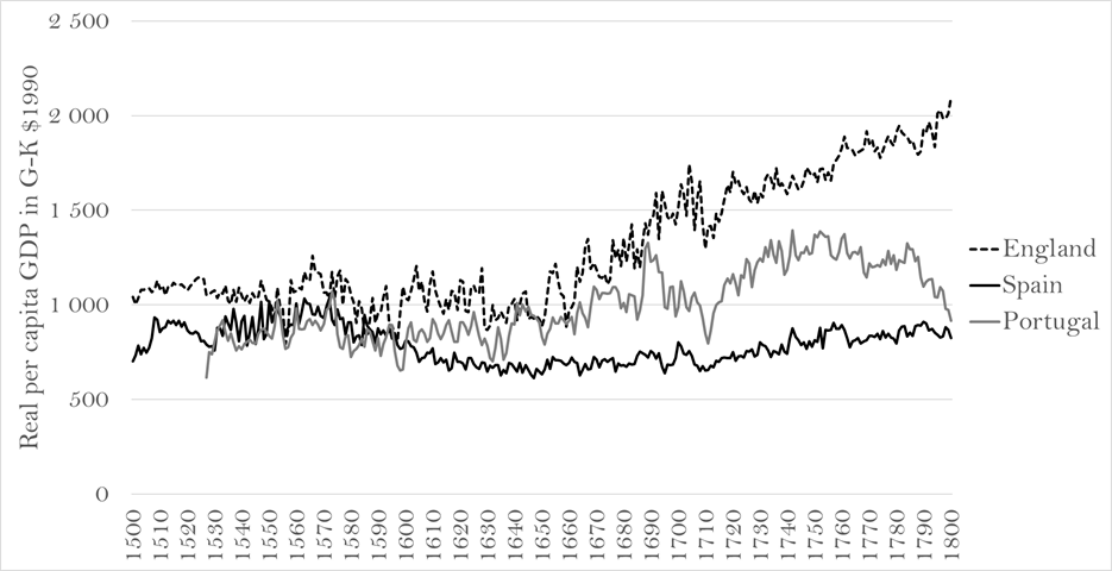

Figure 1: GDP per capita in constant, 1990 "international" Geary-Khamis dollars.

Sources: Broadberry et al. (2015); Prados de la Escosura et al. (2021); Palma and Reis (2019). Note: What mainly needs to be noticed here are changes in growth rates over time, not small differences in income levels, because, as explained in the text, small changes in nineteenth benchmarks can lead to any series as a whole shifting up or down.

2. Historical Background

At some point between 1693 and 1695, alluvial gold was discovered in the Minas Gerais province of Portuguese Brazil. The original explorers were adventurous Paulistas searching for native slaves and Spanish silver, and they sought for a time to keep the secret of the diggings. By 1697, however, word had escaped, and an unprecedented wave of internal and external emigration swept the colony. As many as 50,000 prospectors and their slaves may have inhabited the mining towns by 1705 (Boxer, 1969). Gold-hunters arrived en masse from Portugal; estimates of yearly emigration range from a minimum of 3,000-4,000 to 8,000-10,000, enough to act as a "brake on population growth," which stalled during the first half of the eighteenth century (Costa et al., 2016). Before long, gold was flowing back to Europe in vast quantities, some from the "royal fifth," or quinto, levied on domestic production, but mostly through remittances by the private contractors who predominated in the mines. While local governors strove desperately to regulate exports, smuggling

eighteenth century, but their analysis focuses on the income gains resulting directly from interactions between plantations, mines, and captured export markets. By contrast, in the present paper we consider the unintended structural consequences of gold extraction, which are outside the ambit of their econometric approach, as was previously pointed out by Abad and Palma (2021).

was endemic and highly successful; powerful merchants in the annual Lisbon fleets hid treasure in barrels, chests, and sugar bags, while informants were discouraged. TePaske (2010), estimating aggregate Brazilian production from 1690 to 1810, suggests that output stood at 40,000 kilograms during each of the first two decades of the eighteenth century, before exploding to 100,000 kilograms in the 1720s and over 140,000 in the 1730s. Of this total, more than 80 percent returned to Portugal (Costa et al., 2016). Three annual fleets shipped an average of 3 billion reis apiece, the proceeds of which were distributed to around 2,300 private individuals (Costa et al., 2018, 2013). Most treasure was private and arrived already minted, and about 72% was re-exported. The remainder, spent domestically, may have directly raised incomes by as much as 20 percent. (Sousa, 2006, p.244).

Portugal ran current account deficits with all of its major trading partners after 1700, particularly with England (Costa et al., 2016; Fisher, 1971). The deficit increased steadily throughout the first half of the eighteenth century, stabilizing at around 4,000 million reis per annum by the 1750s. Portuguese annual imports from England rose from 355,000 pounds in 1699-1702 to 1,300,000 pounds in 1756-60, while exports fell from a peak of 387,000 pounds in 1720 to 257,000 pounds over 1756-60. The reduction in exports is especially striking given that wine production increased as a result of the Methuen Treaty (to be discussed below), which gave domestic vineyards access to English buyers. The bulk of English goods consisted of woollen textiles—never falling under 70 percent in any year before 1760, and at one stage reaching 84 percent—which were predominantly re-exported to Brazil, whose demands for durable goods had exploded with the expansion of mineral wealth. In 40 of the 60 years between 1700 and 1760, the yearly London rate of exchange was at or below the gold export point of 5/5.75d. (Fisher, 1963). Portuguese gold became increasingly crucial to the English manufacturing sector, in exchange for which it sent 50 percent of total output. A staggering 90 percent of exported gold went to financing the deficit, leaving regularly for Plymouth in packet-boats, which carried diplomatic immunity and were thus able to escape prohibitions set on metallic outflows. In sum, the peak of gold remittances and the trough of the trade deficit essentially coincide during the early 1750s.

Portugal's increasing deficits with England must be seen in the context of the Methuen Treaty of 1703, which exchanged preferential rates on English textiles (23 percent) for a reduction on wine tariffs to a third below that allotted to France. While it is tempting to see the agreement as a codification of core-periphery relations between the two countries, establishing the former as a manufacturer and the latter as a primary product exporter, to do so would be both anachronistic and historically inaccurate. First, tariffs on English textile imports were not reduced—rather, they were merely an official restatement of a "secret clause" in a

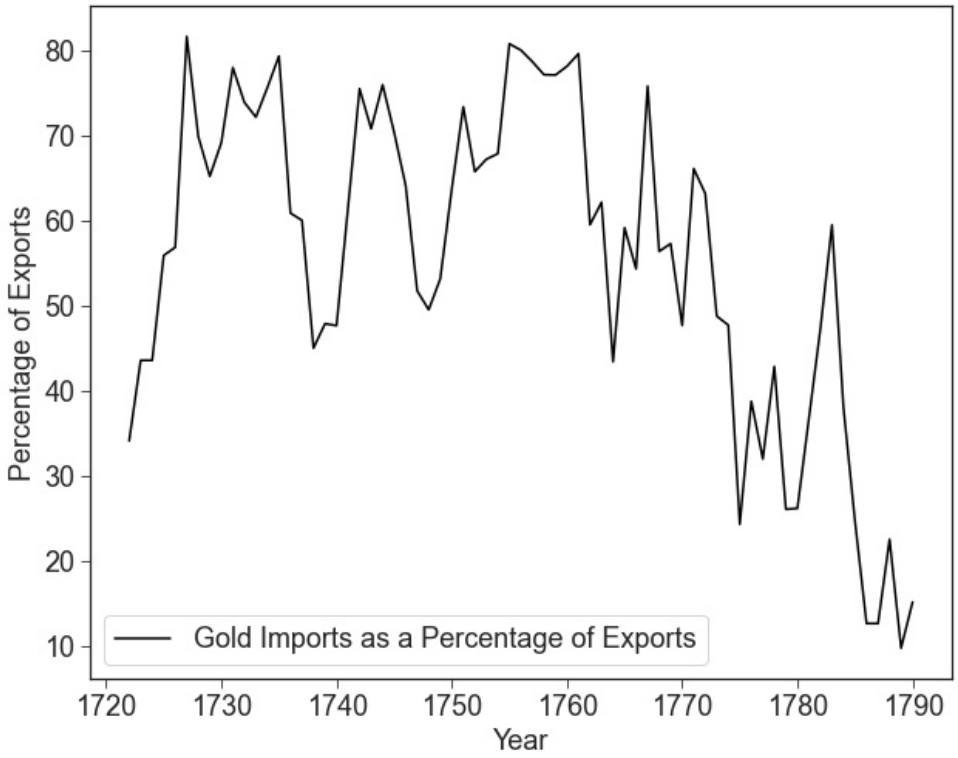

Figure 2: Gold as a Percentage of Total Exports (Costa et al., 2016)

1654 treaty peace treaty guaranteeing these same rates, which had not been enforced by customs officials. The "new article" introduced in 1703 corresponded to the opening of the English market to Portuguese wines, which bought Portugal's participation in the Grand Alliance during the War of the Spanish Succession. The Methuen Treaty (which had military as well as economic implications) held political conditions between the two powers relatively stable, such that the effects of gold imports on the balance of trade could play out according to largely economic factors. The salience of the Treaty itself in Portuguese "deindustrialization" was consequently limited; indeed, when the trade accounts were re-balanced during the early 1770s, the agreement was still legally binding (Costa et al., 2016). The Methuen Treaty may not have addressed the symptoms of Dutch Disease (which modern developing countries have sought to arrest via protection), but it was not the ultimate cause.

A substantial share of the extracted treasure was retained within Portugal. Costa et al. (2018) show that the domestic gold stock rose from 1.148 billion reis in 1720 to more than 58 billion reis by mid-century, a figure potentially in excess of gross domestic product. The growth rate of the money supply, 2.5 percent per

	Private		Public	
	Nominal	**Real**	**Nominal**	**Real**
1720-1724	13,290	13,290	2,118	2,118
1725-1729	18,807	20,136	6,403	6,856
1730-1734	14,257	14,707	6,764	6,978
1735-1739	15,948	16,475	3,456	3,570
1740-1744	23,621	21,829	5,835	5,392
1745-1749	23,766	23,878	2,397	2,408
1750-1754	21,331	20,839	4,912	4,799
1755-1759	16,356	16,412	4,880	4,897
1760-1764	12,212	12,130	6,192	6,151
1765-1769	13,306	11,773	6,406	5,668
1770-1774	12,443	10,935	3,015	2,649
1775-1779	9,427	8,380	1,285	1,142
1780-1784	4,688	3,690	2,313	1,821
1785-1789	873	705	780	630
1790-1794	791	557	519	365
1795-1799	3,661	2,384	1,321	860
1800-1804	6,303	3,279	1,369	712

Table 1: Remittances of Gold to Portugal by Sector, Thousands of Reis (real values in constant 1720 Reis) (Costa et al., 2016)

annum, substantially exceeded output growth over the course of the eighteenth century. 80 percent of this total consisted of coins, many of which were invested in land—a fundamental factor in the non-traded sector. Growing demand for land led the Pombal administration to restrict property transfers to the Church and suppress entailments to improve market liquidity, measures which, though unsuccessful, reflect the rising value of a static resource. In the southern Alentejo region, rising meat prices—a non-traded good—led to wholesale conversion to husbandry from cereal cultivation, which remained comparatively inefficient (yield ratios for wheat and rye remaining below 1:4) and were subject to international competition. Overall agricultural production, which had risen steadily since 1660 (at .72 percent per annum), declined from 1750 until the Napoleonic Wars. Olive oil and wine exports both flourished, but these were products with no ready substitutes and whose producers had gained access to foreign consumers by diplomatic means (such as the Methuen Treaty). As we have previously noted, these sectors did little to arrest the steady decline of Portuguese shipments abroad.

Data is scarce on manufactures, but even with extensive state intervention during the second half of the eighteenth century, industrial development can have been sluggish at best. Until 1769, only four textile factories had been established in the entirety of Portugal, and outside the royal factories, the scale of production remained desperately small. And even these larger, state-run institutions were

really glorified systems of organizing and subcontracting to existing networks of cottage production. Faced with daunting initial investment costs and insufficient capital, the only sizeable enterprises to be established were erected behind heavy tariffs and import bans. The factory-starting efforts of Pombal did not change the previous structure of production; of 200 "program" facilities reported in 1777, the majority were small-scale. Indeed, the proliferation of starts after 1777 (jumping from 55 to 235) was associated with a liberalization of the import licensing system to allow minor firms to set up. And of 180 applications for licenses between 1757 and 1832, 114 (or 63 percent) were by foreigners, bespeaking the absence of domestic industrial entrepreneurship and capital (Pedreira, 1994). The small scale of these undertakings slowed the adoption of mechanized technologies, delaying the arrival of the Industrial Revolution.

Portugal's increased efforts to boost industrial production ultimately failed, as will be later discussed, but the implementation of import-substitution hints at contemporary recognition that gold imports (and re-exportation) led to economic involution. Some politicians of the period were in fact at least vaguely aware of the negative consequences (Silva, 2013). The tariffs, bans, and state entrepreneurship of the Pombal era were coupled with the capture and protection of the Brazilian market on behalf of domestic merchants; in 1785, manufacturing in the colony was banned outright, and efforts were made reduce the influence of "interloper" English shippers and producers by handing monopoly rights to chartered companies. The Company of Grão-Pará and Maranhão exploited state credit to establish primary product plantations in cacao, rice, coffee, and cotton, for which they exchanged manufactured exports, which rose to 43.1 percent of all goods sent to the colony by 1800. Thus there is no basis for attributing — as Acemoglu et al. (2005) do — Portugal's economic ineptitude to the poor representation of merchant interests. Negative structural transformation occurred despite concerted state efforts to boost industry at the expense of Brazil.[7]

3. Theory and Data

Dutch Disease in Theory

One prominent formulation of the "Dutch Disease" theory is that of Corden and Neary (1982), whose paper "Booming Sector and De-Industrialization in a Small Open Economy" demonstrates how a natural resource windfall could affect the sectoral composition of output. In their basic model, the economy consists

[7] Nonetheless, weak institutions by the eighteenth century led to a situation of crony capitalism and state capture (Madureira, 1997).

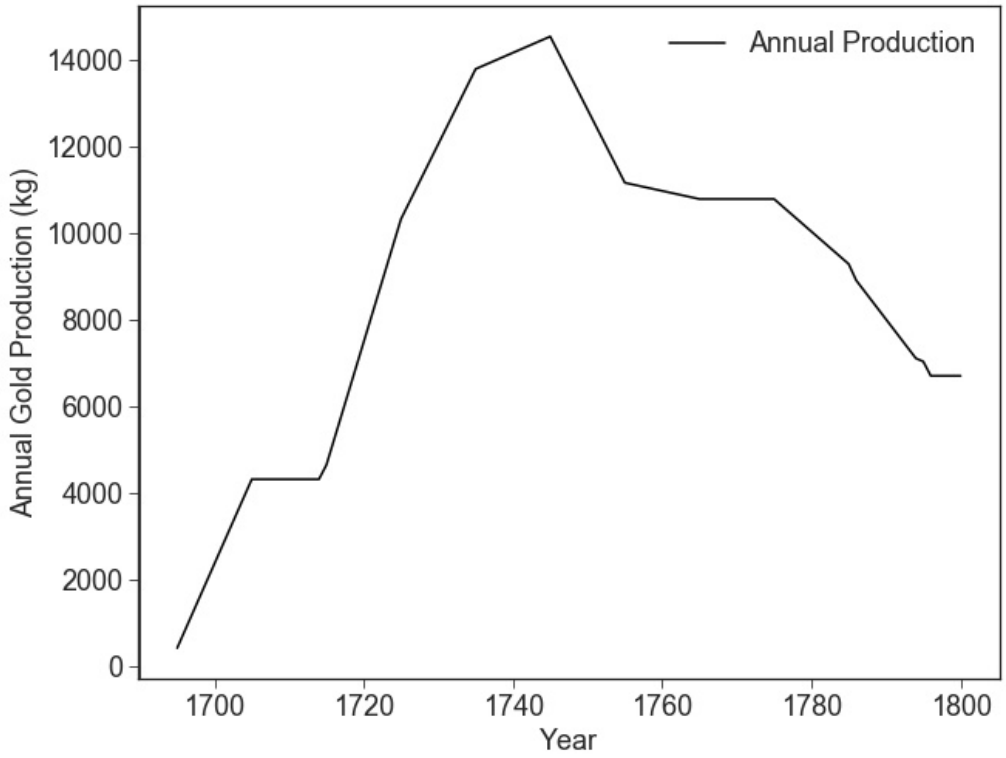

Figure 3: Annual Gold Production in Portuguese Brazil (TePaske, 2010)

of three sectors, across which one common factor (usually labor) is mobile: a booming sector, a lagging (traded) sector, and a non-traded sector. Corden and Neary, with reference to the contemporary experience of the British and Dutch with oil, postulate the first as energy, the second as manufacturing, and the third as services, but the labels are not necessary for the theory to function. The booming sector experiences an initial increase in aggregate factor incomes, the consequences of which can be decomposed into two effects, varying situationally in magnitude: a resource movement effect and a spending effect. In the former case, technological progress (or a resource windfall) increases the marginal product of mobile factors and thus demand for them in the booming sector. Rents and wages rise, drawing workers out of the lagging and non-traded sectors. This is referred to as direct deindustrialization, as employment falls in the manufacturing (and the non-traded) sector. Excess demand for non-traded goods, however, can only be resolved by real appreciation—an increase in the price relative to traded goods.

With the spending effect, the newfound wealth of domestic consumers from the boom—provided the income elasticity of demand is positive—is spent on non-traded goods, causing a further real appreciation as well as an increase in services

output. Resources will be drawn out of the other two sectors into the provision of non-traded commodities and services, which now command higher profits—thus indirect deindustrialization compounds the contraction in manufacturing. Both the spending and resource movement effects lower rents in the lagging sector, which is constrained by constant terms of trade. Fixed world prices ensure that rising wages cannot be compensated for by inflation. Across the whole economy, the resource movement effect will tend to increase incomes, while the consequences of the spending effect will be ambiguous.

Relaxing the assumption that capital is immobile between sectors gives rise to a "paradox model," in which it can be shown that the resource movement will increase output in the relatively more capital-intensive industry—resulting in "pro-industrialization," if that sector is manufacturing. This is the result of the Rybczynski (1955) theorem, which states that a rise in the endowment of one factor leads to a more than proportional increase in the production of the good that uses it intensively. If labor supply decreased, the capital-intensive sector would actually tend to increase output at the expense of its labor-intensive counterpart. The spending effect, however, will continue to unambiguously cause lagging-sector production to fall and non-traded prices and production to increase. In the latter case, if the lagging sector is more capital-intensive, real wages will rise and rents will decline. Further complexity can be added if the lagging sector is decomposed into two or more industries; again by the Rybczynski theorem, the more capital-intensive will raise output and employment at the expense of the other. One critical point to consider in the above analysis is that the traded sector need not be explicitly "industrial"; agriculture could, as in Australia or Nigeria, see similar declines in output as a result of real exchange rate pressures.

Several authors have developed models illustrating the long-term consequences of resource-induced sectoral contraction. Krugman (1987) assumes that the stock of knowledge is proportional to past production and shows that, by pushing up the relative wage rate, a sustained transfer of resource wealth will lead to the permanent out-migration of some traded industries. Sachs and Warner (1995), following the analysis of Matsuyama (1992), present a simple model within an overlapping-generations framework demonstrating how Dutch Disease, by altering the sectoral composition of output, can impact long-run growth. They assume that the relative size of the manufacturing sector determines the rate of increase of the stock of knowledge (human capital accumulation), which is labor-augmenting across all industries. That is, human capital increases the amount of effective labor employed (multiplying that input in the production function) in the traded and non-traded sectors, but is only accumulated in the former. A one-time increase in resource wealth will immediately increase demand for non-traded goods, resulting

in a movement of labor out of the traded sector to compensate. The manufacturing share is thereby reduced, depressing technological progress and thus economic growth. In the subsequent period, savings from the previous influx are again spent on non-traded production, which results in another depression of the manufacturing share.

Once the resource windfall has been spent, the proportion of traded employment converges to the steady state; however, the damage has already been done: human capital will remain below-normal for multiple periods after the resource shock. As a consequence, GDP growth rates will be temporarily depressed, and the affected country could end with output at a permanently lower level. Indeed, depending on the relative capital intensities of the traded and non-traded sectors, GDP could actually decline. In all events, an expected trajectory would consist of an immediate increase in GDP flowing directly from the resource windfall, followed by years of stagnant growth.

Combining the Corden and Neary theoretical framework with the Sachs and Warner growth model yields distinct predictions about the behavior of prices, wages, and sectoral and aggregate output in the wake of a single-period resource boom. Assuming that the lagging traded sector is manufacturing and the non-traded sector primary production, and that the spending effect predominates over the resource movement effect, prices and output should rise in the non-traded sector relative to the traded sector. This real appreciation will in turn decrease output in the traded sector, whose prices are fixed on the international market and whose products can no longer be both profitable and competitive at home. The contraction in manufacturing, besides reducing employment, will also slow the accumulation of productive knowledge, with the result that growth rates in future periods will be reduced. If the resource shock is of long duration and extreme severity, however, the manufacturing collapse and growth slowdown would be far more destructive.

How would the model apply to Portugal? The economy, inclusive of Brazil, can be divided into the expected three sectors: gold is the booming sector, directly augmenting incomes and providing a high marginal product of labor; manufacturing, viticulture, and cereal agriculture constitute the lagging traded sector; and animal and forest production form the land-intensive non-traded sector. Increasing gold production in Brazil enriched Portguese nationals in the colonies, who either remitted their funds home or exchanged them directly for the durable goods arriving on the thrice-annual treasure fleets. Newly-expanded incomes would necessarily increase demand in the non-traded sector, causing a real appreciation and a consequent withdrawal of resources from the lagging sector through the spending effect. A smaller though still significant contraction might follow from the emigra-

tion of hundreds of thousands of Portuguese prospectors, which would constitute a resource movement effect. With the collapse of the traded export sector and the increased purchasing power of the currency, exports would decline and imports surge, increasing the trade deficit. Gold re-exportation would then be required to pay the outstanding balances, as the proceeds of domestic industry no longer earn foreign exchange.

In the long run, the decades-long influx of gold would tend to continue the compression of the traded sector (or at least arrest its expansion). Skilled-based productivity advances, which depend on industry and cereal agriculture, would be persistently stifled, removing the principal driver of expansion. After an initial boom, therefore, GDP growth rates would tend to slow, or even reverse, with critical sectors of the economy being replaced by imports. Though wine prices and exports apparently flourished, this can be reconciled with the "decomposed" traded-sector model discussed above, with land as an additional mobile factor. This fits with the general pattern of farms being transferred to relatively land- and capital-intensive industries, especially viticulture and husbandry, throughout the course of the eighteenth century. Costa and Reis (2017) estimate that the 1750-1800 period was the only extended span in Portuguese history in there was a trade deficit in the agricultural sector alone, as the value of grain imports rose from 23 tons of silver in 1750 (already up from 14.8 in 1700) to 151.6 by 1800. The increasing success of English textiles in both the home and Brazilian markets, meanwhile, indicates that domestic production was increasingly uncompetitive.

This scenario is roughly analogous to that described by Drelichman (2005), who studies the real exchange rate in Spain following the mass importation of silver from Latin America during the sixteenth century. As with this paper, he constructs weighted baskets of traded and non-traded goods. He finds a "strong and persistent increase" in the relative price of non-traded goods coincident with the discovery of precious metals, which persisted for three decades before subsiding. Drelichman also produces a set of stylized facts for the evolution of the Spanish economy which fit the Portuguese case as thus described. Spain, like Portugal, lost control of shipping services to English and Dutch; ceded her fisheries; dropped out of the metal trade; and started to purchase foreign cereals and manufactured goods in bulk. And like Portugal, royal ministers recognized the threat of import dependence, the Cortes requesting in 1586 that the King ban the exchange of foreign luxuries for imperial treasure. Both nations also saw a roughly forty-year lag between the onset of metallic inflows and the beginning of overall decline, coinciding closely with the peak in remittances (Palma, 2019). Analogy is not proof of causality, but Spain provides a plausible example of Dutch Disease ravaging an early modern economy with similar characteristics.

Data Construction

Testing for Dutch Disease requires detailed information on the prices of a range of traded and non-traded goods, so as to establish whether an appreciation in the real exchange rate occurred. This paper makes use of data from the Price, Wages, and Rents in Portugal 1310-1900 (henceforth PWR) project, which collects long-run data of the aforementioned variables from primary sources available in archives in Portugal.[8] The database relies on a variety of primary record sources, including hospitals, charitable institutions (*Misericórdias*), convents and monasteries, royal palaces, municipal bodies, and the University of Coimbra. The price indices to be discussed below are constructed by us from figures converted from their original values in geographically varying Portuguese measures[9] to a metric standard enumerated in reis per unit (rather than silver). Our selected time ranges from 1650 to 1825, which corresponds to a consistently-filled sequence in the dataset (there are few interpolations).

$$index_{i,t} = \frac{\sum q_k \times p_{k,t}}{\sum q_k \times p_{k,1700}}$$

- q_k: quantity purchased of good k
- $p_{k,t}$: nominal price of good k at time t in reis per metric units
- N: number of goods $1, 2, ..., N$
- i: traded (t) or non-traded (nt)

To build the traded and non-traded indices, we first had to choose a relevant set of goods. For a criterion of selection based on empirical data, we use the set of goods and weights employed by Allen (2001) in his consumption baskets, as modified for Portugal specifically by Palma and Reis (2019). We then divide up these categories, displayed in Table 2, into traded and non-traded groups. No early modern good, except in rare cases, was fully traded, but a range of products have been shown by secondary studies to have been either competitive enough in foreign markets (such as wine) or in domestic port cities (such as wheat). Costa et al. (2016) show that nearly 80 percent of all imports were manufactures as of 1685, and that most of the remainder were cereals, dairy products, and fish. The same source suggests that 914 million reis worth of wine and olive oil combined were exported, along with smaller but still significant quantities of salt. With this in mind, we selected wheat (and/or substitute grains, where necessary), olive oil,

[8] This database is available at http://pwr-portugal.ics.ul.pt/

[9] For example, the *almude*, a liquid measure, contained 16.8 liters in Lisbon, 25.4 liters in Porto, 16.7 liters in Coimbra, and 17.4 liters in Évora.

Traded	Weight	Non-Traded	Weight
Wheat/Maize	285 liters	Meat	26 kilos
Wine	68.25 liters	Hens	5 units
Olive Oil	7.8 liters	Eggs	52 units
Linen	5 meters	Soap	2.6 kilos
Candles	2.6 kilos	Charcoal	2.0 million BTU

Table 2: Traded and Non-Traded Categories and Weights (Palma and Reis, 2019)

wine, linen, and candles as traded goods, and meat, hens, eggs, soap, and charcoal as non-traded. Live animals were difficult to move across national borders, and no evidence from the trade accounts suggested that primary meat products—beyond salt cod—were moved in significant quantities. Eggs and soap [10] were too fragile to be moved, while neither charcoal nor firewood appeared in the lists of traded goods from Fisher (1971) and Costa et al. (2016). [11]

Finally, we combine the traded and non-traded baskets into separate indices by using the Laspeyres method, following Allen (2001). For clarity, and to smooth out the incoherencies inevitable with volatile premodern commodity prices, we convert the indices into 11-year moving averages. Even so, spikes in the prices of heavily-weighted goods can still and do disfigure the overall picture. The considerable weight placed on wheat and the secular increase of its price presented a particular challenge; as the price of the good rose toward the end of the eighteenth century, it began to take up an implausibly large share of the consumption basket. To compensate, we follow Palma and Reis (2019) in increasing the fraction of maize in the grain content of flour as wheat becomes more expensive, reflecting production shares derived from tithes.[12] Finally, we construct a whole-Portugal series combining the baskets from the three cities, with the traded and non-traded figures consisting of population-weighted averages of the values for each location. We depict the real exchange rate appreciation as an increase in the price of non-traded relative to traded goods.

[10] In the case of soap, low value-to-weight ratios would have hindered the transfer. Neither Fisher (1963) nor Costa et al. (2016) list soap as being traded; in any event, soap was purchased in such small quantities that a change of status would have next to no effect.

[11] Though the price dataset is impressive in scope, there are inevitably missing values, and for some goods and cities the gaps were significant. We fill these by linear interpolation, and where values were sparse enough that this procedure caused distortions, we make relevant substitutions, for example exchanging charcoal for firewood or wax for candles.

[12] Unlike Allen (2001), we include flour rather than bread, as the latter includes wages—a classic non-traded "good."

4. Empirical Results

Figure 4 plots the ratio between the indexed prices of the traded and non-traded baskets from 1650 to 1825 for the entire country of Portugal. The vertical black line stands at 1690, coincident with the initial gold inflows from Brazil. Several distinct phases are evident: first, a declining real exchange rate for most of the century before 1700; second, a steep appreciation (by over 30 percent) from around 1700 until 1725; third, a high plateau peaking after 1750; and fourth, a gradual but muted recovery after 1775. Significantly, the path of gold production in Portuguese Brazil (shown by the dashed grey line) closely parallels the real exchange rate trend. The peak of Figure 4 follows soon after the peak year of output, in which more than 14,000 kilograms were extracted.

Figure 4: Ratio of Non-Traded to Traded Price Indices for Portugal, 1650-1820 (PWR)

Note: The vertical line in 1690 marks the approximate beginning of gold imports to Portugal.

Two trends stand out: a short, sharp appreciation followed by persistently expensive non-traded goods, which even by 1800—as gold imports were dwindling—remained 20 percent above traded prices. Close examination reveals that the recovery is largely due to the rising price of wheat during the last half of the eighteenth century. Give the high weight placed on flour, the movement of this single good comes to dominate the traded index with an increase in prices. However, this figure will tend to overstate the extent to which the traded index rose;

the price of wheat likely increased due to the simultaneous growth of population after 1730 and stagnation of agricultural output (concomitant with the transfer of farmland to husbandry discussed above). Gradually substituting maize for wheat as the latter grows increasingly expensive—as is both historically accurate and theoretically plausible—mutes this distortion. Portugal's major exports, wine and olive oil, saw essentially flat nominal prices throughout the eighteenth century. Linens—for which English textiles could be substituted—followed a similar pattern, only appreciating (as all goods did) at the time of the Napoleonic Wars. On the non-traded side, beef, pork, eggs, hens, and charcoal all rose sharply in price in the first decade of the eighteenth century, coincident with the arrival of gold imports.

The slow recovery of the real exchange rate during the second half of the eighteenth century points to a persistent effect of continuous gold imports, and suggests that the Portuguese economy was slow to adjust to this shock. Elevated non-traded prices would have been a strong inducement for an influx of productive factors out of import-competitive industries, especially as wage and price inflation squeezed profits in the traded sector. This is broadly consistent with the pattern of increasing trade deficits prior to 1750 and the subsequent collapse in product and real wages. Given the extent to which the rising price of wheat drives the recovery of the traded index, imputing the shift to any historical break is hazardous; yet the modest return of Portugal's competitive position appears does coincide with the diminution of the country's trade deficit amid Pombal's aggressive import-substitution program. In any event, the fact that non-traded industries remained expensive into the nineteenth century accords well with the observed trends in Portugal's GDP.

Figure 5 shows the real exchange rate for Lisbon over the same period. Unsurprisingly, the trends correspond closely with the national version—weighting by population gives extreme predominance to the capital, whose population even after the 1755 earthquake remained nearly four times that of Porto, the next largest city. This is fortunate, as the price data for Lisbon is the most complete and least volatile (as some of the larger categories, such as meats, could be constructed as averages across multiple products). The Lisbon figure undergoes several distinct phase changes—a falling exchange rate before 1690, a dramatic appreciation after 1710 (by 30-40 percent), and a slightly stronger recovery after 1750. This should be expected of the nation's commercial hub: Lisbon, as the principal site of gold offloading and foreign trade, would have most completely absorbed the monetary shock and had prices that more closely reflected "exogenous" world market values than the inland areas.

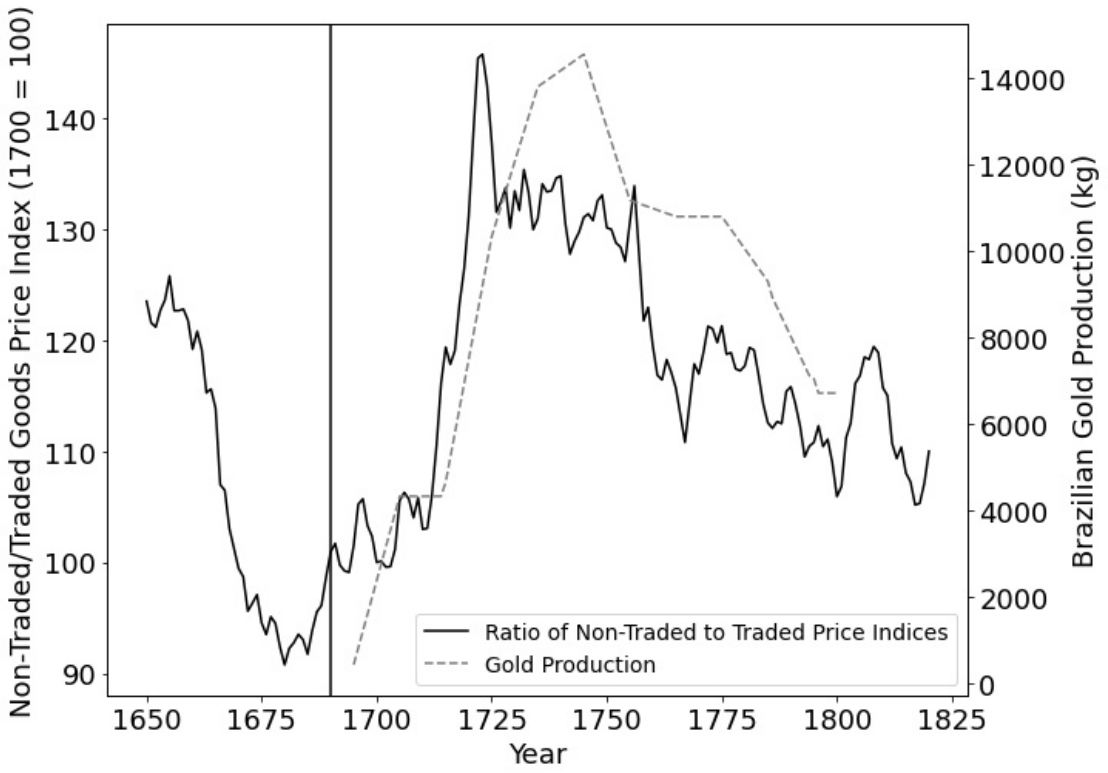

Figure 5: Ratio of Non-Traded to Traded Price Indices for Lisbon, 1650-1820 (PWR)

Note: The vertical line in 1690 marks the approximate beginning of gold imports to Portugal.

5. Discussion

The movements exhibited above in relative prices and the real exchange rate are as predicted by the theory of Dutch Disease, but the task remains to connect them with economic decline. The ailment can be attributed to proximate, intermediate and ultimate (or at least more fundamental) categories. Real exchange rate appreciation falls into the first category, increasing trade deficits, falling wages and product into the second, and the gold inflows into the third, as they drove the others via a resource curse mechanism. These afflictions affected Portugal during the eighteenth century, but while the real exchange rate appreciation and the increasing trade deficits clearly resulted from Dutch Disease, additional work will be required to extend the causal chain to broader economic decline. Output statistics are unavailable for most individual industries except agriculture, so a variety of substitute measures must be employed, in particular for the purpose of differentiating between direct the consequences of gold via its effect on the economy and its indirect effect via a political resource curse which negatively affected institutions. Notice however, that the latter effect is not independent from the former: the expansion of the non-tradables sector (e.g. landed and Church-related

interests) led to the formation of lobbies as had happened in Spain Drelichman (2007); Stein and Stein (2000).

Between 1720 and 1750, as discussed above, the Portuguese trade deficit rose from 2 billion reis (2.4 percent of NGDP) to more than 4 billion (3.9 percent), reaching nearly 6 billion (6.1 percent) in 1756 in the wake of the Lisbon earthquake. The foreign accounts remained in the negative until the last decade of the eighteenth century, notwithstanding the efforts of Pombal and his successors to boost domestic industry and prohibit imports. In any event, Costa et al. (2016) suggest that the restoration of the trade balance was the result of falling domestic consumption, given that exports did not substantially increase. Even the suppression of Brazilian manufacturing by a decree of 5 January 1785 and Pombal's efforts to exclude English "interlopers" from the colonial trade through the assignment of monopoly rights failed to lift exports, and if value rose at the end of the century, this was a result of a pan-European wave of price inflation. So long as the golden tide flowed into Lisbon, Portugal was doomed to involution.

Did individual traded and non-traded industries fit the general pattern? No reliable data exists on manufacturing, but what limited figures can be adduced are not suggestive of general expansion. Before 1769, only 15 factories were established across the country at large; just four of these produced textiles, the growth sector of the Industrial Revolution across the channel. Metallurgy, silk throwing, and dyeing were all neglected, while cotton, woolens, and linen each received only one new venture. Given that between 1736 and 1740 Portugal was purchasing half of the English textile industry's exports, demand for manufactured goods clearly outstripped the supply response of domestic industry. There was no push, as in England, toward modernization and mechanization; rather, the traditional putting-out system that had persisted since the sixteenth century was all but universal. Larger-scale operations—either state-run or state-sponsored—merely subcontracted tasks to peasant production networks. Only by the turn of the century, once gold imports had nearly ceased, government factories started, and an import ban was implemented, does any evidence appear that output and exports increased. Given that Brazil, subjected to a colonial monopoly, was the primary recipient, this does not paint a particularly optimistic picture. The share of population outside agriculture, which had risen quickly until 1750, then fell from 46.5 percent in 1750 to 33.1 percent a century later (Palma and Reis, 2019). The technical stagnation noted above, therefore, would be a predictable consequence of this contraction in the learning-by-doing growth model. While Lisbon and Porto did experience strong urban growth, there is a strong case for regarding them as "consumption cities" dependent on the provision of non-traded services. Gollin et al. (2016) find that consumption cities, by contrast with manufacturing-based "pro-

duction cities," tend to proliferate in countries with high levels of natural resource exports. Lisbon, home to the Crown and Court, proved a particularly voracious consumer of goods funded by gold imports. While aggregate demand increased, Lisbon's status as a hub or foreign trade ensured that much of this was siphoned off into purchases of foreign manufactures (Fisher, 1963).

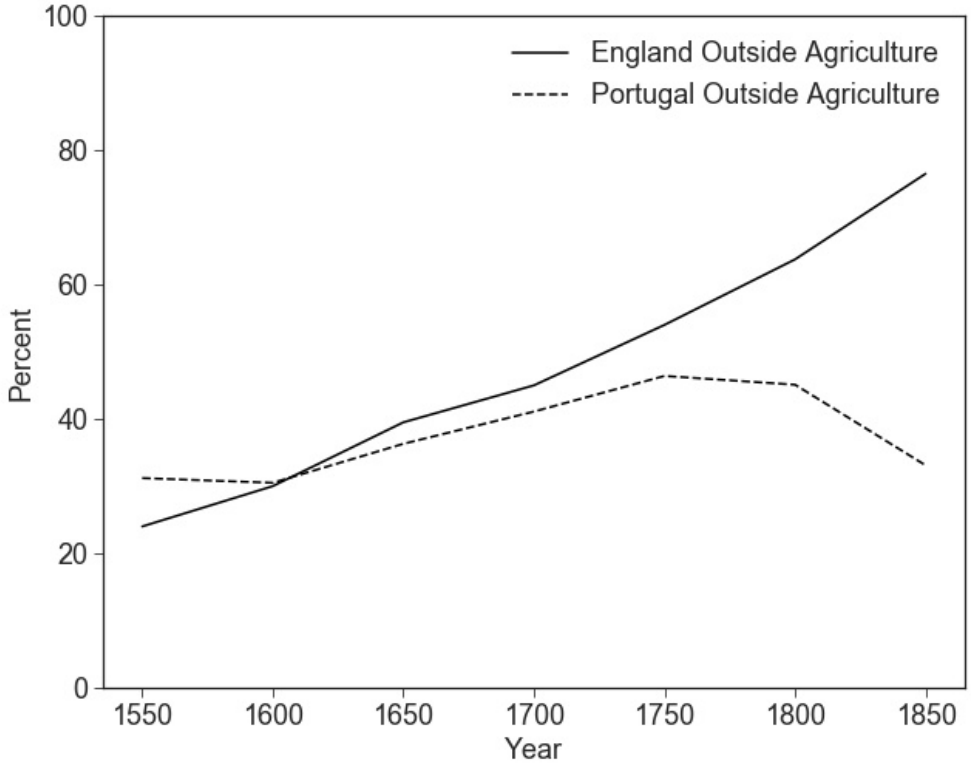

Figure 6: Shares of Population Outside Agriculture for England and Portugal (Wrigley 1985; Palma and Reis 2019)

Viticulture is the great confounding factor. Both wine and olive oil certainly increased production, with the former doubling in cultivated area during the 1700s. Over 70 percent of wine output was exported to England, while olive oil also appears to have been traded, at least with Brazil. This foreign demand appears to have boosted real wine prices throughout the latter half of the eighteenth century. Yet the nature of the industry should give the skeptic pause. First, port wine had no close international substitutes; beer was not treated as such, as evidenced by the behavior of British consumers, while the Methuen Treaty undercut French competition. Thus even if costs increased and opportunities arose to switch capital and labor into the non-traded sector, wine producers were able to compensate with higher prices. Diplomacy protected the winemaker. Furthermore, the growth of a traded subsector is consistent with Dutch Disease. Recalling the Corden and

	England	Holland	France	Spain	Portugal
1550	1041	1798	809	891	836
1650	887	2691	965	668	830
1750	1753	2355	1010	783	1372
1850	2718	2355	1597	1079	923

Table 3: GDP per capita of selected Western European countries in constant prices ("international" dollars of 1990) (Palma and Reis, 2019)

Neary decomposed "Paradox Model," the more capital-intensive lagging industries might actually raise production at the expense of competing trades. Wine was surprisingly capital-intensive, and small farmers were unable to muster the investment necessary to compete with the nobility and urban elites who dominated the sector. Thus the decrease in available labor might well have tended to increase the output of viticulture, and the evidence suggests that both cereal and wasteland were converted extensively for this purpose.

Cereal production, meanwhile, suffered an unambiguous decrease in output during the second half of the eighteenth century (Reis, 2016). Total factor productivity fell at a rate of .44 percent per annum over this period, and yields remained both low and stagnant by European standards (averaging 1:4, and never exceeding 1:7). Though the introduction of maize proved increasingly successful, Portugal continued to import increasing amounts of grain, peaking at 151.6 tons worth (as discussed above) by 1800. Lisbon's foreign consumption rose from an already-high 55 percent in 1729 to a colossal 72 percent by 1778. Though this figure was smaller for the country at large (5.5 to 7 percent), it was still double England's 3 percent, and was impressive in an age of debilitating overland transport costs. Indeed, 5 to 12 percent of Britain's rising exports to Portugal were composed of wheat throughout the period (Fisher, 1963) As a consequence of low productivity and profits, vast tracts of land were switched over to pastoral husbandry, grain production being restricted to poor soils. With the raising of cattle and sheep being more "capital-intensive," outcome should be expected within a Dutch Disease model. The contraction of the sector, moreover, would have inhibited productivity advances, and the changes in technique that revolutionized agriculture in eighteenth-century Britain were predictably absent in contemporary Portugal.

All of these developments should have contributed to the great fact of early modern Portuguese economic history: that GDP per capita fell by almost half between 1750 and 1800. While the economic transformations of the eighteenth century would be expected to contribute to this dramatic decline, and while gold imports (which expanded the metal stock beyond GDP itself) were of sufficient magnitude to produce this effect, econometric analysis and finer-grained import

and production data would be required to enhance the above analysis.

6. Conclusion

The eighteenth century decline of Portugal was due to the structural effects of gold imports from Brazil, which peaked during the 1740s. In this paper we have focused on the economic effects of the resource curse, which led to the de-industrialization of the economy, although this also interacted with a complementary political resource curse (Palma, 2019; Henriques and Palma, 2019).

Price data derived from literary sources shows a sharp appreciation of the real exchange rate consistent with the onset of Dutch Disease. Such an affliction, if present, would have raised prices in the non-traded sector—chiefly primary products—and withdrawn resources from the traded sector, reducing output and employment in manufacturing and grain agriculture. While GDP rose in the short run, the longer-term effects of the gold shock were negative — contractions in industry and cereal production slowed the accumulation of technical progress, causing stagnant growth in successive years. Even if manufacturing's share of employment converged to pre-shock levels, income was permanently reduced. Over the eighteenth century, the country de-industrialized, and in fact the percentage of the population working outside of agriculture declined from around 46% in 1750 to only 33% a year later.

In proffering Dutch Disease as a cause of Portuguese retrogression, we also hope to show that initial institutions were not to blame for this Iberian episode of the "Little Divergence." Contrary to the assertions of Acemoglu et al. (2005), Portugal was ruled by a political system not meaningfully distinguishable (from an economic point of view) from England's until the second half of the seventeenth century. Measured by long-term interest rates on government bonds, extraordinary taxes issued, and years with legislative meetings, Iberia and England were essentially equals until around then (Henriques and Palma, 2019).

Instead, the Corden and Neary framework—extended to a growth model—provides a compelling alternative conception of the Portuguese problem. Increasing imports of gold coincide with a strong appreciation of the real exchange rate, which only began to recover with the decline of remittances during the 1770s. The prices of traded goods remained for the most part stagnant, barring wheat, whose price alone among grains tended upward during long spells of the eighteenth century. Imports rose throughout the first half of the eighteenth century, with gold remittances and the deficit peaking simultaneously, while exports remained stagnant or declined outright, despite deliberate efforts at import substitution. The share of employment outside agriculture, after rising synchronously with that of other

European powers, fell by a quarter in the century after 1750.

Understanding how the seemingly inevitable course from commercial success to industrial might could be diverted is crucial to locating the sources of economic progress, both in the early modern world and the present. Resources and institutions play important and often contradictory roles in this process; unraveling how the two interacted at any point is a significant step toward solving the eternal mystery of development.

References

Abad, L. A. and Palma, N. (2021). The fruits of el dorado: the global impact of american precious metals. In The Fruits of the Early Globalization, pages 95–131. Springer.

Acemoglu, D., Johnson, S., and Robinson, J. A. (2005). The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth. American Economic Review, 95:546–579.

Allen, R. C. (2001). The Great Divergence in European Wages and Prices from the Middle Ages to the First World War. Explorations in Economic History, 38(4):411–447.

Asea, P. K. and Lahiri, A. (1999). The precious bane. Journal of Economic Dynamics and Control, 23:823–849.

Boxer, C. R. (1969). Brazilian Gold and British Traders in the First Half of the Eighteenth Century. The Hispanic American Historical Review, 49(3):454–472. Publisher: Duke University Press.

Broadberry, S. (2020). The Industrial Revolution and the Great Divergence: Recent Findings from Historical National Accounting. SSRN Scholarly Paper ID 3688159, Social Science Research Network, Rochester, NY.

Broadberry, S., Campbell, B. M. S., Klein, A., Overton, M., and van Leeuwen, B. (2015). British Economic Growth, 1270–1870. Cambridge University Press, Cambridge.

Corden, W. M. (1984). Booming Sector and Dutch Disease Economics: Survey and Consolidation. Oxford Economics Papers, 36:359–380.

Corden, W. M. and Neary, J. P. (1982). Booming Sector and De-Industrialisation in a Small Open Economy . The Economic Journal, 92:825–848.

Costa, L., Lains, P., and Münch Miranda, S. (2016). An economic history of Portugal, 1143-2010. Cambridge University Press. Journal Abbreviation: An Economic History of Portugal, 1143-2010 Pages: 406 Publication Title: An Economic History of Portugal, 1143-2010.

Costa, L., Palma, N., and Reis, J. (2015). The Great Escape? The Contribution of the Empire to Portugal's Economic Growth, 1500-1800. European Review of Economic History, 19.

Costa, L. F. and Reis, J. (2017). The chronic food deficit of early modern Portugal: Curse or myth? . Análise Social, 52:416–429.

Costa, L. F., Rocha, M. M., and Brito, P. B. (2018). The alchemy of gold: interest rates, money stock, and credit in eighteenth-century Lisbon. The Economic History Review, 71(4):1147–1172. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/ehr.12610.

Costa, L. F., Rocha, M. M., and Sousa, R. M. d. (2013). O ouro do Brasil. Imprensa Nacional-Casa da Moeda.

Drelichman, M. (2005). The Curse of Moctezuma: American Silver and the Dutch Disease. Explorations in Economic History, 42:349–380.

Drelichman, M. (2007). Sons of something: Taxes, lawsuits, and local political control in sixteenth-century castile. The Journal of Economic History, 67(3):608–642.

Fisher, H. (1963). Anglo-Portuguese Trade, 1700–1770. The Economic History Review, 16:219–233.

Fisher, H. E. S. (1971). The Portugal Trade. Taylor & Francis.

Forsyth, P. J. and Nicholas, S. J. (1983). The Decline of Spanish Industry and the Price Revolution: A Neoclassical Analysis. Journal of European Economic History, 12(3):601–610.

Godinho, V. M. (1955). Prix et monnaies au Portugal: 1750-1850. Armand Colin.

Gollin, D., Jedwab, R., and Vollrath, D. (2016). Urbanization with and without industrialization. Journal of Economic Growth, 21(1):35–70.

Gylfason, T., Herbertsson, T. T., and Zoega, G. (1999). A MIXED BLESSING: Natural Resources and Economic Growth. Macroeconomic Dynamics, 3(2):204–225. Publisher: Cambridge University Press.

Henriques, A. and Palma, N. (2019). Comparative European Institutions and the Little Divergence, 1385-1800. Working Paper.

Krugman, P. (1987). The narrow moving band, the Dutch disease, and the competitive consequences of Mrs. Thatcher: Notes on trade in the presence of dynamic scale economies. Journal of Development Economics, 27:41–55.

Leitão, H. (2007). A ciência na" Aula da Esfera" no Colégio de Santo Antão, 1590-1759. Comissariado Geral das Comemorações do V Centenário do Nascimento de São Francisco de Xavier.

Leitão, H. and Romeiras, F. M. (2015). The role of science in the history of Portuguese anti-Jesuitism. journal of jesuit studies, 2(1):77–99.

Macedo, J. B. d. (1982a). Problemas de história da indústria potuguesa no século XVIII. Querco.

Macedo, J. B. d. (1982b). A situação económica no tempo de Pombal: alguns aspectos. Moraes editora.

Madureira, N. L. (1997). Mercado e privilégios: a indústria portuguesa entre 1750 e 1834. Lisboa: Editorial Estampa.

Matsuyama, K. (1992). Agricultural Productivity, Comparative Advantage, and Economic Growth. Journal of Economic Theory, 58:317–334.

North, D. C. and Weingast, B. R. (1989). Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England. The Journal of Economic History, XLIX:803–832.

Palma, N. (2019). American Precious Metals and Their Consequences for Early Modern Europe. In Battilossi, S., Cassis, Y., and Yago, K., editors, Handbook of the History of Money and Currency, pages 1–20. Springer, Singapore.

Palma, N. and Reis, J. (2019). From Convergence to Divergence: Portuguese Economic Growth, 1527–1850. The Journal of Economic History, 79:477–506.

Palma, N. and Reis, J. (2021). Can autocracy promote literacy? evidence from a cultural alignment success story. Journal of Economic Behavior & Organization, 186:412–436.

Pedreira, J. M. V. (1994). Estrutura industrial e mercado colonial : Portugal e Brasil (1780-1830) /. Place: Lisboa : Publisher: Difel,.

Prados de la Escosura, L., Álvarez Nogal, C., and Santiago-Caballero, C. (2021). Growth recurring in preindustrial Spain? Cliometrica.

Reis, J. (2016). The Gross Agricultural Output of Portugal: A Quantitative, Unified Perspective, 1500-1850. Working Paper 0098, European Historical Economics Society (EHES).

Romeiras, F. M. (2019). The Pombaline expulsion and the building of anti-Jesuitism. In Jesuits and the Book of Nature, pages 23–41. Brill.

Rybczynski, T. M. (1955). Factor Endowment and Relative Commodity Prices. Economica, 22(88):336–341. Publisher: [London School of Economics, Wiley,

London School of Economics and Political Science, Suntory and Toyota International Centres for Economics and Related Disciplines].

Sachs, J. and Warner, A. (1995). Natural Resource Abundance and Economic Growth. NBER Working Paper.

Silva, A. D. (2013). Testamento político de D. Luis da Cunha. Lisboa: Biblioteca Nacional.

Sousa, R. M. d. (2006). Moeda e metais preciosos no Portugal setecentista: 1688-1797. Impr. Nacional-Casa da Moeda.

Stein, S. J. and Stein, B. H. (2000). Silver, trade, and war: Spain and America in the making of early modern Europe. JHU Press.

Stolz, Y., Baten, J., and Reis, J. (2013). Portuguese living standards, 1720–1980, in European comparison: heights, income, and human capital. The Economic History Review, 66(2):545–578.

TePaske, J. J. (2010). A New World of Gold and Silver. Brill.

Van Wijnbergen, S. (1984). The 'Dutch Disease': A Disease after All? Economic Journal, 94:41–55.

A Appendix (for online publication only)

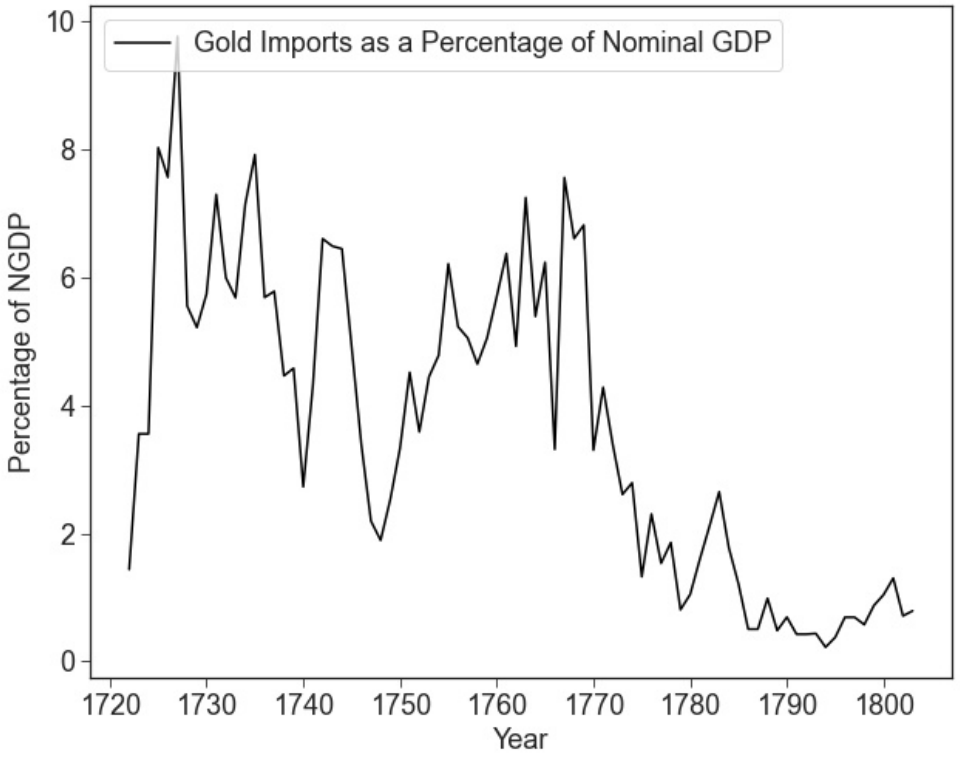

Figure A.1: Gold Imports as a Percentage of Nominal GDP (Costa et al., 2016; Palma and Reis, 2019)

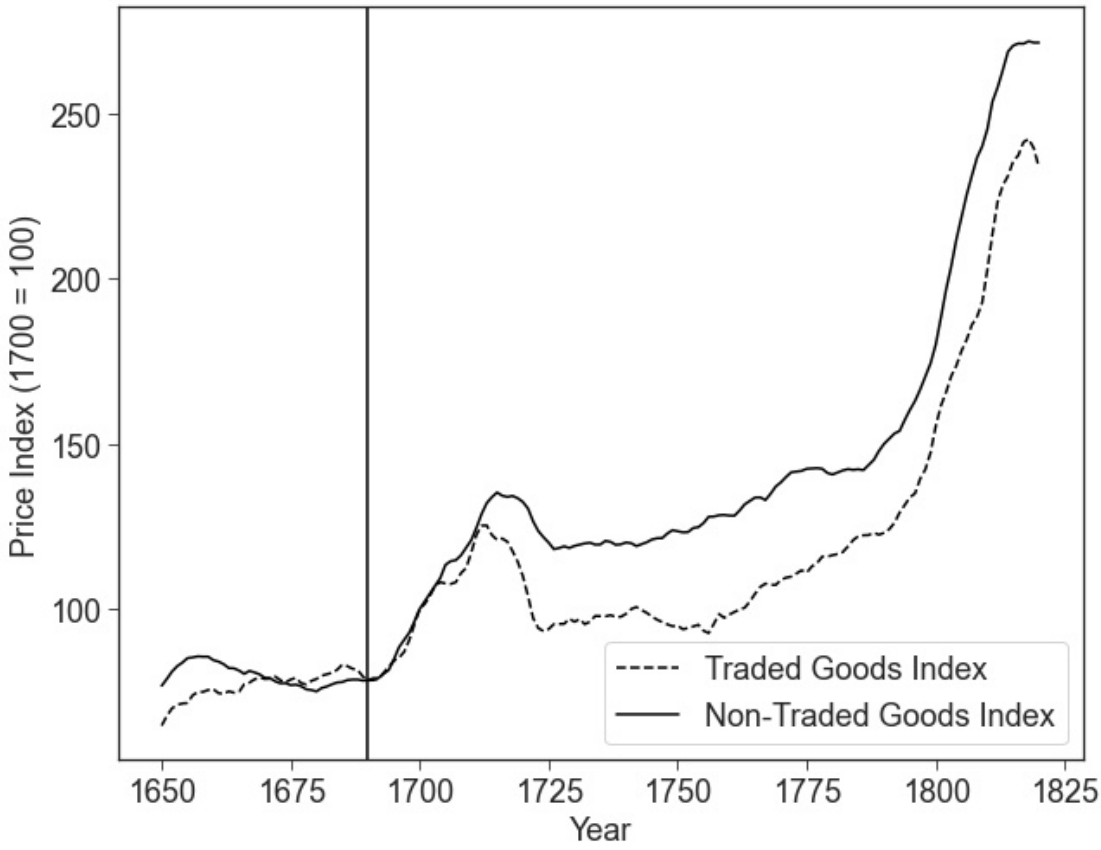

Figure A.2: Traded and Non-Traded Price Indices for Portugal, 1650-1820 (PWR project)

Note: The vertical line in 1690 marks the approximate beginning of gold imports to Portugal.

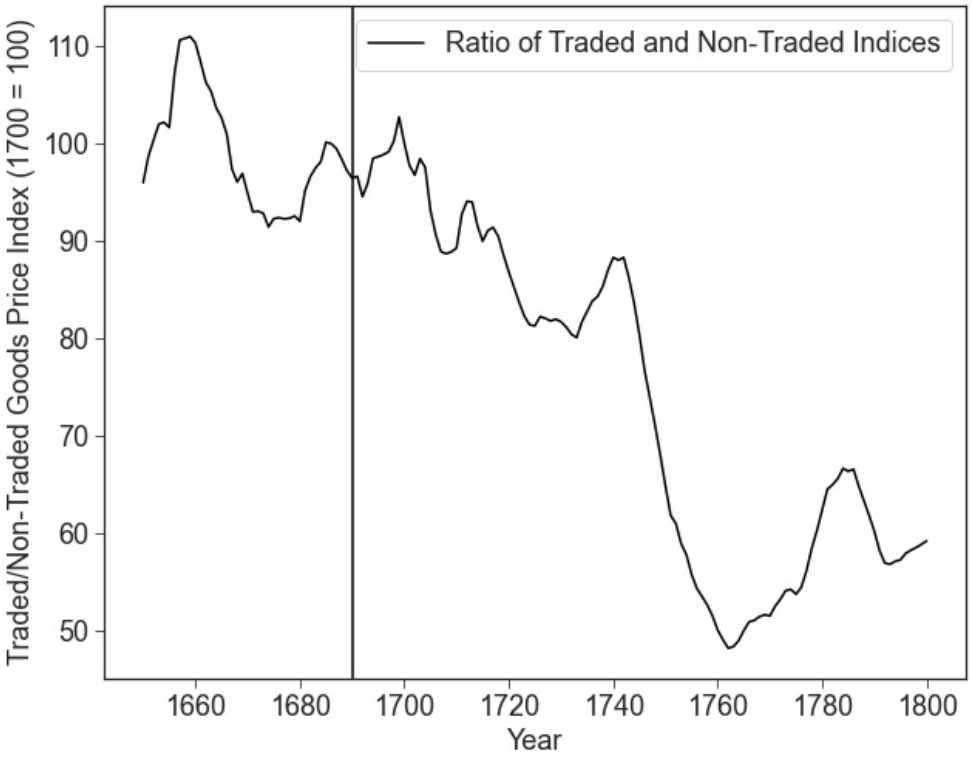

Figure A.3: Ratio of Non-Traded to Traded Price Indices for Porto, 1650-1820 (PWR project)

Note: The vertical line in 1690 marks the approximate beginning of gold imports to Portugal.