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Abstract

Over the early modern period and beyond, massive amounts of silver and gold were found and mined in the Americas. In this paper, I review the consequences for the European economies. Some second-order receiver countries such as England benefited in both the short and long run. First-order receivers such as Spain and Portugal also benefited in the short-run, but their continued exposure to the arrival of massive quantities of precious metals eventually led to loss of competitiveness and an institutional resource curse.

JEL Codes: E02, E4, N14, O11

Keywords: American Precious Metals, Early Modern Period, Dutch Disease, Political Institutions, Economic growth, Comparative Development

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1. Introduction

Over the early modern period, massive quantities of silver and gold were produced in the Americas. Most gold and much silver arrived to Europe, even if some of the silver was sent directly to Asia via the Pacific (Manila) route and some was retained in the Americas. Nevertheless, Europeans were the main direct beneficiaries of this windfall, which dwarfed the initial quantities available. It is hence natural to ask what where the effects that these precious metals had for the European early modern economy. In particular, were they a curse or a blessing?

Contemporaries were already puzzled by these questions. For example, scholars of the Salamanca school discussed an early formulation of the Quantity Theory of Money in the sixteenth century. By the seventeenth, it was clear to several observers that the Spanish economy was in a process of secular decline. And by the eighteenth, David Hume held the view that "[S]ince the discovery of the mines in America, industry has increased in all the nations of Europe, except in the possessors of those mines" (Hume 1987/1742, p. 33). He believed that increased monetization benefited industrial development, at least temporarily: "labor and industry gain life; the merchant becomes more enterprising, the manufacturer more diligent and skillful, and even the farmer follows his plough with greater alacrity and attention". Additionally, monetization made it easier for the state to collect tax revenues: "[W]here money is … scarce … the prince can levy few or no taxes … it is evident that such a kingdom has little force even at home; and cannot maintain fleets and armies to the same extent, as if every part of it abounded in gold and silver". Hume is often interpreted as having argued that the effects are only transitory (e.g. Lucas 1996), though in my view this is not clear-cut, as this interpretation is supported by some passages but contradicted by others.

In this paper, I review recent research which provides some answers. I argue that the precious metals had qualitatively different effects for first and second-order European receivers, and on different horizons. Spain (and from the late seventeenth-century onward, Portugal) were first-order receivers. These countries benefitted from the inflows in the short run, but the continued arrival of precious metals ultimately caused a net negative effect which persisted for a long time as it damaged their export sector and ultimately their domestic political institutions. By contrast, some second-

order receivers such as England benefited unambiguously from the additional availability of precious metals. Below, I explain the mechanisms behind these differential results.

2. From precious metals to money

Figure 1 shows the variation over time in the quantities of silver and gold produced in the Americas during the early modern period. According to one estimate, New Word production corresponded to 85% of the world's production of silver and 70% of gold during 1493-1800 (Barret 1990, p. 224). As Table 1 shows, over the sixteenth century alone, imports to Europe overtook the 1492 stock. Production only continued to increase over the next centuries.

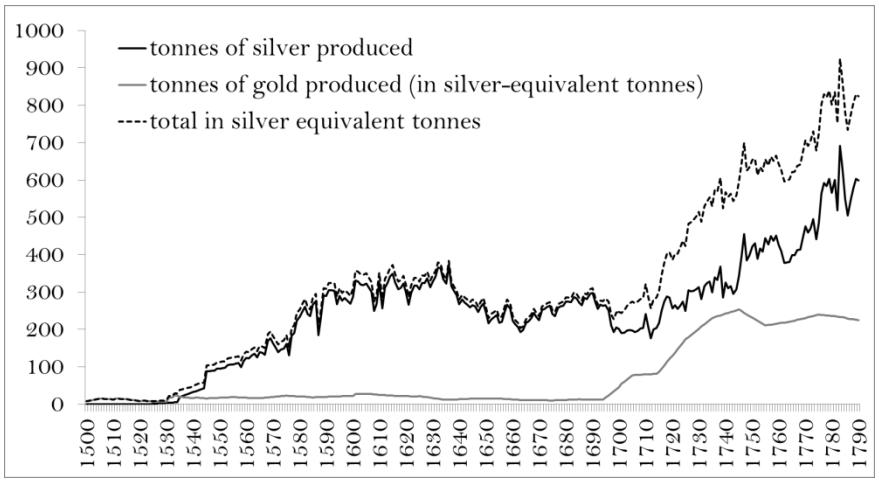

Figure 1. Silver and gold (in silver-equivalent units) produced in the Americas. Source: Palma (2019), based on the data in TePaske (2010).

Some discussion of the numbers of Table 1 is warranted. My 1492 baseline as well as that of Glassman and Redish are considerably smaller than the numbers that Braudel and Spooner (1967, p.445) give for Europe in 1500. My estimate relies on the Velde and Weber world stock. Their numbers and those of Glassman and Redish rely on several assumptions as well as on rather old secondary sources. Still, their methodology is much more solid than that of Braudel and Spooner, which, while endorsed by Parker (1973) and many others, is not well grounded in economics (Glassman and Redish 1985, p. 40). Finally, Morineau (2009, p. 571, 580) gives a figure of 15,000 tons for 1500 – almost 10 times higher than the baseline I adopt here – which I do not consider credible, as it is calculated using arbitrary assumptions.

	Fine silver, tons	Gold, tons	Gold, silver-equivalent tons	Total in silver-equivalent tons
Stocks in 1492				
World stock in 1492 (Velde and Weber 2000, p. 1230)	3,600	297	3,267	6,867
Baseline European stock (combining Velde and Weber with European output shares)	828	68	751	1,579
Alternative European stock (based on the stock of money figure by Glassman and Redish 1985, p. 40)	-	-	-	3,542
Imports to Europe				
16th century	7,500	150	1,650	9,150
17th century	26,168	158	2,212	28,380
18th century	39,157	1,400	21,000	60,157
Total imports	73,825	1,708	24,862	97,687

Table 1. Gold and silver stocks, and flows to Europe. Sources: For the initial stocks, sources as follows. In the case of the baseline European initial stock, it is calculated as 23% of the Velde-Weber figure, using the European share of global output in PPPs from the Maddison Project Database (MPD; Bolt et al 2018). The countries included in the numerator are all the European countries currently present in the MPD with data for 1492 or earlier (England, Germany, France, Italy, Netherlands, Spain, Portugal, Switzerland, Poland and Greece). When the value for 1492 was missing, it was obtained from linear interpolation from the closest two observations. The denominator is the sum of the GDPs of all the countries in the MPD and was calculated in an analogous manner. Flows from Morineau (2009, p. 570). For bimetallic ratios (to convert gold to silver-equivalent units), I used 1:11 for the sixteenth century, 1:14 for the seventeenth, and 1:15 for the eighteenth. This is in line with the evidence discussed in Barret (1990, p. 238) or Spooner (1972, p. 21). The unit tons in the table refers to metric tons.

While precious metals (bullion) were not the same as money, silver and gold were key inputs for producing commodity money in the form of metallic coins. This input was available in Europe (from places such as Kutná Hora or Jáchymov in Bohemia) but under relatively inelastic supply. Once minted, coins typically circulated by tale – that is, by count (coins did not begin to have a numeric face value until relatively late). This meant that the purchasing power of a coin was usually superior to the market value of its melted materials. This was especially true of coins primarily made of copper, which mattered for small denominations and whose intrinsic value was typically negligible. As a result, coins of such small denominations were tokens which behaved more like fiat money than commodity money. But, at least in Western Europe and most of the time, even larger denominations circulated by tale, so the distinction between commodity money and fiat was never binary, since there was always an element of credibility to the value of currency. Paper money (usually backed by reserves hence not fiat) and other credit instruments which for functional purposes classify as money appeared gradually, but for most countries did not become an important part of the money supply until rather late (Palma 2018b).

In modern Western societies characterized by high levels of fiscal capacity and a large degree of independence in monetary policy, credit issued by commercial banks and placed in the deposit accounts of households and firms can be a substitute for liabilities of central banks in the form of currency. In such societies, fiat money circulates at no discount. But in early modern Europe (as in most premodern societies), there was no fiat money available, and no independent monetary authority committed not to destabilize the value of coin existed. In premodern societies, where potential political instability and hence the specter of fiscal dominance were always present, coin and credit were complements, not substitutes. This was for the following reasons (Palma 2018b). First, personal credit instruments had to be based on private knowledge with respect to the creditworthiness of others and so they often did not circulate. Second, the decision of whether to issue credit to someone was in part based on the anticipation of whether the prospective debtor would have the liquidity to honor the bill at maturity, and that in turn depended on the overall availability of coin. Third, notwithstanding the bill of exchange, due to information problems in many contexts the transaction costs involved when making long distance credit payments were higher than those of using coin (despite the lower transportation costs). And finally, coin and credit were also complements in a supply sense to the extent that reserves in the form of bullion or

specie were required to back forms of credit – including paper (but non-fiat) money during the nineteenth century Classical Gold Standard. In such cases, credit was not a suitable substitute for coins.

Hence, without access to new silver and gold, sustained monetary expansion was difficult. Nevertheless, adjustments to the silver value of the monetary unit were sometimes required and made in the form of defensive debasements. Yet, such measures only served as temporary remedies at best. In worse cases where debasements were motivated by fiscal purposes, they could lead to significant depreciations and inflation (Karaman et al 2019).

The availability of silver and gold in the Americas led to increased minting activity which helped overcome Europe's problems related to monetary scarcity (Day 1978). In the case of the Spanish Empire, silver was coined both in Spain and in the Americas. As time went by the latter option became more frequent, and most silver ore was molded into bars (ingots) and sent to the nearest local mint where it was transformed into coins before being shipped to Spain (TePaske 2010). Precious metals were privately extracted and owned. The industry was taxed by the Crown, but also received a variety of state support, for instance in the subsidized provision of quicksilver (mercury), an important input in the production process. In the case of colonial Brazil, it was also the case that most remittances were sent as specie: more than three quarters of the gold arrived to Portugal already as coin (Costa et al 2013, p. 63). The Iberian receiving countries used the inflows to finance the import of goods and military payments abroad. The second-order receiver countries (such as England) then either used these coins to trade with Asia – where Spanish dollars (*pesos*) were a standard means of payment and even circulated locally – or reminted them into their local currencies.

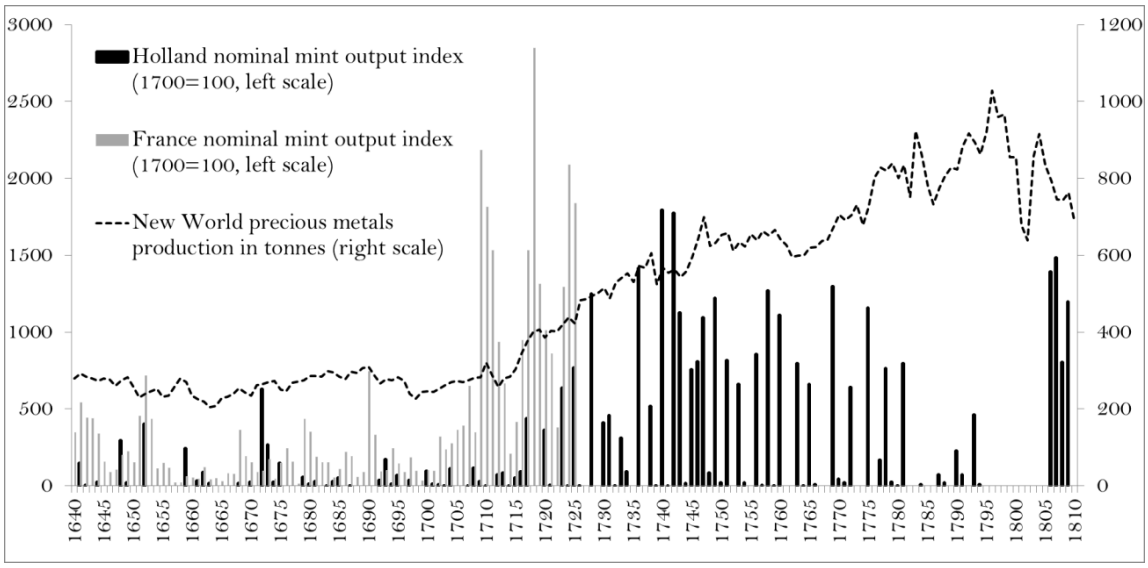

Figure 2. New world precious production (in silver-equivalent tonnes) and nominal mint output in Holland and France. French data is only available until 1725 and zeros in the graph refer to missing data. Sources: Palma (2019), relying on data by TePaske (2010), Spooner (1972, pp. 334-341), Stapel (2016), and Zuijderduijn et al (2018).

Figure 2 shows the correlation over time between the production of precious metals in the Americas (in silver-equivalent metric tons, i.e. tonnes) and nominal mint output in two European countries, France and Holland. The data available is usually not ideal, because mint output is a gross measure. This implies that some of the peaks are spurious since they correspond to recoinages, i.e. periods when old coins were recalled and substituted. A net measure is not available, however, except for the case of England (Palma 2018a) and, with stronger assumptions, Spain (Brzezinski et al 2019). In spite of these data difficulties, Figure 2 shows that an abundance of New World precious metals usually coincided with increased minting activities in Europe. This indicates that the amount of precious metals available to European countries indeed posed a binding constraint on monetary expansion.

The importance of New World precious metals for early modern Europe is also confirmed by the chemical analysis of the coins in circulation. The variation in the isotopic abundance composition of English coins reveals that much of the English silver coinage minted during the 16-17th centuries had a Spanish-American (and in particular, Andean) provenance (Desaulty and Albarede 2013). This evidence, which came to light only recently, is in line with the views of historians who argue that "there can be no doubt that Spanish bullion did come into the [English] mint, and did so in such

quantity that ... [at times] it formed the core of mint supply" (Challis 1978, p. 195; see also Mayhew 1999, p. 63). Indeed, for the English case, for which data on the coin stock is available, there is a close correlation between availability of precious metals and higher mint output, as one would expect (Palma 2018b, 2019).

Similar evidence is available (also in relation to other European countries) for the eighteenth century, when Mexican silver and gold, as well as Brazilian gold, became important (Barrandon et al 1999; Desaulty et al 2011). Some second-order receivers got a large share, in particular England which received a disproportionate share of the silver in the decades after the 1630s (Palma 2018b), plus two-thirds of the Portuguese-Brazilian gold extracted over the eighteenth century (Fisher 1971). The fact that England got a large share may have had to do with country-specific characteristics, but was also the result of exogenous geopolitical matters, as detailed in Palma (2018b). These also applied to the Netherlands (including the territories of modern Belgium), which were the receivers of large quantity of Spanish military payments, and also performed well during much of the early modern period.

3. Consequences for second-order receiver economies

For both first and second-order receivers, additional money led to higher nominal and real GDP, and after a considerable delay, rises in the price level (Palma 2019). The fact that interest rates became lower (Brzezinski et al 2019) and prices were sticky interacted to cause real GDP to rise, and typically the effects were large and still positive several years later (Palma 2019).

As discussed, there were considerable short-to-medium run effects for first- and second-order receiving countries. But at least for England, there is evidence that money mattered beyond the medium-run as well. As Figure 3 shows, from the 1630s, the scale of the increase in English coin supply was not matched by an increase in prices – and hence this was necessarily even less the case for less narrow measures of money. The reason does not have to do with changes in velocity, which was, to a first degree of approximation, stable over the early modern period (Palma 2018a). Instead, the cause for this development was economic growth.

The fact that a narrow measure of the money supply (the coin stock) increased as much as it did over time with a much more muted response from prices, as seen in Figure

3, seems to contradict the Quantity Theory of Money (QTM). But that is not surprising. By assumption, the QTM holds real income and velocity constant in the long run. Now, consider the equation of exchange (MV=PY), which says that money times velocity equals nominal income, that is, the price level times real income. This is just an accounting identity, unlike the QTM. But mechanically, re-writing it as P=MV/Y shows that under real growth, prices must not necessarily rise when there is an increase in money supply, even if V stays constant.

The relevant question is whether the increases in monetization themselves partly caused the levels of economic growth which were observed. I argue that this was the case. The increased availability of precious metals "allowed for a substantial increase in the monetization and liquidity levels of the economy decreasing transaction costs, increasing market thickness, changing the relative incentive for participating in the market, and allowing agglomeration economies to arise" (Palma 2018b). It additionally made trade with Asia possible on a much greater scale, and contributed to high fiscal capacity levels by making tax collection easier. I now discuss each of these mechanisms in turn.

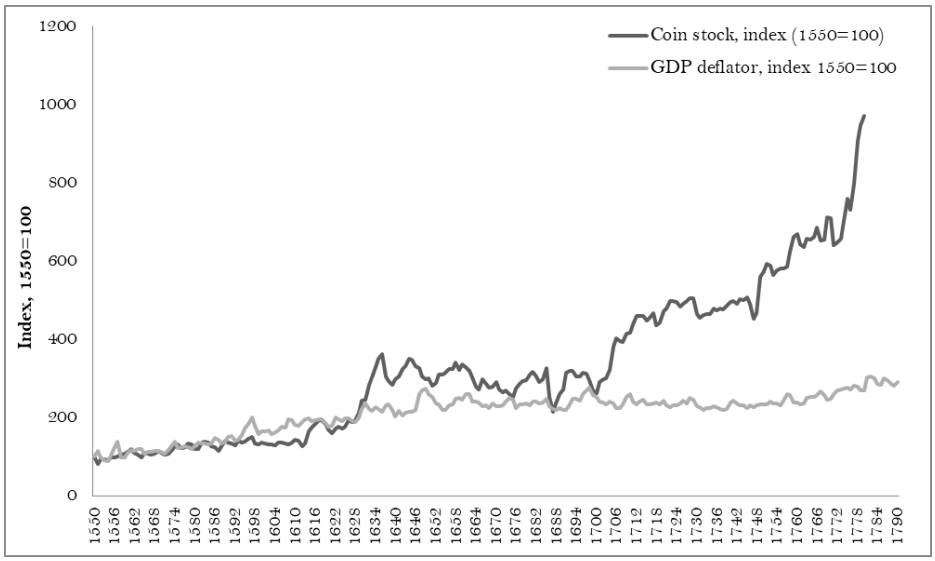

Figure 3. Coin supply and price level in England, 1550-1790. Source: coin supply from Palma (2018a, 2018b); the price level is the GDP deflator of Broadberry et al (2015).

Before proceeding with a detailed study of England's case, it is necessary to introduce the concept of deep monetization. Lucassen (2014, p. 74) defines deep monetization as the existence of denominations which are equal to 1 hour or less of waged work and exist in a per capita quantity of at least five hours of waged work. He shows that the Netherlands were deeply monetized during parts of the early modern period, as well as after

1840. England became deeply monetized from the 1630s, at a time when the so-called Cottington treaty was signed (Palma 2018b) and when structural change in England started (Wallis et al. 2018).

Precious metals impacted England directly through increasing the country's money supply. This effect trickled down to small denominations which could be used for daily payments. Figure 4, which relies on new data on random coin finds, shows that small denominations – defined as one penny or less – first became more than half of the total coins lost from the reign of Charles I. This evidence contradicts earlier claims about widespread lack of small coinage (e.g. Muldrew 2008, Selgin 2008). Of course, coin was not as readily available as today – but the important point is that in England, from the mid seventeenth century coins became much more available than they were, including those of relatively small denominations. This was sufficient to encourage market participation via a reduction of transaction costs (which supported additional market integration). Comparative work with other countries would be helpful, but so far it does not exist, except for the Netherlands (Lucassen 2014). However, evidence from early modern China suggests that the lack of a stable minting standard and the fact that the government was not sufficiently credible to mint coins (other than small-denomination copper coins), "imposed high transaction costs on market exchanges" (Ma 2013, p. 59; see also Ma and Zhao 2018). Monetary fragmentation had a similarly damaging effect on the countries which were part of the former Spanish empire, once it disintegrated (Irigoin 2009). Overall, the evidence suggests that a relatively efficient level of monetization is a necessary (but not sufficient) precondition for sustained economic growth to take place.

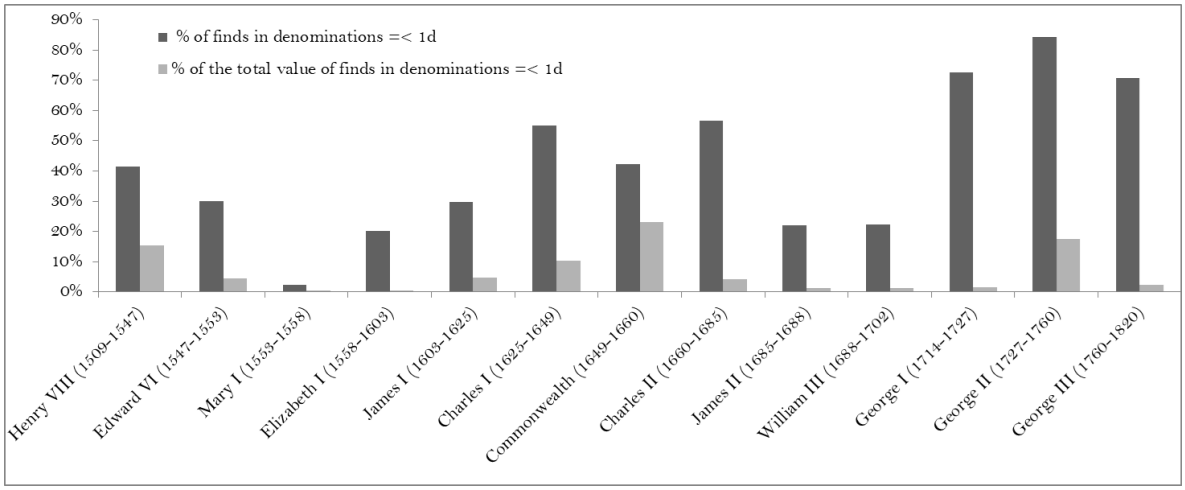

Figure 4. Distribution of denominations for different periods. Source: Palma (2018b)

There were other ways in which American precious metals mattered. By making trade with Asia possible, precious metals induced demand for new desirable goods which could be imported, such as silver, porcelain, and tea. Without American precious metals, early modern Euro-Asian trade would have been much smaller (Palma and Silva 2016). The tea, silk and porcelain which arrived to Europe then mattered because they generated an industrious revolution (de Vries 2008) and encouraged industrialization (Berg 2005).

Increased monetization and market participation also made tax collection easier (Palma 2018b; see Besley and Persson 2011 for the importance of state capacity). This helped the government build up fiscal capacity and provide for public goods. Figure 5 shows that the timing of the sustained increase of per capita government revenues in England (from the 1630s) matches well the timing of the monetization of the English economy (Palma 2018b).

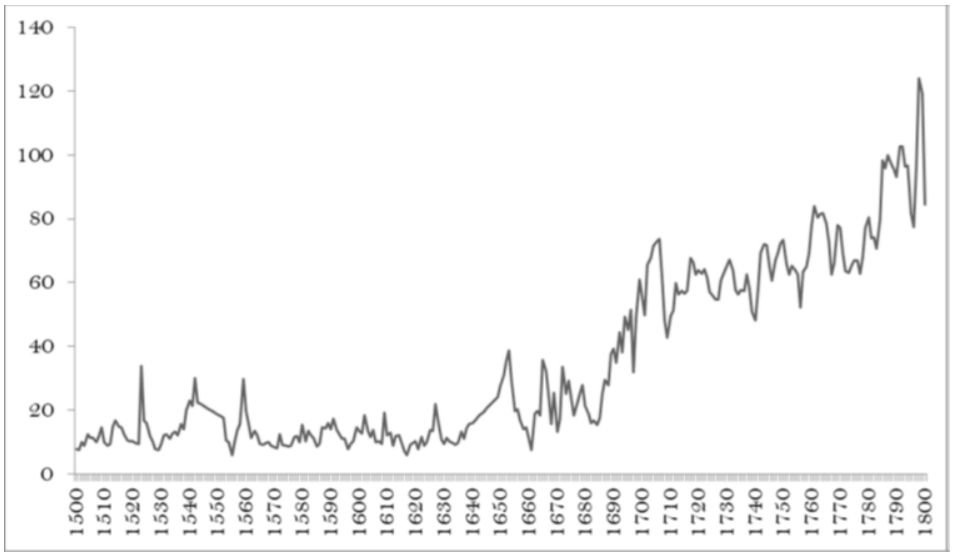

Figure 5. English government real per capita revenues, 1500-1800. Sources: Karaman, et al (2017). The unit is per capita tax revenue in grams of silver divided by a daily cost of the Allen (2001) respectability basket; hence the unit corresponds to "days of Allen's basket".

Bonfatti et al (2017) define monetary capacity as "government's capacity to issue sufficient liquidity for the markets to work properly… and for the collection of taxes to be efficient". England and the Netherlands are examples of a symbiotic relationship between high monetary and fiscal capacity, and the state failures of Qing China (or Poland) exemplify that complementarity not being present.

Finally, the additional wealth at impact to the Iberian first-order receivers meant increased demand for the tradable sector products of some second-order receiv-

ers (both in direct exchange for goods and indirectly in the context of military payments to Spanish troops in the Netherlands). As Cipolla (1993) writes, "[t]hrough both legal and smuggled imports, effective Spanish demand, sustained by American silver, promoted the economic development of Holland, England, and other European countries".

Overall, it is fair to say that we do not yet know enough about the diffusion and final distribution of the precious metals across Europe (and elsewhere). Nonetheless, as Braudel and Spooner (1967, p. 448) write, "Spanish silver, for political and commercial reasons, had preferred circuits. They greatly benefited northern Europe". Hence, although the precise consequences for the early modern economies (especially in the long-run) remain to be determined with more precision, it is likely they had widespread positive effects for several second-order receivers. As the historian Tim Blanning writes with respect to the eighteenth century, "the rapidly expanding output of Brazilian mines helped alleviate the chronic shortage of coin and, among other things, allowed the stabilization of European currencies" (Blanning 2008, p. 95).

4. Consequences for first-order receiver economies

First-order receivers (Spain and Portugal) benefitted from the same type of short-and-medium run effects as England did. As Palma (2019) shows, the impact of additional availability of American precious metals was stronger and faster (i.e. lags were shorter) than it was for second-order receivers. The magnitude of the effect is larger and the peak happens earlier than for the second-order receiving countries. However, these particularly strong effects came with a caveat: while the short and medium-term effects on income were stronger, the effects on the price level added up over time, and by 1600 the price level, measured in silver, had risen considerably more than in other European countries.

In the case of early modern Spain, it is also possible to see what happened when there were unexpected losses of ships from the silver fleets that were lost at sea. These ships were expected to arrive but were lost in maritime disasters (typically due to storms, not pirate attacks). Brzezinski et al (2019) use these episodes as natural experiments to identify the effects of un-anticipated money supply changes (i.e. shocks) on the Spanish economy. We show that 1 percentage point reduction in the money growth rate (or equivalently, a 1% reduction in the money supply) led to a 1.3% drop in real output that persisted for several years. The price level fell, and it did so perma-

nently, but only with a lag. Additionally, tighter credit markets temporarily increased lending rates in Spanish cities, but not in other cities which can be thought of as placebos or control groups (see Brzezinski et al 2019 for details).

The results of Palma (2019) and Brzezinski (2019) go in the same direction. They show that up to a few years after impact, additional precious metals had a positive effect for Spain – just as they typically did elsewhere in Europe. But we cannot conclude from this that the long-run effects were neutral. As time went by, the repeated arrival of massive amounts of silver from the New World changed the nature of the Iberian economies in two ways. First, Dutch disease set in: inflation caused the appreciation of the real exchange rate, which led to a loss of competitiveness of the export sector, in line with some of the arguments put forward by Hamilton (1934). Second, institutional resource curse set in. I will now consider each of these mechanisms in turn.

While early modern writers often point out that American precious metal mines could not be a sustained engine for long-run Spanish economic growth, and while not all aspects of Hamilton's work have aged well, overall his work represented a great advance both conceptually and empirically in our understanding of these issues. Recent work using alternative baskets for the calculation of inflation rates confirms Hamilton's general pattern, often finding that he even underestimated the inflation in the prices of many goods and services (González Mariscal 2015, Agudo 2019).

Dutch disease manifested itself, for instance, in Spain's woolen textiles industry, which declined steadily over the early modern period (for a classic work on the Mesta, the association of transhumant sheep ranchers, see Klein 1920; for a more recent and topical treatment, see the edited volume of Enciso 2001). While in the middle ages Spain specialized in the production of finished textiles, during the early modern period it gradually de-urbanized, de-industrialized and reverted to exporting raw wool (as well as other primary products such as fruit; see Reher 1990). Forsyth and Nicholas (1983), and Drelichman (2005a), argue along these lines, though more work would be welcome, using data on exchange rates, exports, and a sectoral breakdown of industries into tradable and non-tradable kinds, including at the local level.

The region of Spain which first received the metals, Andalusia, experienced the largest economic decline over 1530-1591. Being the richest region of continental Spain in 1530, it was one of the poorest as early as 1591. It then stagnated (Álvarez-Nogal

and Prados de la Escosura 2007; p. 353). Spain as a whole declined from 1590 onward, with only a timid recovery during the eighteenth century (Álvarez-Nogal and Prados de la Escosura 2013). Spain and Portugal clearly diverged from Western Europe from the eighteenth century onwards, and would only enter a process of modern economic growth and convergence in the second half of the twentieth century.

Portugal's economic activity also boomed during the initial period of growth in Brazilian gold production, but incomes then steadily declined from the mid-eighteenth century onwards, as the percentage of the population working outside agriculture declined from 46.5% in 1750 to 33.1% in 1850 (Palma and Reis 2019).

Dutch-disease type problems could only have temporary consequences for economic growth if long-run monetary neutrality holds (or the closely-related notion of "super-neutrality", which relates to changes in growth rates rather than levels). Still, this is not necessarily the case if hysteresis-type effects were at play. Multiple equilibria could have existed, for instance, if the destruction of industry led to a new history-dependent pattern of trade networks. On top of this, and possibly even more importantly, the negative effects of the continued arrival of the precious metals for the long-run performance of the Spanish economy were likely not limited to Dutch-disease type problems, but were also related to institutional resource curse. Furthermore, the development literature suggests Dutch-disease and institutional resource curse could positively interact (Collier 2010).

The arrival of increasing amounts of precious metals was also associated with a decline in the quality of Spanish institutions over time, as some scholars suggest (e.g. Drelichman 2005b, 2007, Drelichman and Voth 2008). Acemoglu et al (2005), Hough and Grier (2015), and Tilly (1992) confidently assert that Iberian institutions were already worse than those of England from the beginning of the early modern period.. This was not the case (Henriques and Palma 2019). Iberian institutions were not worse than those of England around 1500, but instead, there was a gradual worsening of their quality over the early modern period.

Acemoglu et al (2005) write that "The more rapid economic growth took place in societies with relatively non-absolutist initial institutions, most notably in Britain and the Netherlands. In contrast, countries where the monarchy was highly absolutist, such as Spain and Portugal, experienced only limited growth in the subsequent centu-

ries" (Acemoglu et al. 2005, p.547). The claim that Spain and Portugal grew slower after 1500 can now be tested: While Maddison's numbers prior to 1820 were guesstimates (e.g. Maddison 2001), over the last decade economic historians have reconstructed historical national accounts for the medieval and early modern periods from actual primary sources (Palma 2020). As Table 2 shows, the data rejects the idea that Spain and Portugal grew less, at least until the mid-seventeenth century. It was instead England (and Holland) which did not grow (until 1650, and 1700, respectively). After those dates the two countries did experience growth, and in particular England experienced fast growth by the standards of the time. By contrast, Portugal, which had experienced fast growth until c. 1750, initiated a period of fast decline afterwards. But the important thing to retain is that this timing of events does not fit with the "initial" institutions hypotheses of Acemoglu et al (2005), Hough and Grier (2015), or Tilly (1992).

	annual real p.c. growth, 1530-1650	annual real p.c. growth, 1530-1700	annual real p.c. growth, 1530-1750	annual real p.c. growth, 1530-1800
England	-0.16%	0.20%	0.20%	0.24%
Spain	-0.14%	0.00%	-0.02%	0.04%
Portugal	0.03%	0.12%	0.24%	0.05%
Holland	0.20%	0.00%	0.05%	0.08%
Poland	-0.05%	0.01%	0.05%	-0.01%
France	0.06%	0.08%	0.05%	0.07%
Sweden	0.00%	0.19%	0.00%	-0.04%
Italy	0.00%	0.03%	0.04%	-0.01%

Table 2. Average annual per capita real growth 1530-1800. For England, Broadberry et al (2015); for Holland, van Zanden and van Leeuwen (2012); for Spain, Álvarez-Nogal and Prados de la Escosura (2013); for Portugal, Palma and Reis (2019); for Italy, Malanima (2011); for Poland, Malinowski and van Zanden (2017); for France, Ridolfi (2016); for Sweden, Krantz

(2017) and Schön and Krantz (2012). Annualized growth rates were calculated using the familiar compound growth formula. As per the available data, for France dates are not until 1800 but 1790; For Poland they are not until 1800 but until 1795.

A comparison between England, Portugal and Spain shows that the dominance of England was not clear-cut at the start of the early modern period (Figure 6). Due to the uncertainties associated with the building of truly comparable Purchasing Power Parity benchmarks (Jong and Palma 2018), when interpreting these numbers it is best to place emphasis on changes in growth rates over time, and not on any small differences on income levels. For instance, using the same growth rates over time but instead going backwards from the alternative early 19th century income benchmarks of Prados de la Escosura (2000) would imply that Spain and Portugal were richer than England until the second half of the seventeenth century (Palma and Santiago-Caballero 2020). With these limitations in mind, Figure 10 suggests that no significant differences existed between either the levels or the growth rates of Iberian and English GDP before the seventeenth-century.

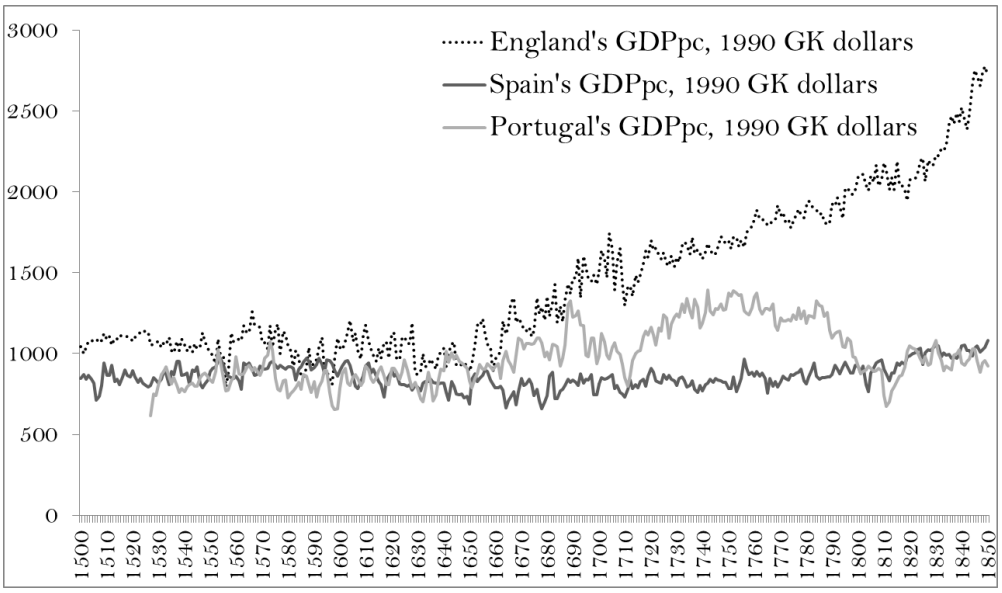

Figure 6. GDP per capita in constant, 1990 "international" Geary-Khamis dollars for England, Spain, and Portugal 1500-1850. Sources: for England, Broadberry et al (2015); for Spain, Alvarez-Nogal and Prados de la Escosura (2013); for Portugal, Palma and Reis (2019). In the case of England, levels are extrapolated backwards from the 1870 level for Great Britain, with growth rates corresponding to the borders of England until 1700 and Great Britain afterwards. Note: Changes in growth rates over time, not small differences in income levels, is what needs to be noticed here, because a change in 19th c. benchmarks can lead to a reversion of earlier levels (i.e. each series as a whole shifting up or down) as explained in the text.

What Figure 6 does suggest is that the continued arrival of precious metals was temporally correlated with negative economic performance for the Iberian economies – not at impact, but with a lag of about four decades. American silver and gold (while discovered earlier), started arriving in large quantities from the 1540s to Spain (TePaske 2010) and from the 1710s to Portugal (Costa et al 2013). Both countries experienced good economic performance in the first 40-50 years from the arrival of large quantities of precious metals (mostly silver in the Spanish case and gold in the Portuguese case), but strong economic decline afterwards.

Why have these economies worsened so drastically after the arrival of precious metals? In the case of early modern Spain, Drelichman (2005b, 2007) suggests that political institutions worsened as a consequence of the arrival of the silver, a view which finds modern-day parallels in the follow-up to the commodity booms in many poor countries (Collier 2010). But is there evidence that this was a direct result of the import of precious metals? Even given the macroeconomic performance documented in Table 2 and Figure 6, could it be that Acemoglu et al (2005) and Hough and Grier (2015) were right that Iberian institutions were already worse in the Middle Ages, so the early modern period was simply a continuation of the previous institutional trend?

Institutions are notably difficult to measure quantitatively, which makes cross-country comparisons difficult. But in recent work, Henriques and Palma (2019) build measures which allow for an explicit comparison of institutional quality over time. The paper considers several potential measures including the number of crown refusals at legislative assemblies, the number and strength of episodes of coin depreciation, the number and strength of ad hoc taxes introduced, and real interest spreads for public debt. All of these suggest that the political institutions of Spain (at least as measured by Castile) and Portugal were by no means worse than those of England until the mid-seventeenth century. Hence, while North (1990) was correct in assuming that Iberian institutions eventually did became worse than those of England, this was not yet true around 1500 or even 1600.

For example, consider interest rates paid on long-run public borrowing. North and Weingast (1989) argue that the fall in English interest rates observed following the Glorious Revolution of 1688-9 can be seen as evidence of the higher credibility of the post-revolution regime, since less credible regimes carry a risk-premium which

internalizes the possibility of default. Their analysis is not comparative, but a comparison of the situation in England, Holland, Portugal and Spain shows that if this argument is taken at heart, then English political institutions only converged to Iberian credibility levels over the second half of the seventeenth century. England was first unable to issue long-term debt (until 1650) and even afterwards it paid higher real interest rates than those paid in Spain and Portugal until after 1710 (Henriques and Palma 2019 discuss the comparative evidence in detail; for the importance of 1710, see Macdonald 2013).

Public long-term interest rates are just one illustrative example, as most of the Henriques and Palma (2019) measures in fact show that at the start of the eighteenth century, a divergence in institutional quality was already taking place. In England, parliament – which sometimes exerted executive constraints – met increasingly frequently over the second half of the seventeenth century, and it became permanent during the eighteenth. By contrast, in Spain and Portugal parliament (the *Cortes*) rarely met over the 1675-1800 period, while in earlier periods meetings were much more frequent.

What were the fundamental causes of the comparative worsening of quality of Iberian institutions? The first part of the explanation lies with England's success rather than Iberian failure per se. Once we set aside the idea that there was anything special about England's economy before the seventeenth century, it becomes clear that on a political level, there were two stages to England's success. The most well-known and emphasized by a variety of authors including North and Weingast (1989) is the Glorious Revolution of 1688-89. This was, however, preceded by important fiscal reforms emphasized by O'Brien (1988, 2011). Even Pincus and Robinson (2014), in their defense of the Glorious Revolution which lays emphasis on parliamentary sovereignty and the Whig program of modernization, recognize that "the English fiscal-military state had been growing by leaps and bounds since the 1640s".

A second part of the explanation as to why Iberian institutions worsened comparatively lies in the forces that acted directly on Portugal and Spain. The fact that the reasons of the eventual divergence of Iberian political and economic performance are not medieval but must instead be found during the early modern period makes American precious metals a plausible causal candidate, as argued by scholars such as Drel-

ichman (2005b, 2007) for the Spanish case and Macedo (1982) for the Portuguese case. Precious metals are a better candidate than the influence of colonial trade generally, because the relationship between colonial trade and institutions is more nuanced than it may appear at first glance. This can be illustrated with the case of Portugal. Tilly (1992, p. 62) claims that the fiscal dependence of the Portuguese crown on maritime revenues meant that no representative institutions developed. Tilly (1992, p. 124-5) even compares early modern Portugal to today's oil-exporting countries where, thanks to colonial revenues, the leaders have much autonomy vis-à-vis the general population because they do not need to collect fiscal revenues by taxing a broad tax base. In fact, Portuguese fiscal capacity was comparable to that of other Western European countries, and empire-related revenues were typically not a large share of total state revenues, except during parts of the sixteenth century (Costa et al 2019). Instead, the colonial empire grew to have a large effect on both fiscal revenues and the economy during the country's less representative period, the eighteenth century (Costa et al 2015).

5. Conclusion

There is no contradiction between the view that precious metals had different effects for first-and-second order receivers and also different effects at different time horizons. Precious metals had a positive effect for the English economy, and possibly other second-order receivers such as the Netherlands, in both the short and long run (Palma 2018b, 2019). It also had a positive effect for Spain and Portugal in the short run (Palma 2019, Brzezinski et al 2019). They were, however, likely to have had net negative long-run consequences for the first-order receivers, the Iberian economies. This is because for these economies, the indirect negative effects (the interaction of Dutch disease, institutional resource curse, and comparatively deficient growth in sustainable fiscal capacity) eventually overtook the positive consequences of monetization which took place in some second-order receivers such as England.

Early modern European history teaches us that the relationship between money and economic growth is more nuanced than some monetary neutrality narratives suggest. It is now widely accepted among most macroeconomists that money is not neutral over a business-cycle frequency, though prominent deniers remain. The experience of early modern Europe suggests that the majority are right, and additionally

that the magnitude of monetary non-neutrality effects (which is more debated) can be large.

By contrast, most macroeconomists believe in the notion of long-run monetary neutrality (and super-neutrality, which concerns growth and inflation rather than changes in levels). But the increase in money supply made possible by the increased availability of precious metals from America did lead to higher economic growth in early modern England, with a visible, but muted inflation response (by comparison with the magnitude of the arrivals). The financial history of early modern England suggests that in societies with a deficient provision of liquidity, additional money supply can induce economic growth through a variety of channels which include lower transaction costs. These effects were also present for first-order receivers of the precious metals (Spain and Portugal), but in these cases they were eventually dominated by negative and indirect consequences in the forms of Dutch-disease and institutional resource curse.

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