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## Abstract

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JEL Classification: N13, O11, O57

Keywords: resource curse, Dutch disease, State Capture, early modern Spain

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# American treasure and the decline of Spain*

Carlos J. Charotti† Nuno Palma‡ João Pereira dos Santos§

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**Abstract**

Spain was one of the world's richest countries and a first-rank European power around 1500. Two centuries later it was a backwater. In this paper, we rely on a synthetic control methodology study the long-run impact of the influx of silver from the New World since 1500 for the economic development of Spain. Compared with a synthetic counterfactual, the price level in Spain increased by up to 200% more by the mid-seventeenth century. Spain's GDP per capita outperformed other European nations for around a century: by 1600, it was close to 40% higher than in its counterfactual. However, this effect was reversed in the following 150 years: by 1750, GDP per capita was 40% lower than it would have been if Spain had not been the first-wave receiver of the American treasure.

*Keywords: Resource Curse, Dutch Disease, State Capture, Early Modern Spain, Augmented Synthetic Control*
*JEL Codes: N13, O11, O57*

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# 1 Introduction

> "Let London manufacture those fine fabrics of hers to her heart's content; Holland her chambrays; Florence her cloth ... Milan her brocades, Italy and Flanders their linens ... so long as our capital can enjoy them; the only thing it proves is that all nations train journeymen for Madrid ... for all the world serves her and she serves nobody" Alfonso Núñez de Castro, written in 1675 and quoted in Vicens Vives (2015, pp.416-7).

Spain was one of the world's richest countries and a first-rank European power around 1500 (Palma and Santiago-Caballero, 2022). The economy boomed during much of the sixteenth century, but then began to decline persistently. Spain became one of Western Europe's poorest countries in the eighteenth and nineteenth centuries, and it was one of the last to enter modern economic growth – as late as the mid-twentieth century (Prados de la Escosura, 2017). In this paper, we study the long-run impact of precious metals from the New World, arriving from around 1500, for the economic development of Spain in subsequent centuries. Mining output in Spanish America was exogenous to the state of the European economy, as it depended on the fortuitous discovery of new mines and on local conditions in the Americas (Palma, 2022). Using an augmented synthetic control methodology, we show that in the long run, the growth and price level trajectories evolved dramatically different in Spain relative to other Western European nations. Spain initially boomed but suffered from high inflation and in the long run became poorer as the result of a resource curse which had economic and political dimensions.

We rely on macroeconomic time series data from recent developments in the historical national accounts literature (de Jong and Palma, 2018; Palma, 2020b; Broadberry, 2021). The data consists of GDP and price level estimates built from detailed information on market prices for goods, wages, and land rents collected from a variety of sources at an yearly frequency. We combine time series spanning four centuries from different Western European countries. Around 1500, all these countries shared similar fundamentals. In particular, all were pre-modern, primarily agricultural economies, and differences in economic and institutional performance were small and second-order relative to the latter divergences that were to occur (Broadberry, 2021; Henriques and Palma, 2022).

As mentioned, Spain was, in fact, one of the richest and more institutionally advanced countries of Western Europe around 1500 (Palma and Santiago-Caballero, 2022; Henriques and Palma, 2022). Less than two centuries later, however, this was no longer the case, as Spain had entered a period of sustained decline in economic outcomes (Álvarez-Nogal and Prados de la Escosura, 2013; Prados de la Escosura et al., 2022), which was accompanied by intellectual decline and a gradual political shift towards absolutism and state capture (De La Croix et al., 2020; Drelichman, 2007; Stein and Stein, 2000; Henriques and Palma, 2022). Contemporaries noticed the problem: "By the mid-seventeen century, silver was becoming more than a little tarnished. Observers noted how all the silver of America had failed to bring prosperity to Spain" (Elliott, 2008, p.114).[1]

Our results suggest that the influx of metals from the Spanish Empire in the Americas increased the price level in Spain by up to 200% more by the mid-seventeenth century than in a weighted average of European areas which were similar to Spain prior to 1500. The price level only converged back to trend more than 200 years later.[2] In addition, due to influx of silver and gold, GDP per capita outperformed other European nations for around a century: by 1600, it was close to 40% higher in Spain than in its synthetic counterfactual. Seville, the city where the metals arrived, became the largest city in Spain, with 150,000 inhabitants Vicens Vives (2015, pp.436). Nevertheless, this effect was reversed in the following 150 years: in the late seventeenth century and eighteenth century, the Spanish economy performed significantly worse than others. Our results indicate that by 1750, GDP per capita was 40% lower than it would have been had Spain not been the first receiver of the American treasure.

We contribute to the literature on the resource curse (Ross, 2015; Brollo et al., 2013; Caselli and Tesei, 2016; Berman et al., 2017; Vicente, 2010).[3] While this literature has, in recent decades, been focused on the case of resource-rich developing countries such as Columbia or Venezuela (Martinez,

[1]For example, the Spanish diplomat Diego de Saavedra wrote about the Spanish economic (under)development in consequence of silver curse in his book *Idea de un Príncipe Político Christiano representada en cien empresas.* We thank Phil Roessner for calling our attention to this text. See also Vicens Vives (2015, pp.422, 432-4).

[2]Chen et al. (2021) show that the Spanish money supply (measured in silver) increased more than 10-fold. In turn, Brzezinski et al. (2022) show that periods when the treasure fleet failed to arrive had negative consequences for the Spanish economy in the following year. Note that such short-to-medium term effects in no way contradict the results of the present paper. On the contrary, it is precisely because of the net positive effects on impact that the endowment of silver had negative long-run effects for Spain.

[3]The empirical evidence on resource curse is sometimes argued to be mixed. But there are two important factors to keep in mind. First, resource curse is always conditional on initial institutions and human capital. Norway during the 20th century, for example, was able to avoid a resource curse by investing in a sovereign fund due to such factors. Second, due to the fact that natural wealth can create an initial net boom, evidence concerning resource curse should look at long horizons. Here, we focus on a single country, premodern Spain, and use centuries of data, hence avoiding both problems.

2019; Márquez-Velázquez, 2019), early modern Spain is in fact the most prominent example which spawned the original debate going back to the sixteenth century (Hamilton, 1934; Drelichman, 2005b, 2007; Palma, 2020a; Palma and Santiago-Caballero, 2022; Abad and Palma, 2021). There is both an economic and a political aspect to the resource curse. From an economic perspective, the influx of metals made tradable industries less competitive because inflation led to an appreciation of the real exchange rate. As a result, imports increased and exports were much reduced (Drelichman, 2005b).[4] Additionally, there was a political effect: institutions deteriorated as power became more absolute and the state was captured by foreign interests and internal lobbies (Stein and Stein, 2000; Vicens Vives, 2015; Drelichman, 2007; Henriques and Palma, 2022). While previous research has covered different aspects of the resource curse in early modern Spain, no modern empirical evaluation of the long-run counterfactual – as we do in this paper – was previously available. Our paper finds support for the resource curse explanatory hypothesis concerning Spain's long-run decline, which emphasizes the role of American precious metals and has been discussed since the sixteenth century (Hamilton, 1934; Drelichman, 2005b, 2007; Palma, 2020a). We innovate relative to this existing literature by using new macroeconomic data and modern causal inference methods.

The resource curse hypothesis for explaining Spain's decline contrasts with other competing explanations which, in our view, are either endogenous to our explanation or of second-order importance. While it has been known for some time that there is "extremely abundant evidence pointing to a decline in herding, agriculture, industry, and trade in the Spain of the seventeenth century" (Vicens Vives, 2015, pp.411), there is currently no agreement in the literature with regards to the underlying cause for Spain's decline. Our results support the resource curse explanation, but we note that other explanations focusing on proximate factors could have been endogenous to these. We now review four alternatives that have been proposed in the literature.

Grafe (2011) argues that early modern Spain was a politically divided weak state, and focuses on the role of market fragmentation. This idea is, however, contradicted by recent research showing that Spain's economy was largely integrated – the market fragmentation that existed was not unusual

[4] This is what is usually called Dutch Disease. In the early sixteenth century, Spain exported large quantities of fine cloth, but industry entered a long period of decline still during that century as the result of a rising prices of tradables (Vicens Vives, 2015, pp.354-5, 427-8, 436-8). From 1548, foreign cloth was admitted duty-free, and Spain "remained a net importer of cloth until the nineteenth century" (Cameron and Neal, 2016); see also Vicens Vives (2015, p.422, 428). For a similar process taking place in eighteenth century Portugal, see Kedrosky et al. (2021).

by the standards of the time, and it was determined by geography rather than political divisions (Cermeño and Santiago-Caballero, 2020). The Catalan trade, for instance, was well integrated to that of Castile (Vicens Vives, 2015, pp.362). Furthermore, while in addition to Castile, Spain also included Aragon and Navarra – ruled by the same king, but having a separate legal environment, especially prior to the eighteenth century – the economy of Castile was in fact dominant, corresponding to around 3/4 of that of Spain. Finally, the comparative fiscal capacity measures of Karaman and Pamuk (2010, 2013) additionally show that early modern Spain was not a weak state, since its fiscal capacity was comparable to that of most other Western European states.[5]

Another explanation in the literature concerns the role of the Catholic religion (Becker et al., 2016). Notice, however, that protestant countries only began growing systematically more than a century after their Reformations, and not all of them did (Broadberry, 2021). In England, there was only systematic per capita growth from the mid-seventeenth century, more than a century later after its Reformation (Broadberry et al., 2015; Humphries and Weisdorf, 2019). Moreover, the second country in Europe to have an industrial revolution was Belgium, a Catholic country which had been for a long time under Spanish domination. Other Catholic countries such as France or Italy followed England and were able to industrialize during the nineteenth century. Within Germany, which had Catholic and Protestant individuals, there were no significant differences in outcomes such as income levels, savings, and literacy rates, except when related to the presence of a Polish minority in the East (Kersting et al., 2020). Finally, there is evidence that tolerance was not lower in Catholic Europe until the second half of the seventeenth century. For example, persecution of Jews increased in areas of Germany that became Protestant (Becker and Pascali, 2019).[6] Furthermore, Catholics were persecuted in Protestant Europe, just as the converse happened in Catholic Europe. While it is true that by the eighteenth century, Catholic Europe was less tolerant, the above description suggests the endogeneity of tolerance to the overall institutional environment.

A related cultural explanation posits that the south of Europe discriminated against women to a larger extent than Northwestern Europe did, with negative implications for fertility practices and

[5]Spain's fiscal capacity was higher than that of England in the sixteenth century. And it was remarkably higher than non-Western weak states such as the Ottoman Empire.

[6]In England, the expulsion of the Jews happened in 1290 - two centuries before the Iberian expulsions of the 1490s. The Jews were only accepted in England again under Oliver Cromwell's rule, in exchange for a generous payment, and faced restrictions and discrimination well into the nineteenth century.

human capital accumulation (Van Zanden et al., 2019). According to this literature, social norms in Northwestern Europe were, hence, more conductive to economic growth. However, recent research have shown that the Iberian evidence does not in fact support this interpretation, since marriage practices and social norms at the family level, as well as gender wage gaps, age of first marriage, and women's labor market position, were similar in Spain and Portugal to elsewhere in Western Europe (Drelichman and González Agudo, 2020; Palma et al., 2021).

A final explanation for Spain's decline is that of Acemoglu et al. (2005), who argue that medieval political institutions were superior in England and the Netherlands than in Spain or Portugal, where kings were, according to these authors, more absolutist.[7] In absolutist states, checks on executive constraints were minimal or nonexistent, which did not allow merchant elites to capture the profits of Atlantic trade and gain political power as did in England. However, parliaments in fact met as frequently in Iberia than in England until the seventeenth century, and exercised no less executive constraints (Henriques and Palma, 2022). Until the second half of the seventeenth century, the cost of sovereign borrowing was lower in Iberia than in England, observed loan maturities were longer, and the public risk premia (measured by the public-private spread) was lower, suggesting that the risk of default from the English Crown was higher. Sixteenth-century England also had large fiscally-motivated debasements, which only happened in Iberia in later centuries (Karaman et al., 2020; Henriques and Palma, 2022). By the eighteenth century, however, the evidence is clear: Spain and Portugal had comparatively backward political institutions, with insufficient checks and balances and dominant rent-seeking elites (Drelichman, 2007, 2005a; Henriques and Palma, 2022). The comparative institutional situation hence changed over time, and this evidence is consistent with the viewpoint that we defend in the present paper: Spain's comparative economic and political decline was a consequence of a resource curse associated with the American treasure.

## 2 Empirical strategy and data

The synthetic control method permits comparing a treated unit with a donor pool in two steps (Abadie, 2021). First, the treated unit is compared with the donor pool in a pre-treatment period

[7] See also North and Thomas (1973), Hough and Grier (2015), or Fukuyama (2011) for similar arguments.

(before 1500 in our case) in order to observe which combination of units from the donor pool best replicates the behaviour of the treated unit. In our case, Spain is compared with other European countries which are used to construct a counterfactual Spain for the period from 1500. The procedure is made to ensure that the outcome variables imitate both the levels and the trend of the outcome before treatment occurs. Second, after the treatment – in our case, the influx of silver and gold from the New World – has taken place, we observe how the behaviour of the treated unit differs from the behaviour of the donor pool. The behaviour of the donor pool in the post-treatment period is understood as the counterfactual of how the treated unit would have behaved in the absence of the event. Notice that in the present case, our counterfactual represents a hypothetical situation whereby Spain was a second-wave receiver like other Western European countries what were similar to it prior to 1500. It does not represent a situation where the influx of metals from the New World did not happen, which cannot be identified.

This procedure requires an appropriate donor pool to construct an optimal combination of weights chosen to minimise the pre-shock differences between Spain and its artificial "doppelganger": synthetic Spain, a counterfactual. In our analysis, this is built using long time series from a donor pool formed by several European countries for which such data exists. By design, however, causal inference using this method is only valid in settings where an excellent fit on pre-treatment outcomes is possible (Abadie et al., 2015). When this is infeasible, the SCM approach has to be slightly modified to adjust for pre-treatment fit.

We follow Ben-Michael et al. (2021) and use the augmented synthetic control methods (ASCM), which controls pre-treatment fit while minimizing extrapolation, to estimate the long-run impact of the influx of silver and gold on the economic development of Spain. Formally, we consider a panel data setting with $i = 1, ..., N$ units observed for $t = 1, ..., T$ times period. Let $W_i = 1$ be an indicator that the unit $i$ received the treatment at time $T_0 < T$, and $W_i = 0$ means that the unit $i$ never received the treatment. To simplify the notation, we define the pre-treatment period as $T_0 = 1, ...., T_0$ and the post-treatment period as $T = T_0 + 1, ..., T$. Also, we follow the convention that $i = 1$ is the single unit that receives the treatment. Therefore, the observed outcomes of interest are:

$$Y_{it} = \begin{cases} Y_{it}(0), & \text{if} \quad W_i = 0 \quad \text{or} \quad t \leq T_0 \\ Y_{it}(1), & \text{if} \quad W_i = 1 \quad \text{and} \quad t > T_0 \end{cases} \tag{1}$$

The treatment effect of interest is thus $\tau = \tau_{1T} = Y_{1T}(1) - Y_{1T}(0)$. We follow Ben-Michael et al. (2021) and define the ridge-augmented SCM estimator as: $\hat{Y}_{1T}^{aug}(0) = \sum_{i=2}^{N} \hat{\gamma}_i^{aug} Y_{iT}$, where the weights $\hat{\gamma}^{aug}$ are the solution to:

$$\min_{\gamma} \frac{1}{2\lambda^{ridge}} \|(Y_{1T_0} - Y'_{iT_0}\gamma)\|_2^2 + \frac{1}{2}\|(\gamma - \hat{\gamma}^{scm})\|_2^2 \tag{2}$$

$$\text{subject to} \quad \textstyle\sum_{i=2}^{N} \gamma_i = 1$$

Where $\hat{\gamma}^{scm}$ are the SCM weights and $\lambda^{ridge}$ is the hyperparamenter which determines the amount of extrapolation (with the level of imbalance). Also, $\|(Y_{1T_0} - Y'_{iT_0}\gamma)\|_2^2 \equiv (Y_{1T_0} - Y'_{iT_0}\gamma)'(Y_{1T_0} - Y'_{iT_0}\gamma)$ and $\|(\gamma - \hat{\gamma}^{scm})\|_2^2 \equiv (\gamma - \hat{\gamma}^{scm})'(\gamma - \hat{\gamma}^{scm})$ are the 2-norm on $\mathbb{R}^{T_0}$ and $\mathbb{R}^{N-1}$, respectively. We follow the cross-validation approach proposed by Ben-Michael et al. (2021) and the "one-standard-error" rule (Hastie et al., 2009) to select $\lambda^{ridge}$. The results are presented in detail in the Appendix.

Spain was the first-wave receiver of the precious metals from the New World from around 1500.[8] The metal coins, which were privately owned, spread over Europe through two mechanisms: first, the higher level of prices in Spain led to the appreciation of the real exchange rate which favored imports and worked against exports, meaning that Spain's balance of payment was settled by sending currency abroad; and second, the Crown benefited from taxes on the production of these metals in the Americas, which it used to make diplomatic and military payments abroad, especially in Italy and Flanders (Vicens Vives, 2015, pp.372-3). There is evidence that as the American silver and gold coins affected most Western European countries (Palma, 2022). Hence, our counterfactual does not represent a situation where the influx of metals from the New World did not happen. Instead, it represents a hypothetical situation whereby Spain was a second-wave receiver like other Western

[8]There were also much smaller quantities produced in central Europe until the mid-sixteenth century, outside the regional scope of all the countries in our sample. Additionally, in the eighteenth century, Portugal also received important quantities of gold, though not silver. All other countries were second-wave receivers only.

Table 1: Gold and Silver Stocks and Flows to Europe

| | Fine Silver, tons | Gold, silver-equivalent tons | Total, silver-equivalent tons |
|---|---|---|---|
| 1492 | | | |
| World stock | 3600 | 3267 | 6867 |
| European stock | 828 | 751 | 1579 |
| | | | |
| Imports to Europe | | | |
| Sixteenth century | 7500 | 1659 | 9150 |
| Seventeenth century | 26168 | 2212 | 28380 |
| Eigtheenth century | 39157 | 21000 | 60157 |
| | | | |
| Total Imports | 73825 | 24862 | 97687 |

*Notes*: Adapted from Palma (2020a)

European countries what were similar to it prior to 1500.

The long period covered in our study starts in 1400 and ranges until 1750, and the panel is balanced. We chose the treatment period as starting in 1500, giving us a full century of pre-treatment data. This is justified by the fact that the influx of silver and gold from the New World started around then (Table 1).[9] We stop in 1750 rather than later to avoid a post-treatment period which would include the classical period of the English industrial revolution from arond 1760 and the disruptive period of the French Wars from 1792. The treated unit is Spain and four donor countries are included: England, France, Italy, and Sweden.[10] These are all the Western European countries for which data is currently available, with three exceptions: Portugal and the Netherlands, which we exclude to the being ruled by the King of Spain for much of our period, and Germany, because its data only starts from 1500, meaning we do not have pre-treatment data (van Zanden and Van Leeuwen, 2012; Palma and Reis, 2019; Pfister, 2022).[11]

For all these countries, annual prices have been collected from accounting books which survived in national and regional archives. Regarding premodern GDP, two reconstruction methods have

[9]The magnitude of production and inflows became stronger after 1530 (Palma, 2022), but it is safer to start in 1500 to mitigate possible anticipation effects internalized via the expectations of agents.

[10]We follow the convention of using modern borders despite the fact that some of these countries did not yet exist politically at the time. Moreover, it is important to highlight that, in the case of Italy, the available data corresponds to north and central Italy only, an area that was for the most part not under Spanish rule, unlike what was the case for the South of Italy during some of our period.

[11]Parts of the Low Countries were under Spanish rule from 1556 to 1714. The same is also true for Portugal between 1580 and 1640. In addition, during the eighteenth century Portugal received huge quantities of gold from Brazil, and also suffered from resource curse as a consequence (Kedrosky et al., 2021).

been employed.[12] The most accurate, but also the most demanding in terms of data requirements, is the supply-side approach, where the different yearly components of output, at current prices, are directly observed and then aggregated and transformed into real values using a price index. This is how Broadberry et al. (2015) measured England's GDP, and Krantz (2017); Schön and Krantz (2015) measured that of Sweden. To give a more concrete idea, these authors estimated the contribution of the three sectors of activity as follows: for agriculture, they relied on yearly data on agricultural land output, considering both crop and livestock production. For industrial production, they added the output of important industries at the time such as tin, coal, textiles, and wool. For services, which they divided into government services, commercial and financial services, and domestic and personal services, they used individual series when possible and proxies when not (Broadberry et al., 2015).

The second reconstruction method is a more indirect, consumption/demand-based approach based on income measures such as on real wages and land rents. This is how researchers have computed the GDP for Italy (Malanima, 2011), France (Ridolfi and Nuvolari, 2021), and Spain (Álvarez-Nogal and Prados de la Escosura, 2013).[13] In the case of Portugal, the approach was mainly the latter, but in fact corresponds to a mix of demand and supply-side methods (Palma and Reis, 2019; Henriques et al., 2019).[14]

We consider three outcomes in this study: the price level (measured in silver), real GDP per capita, and real GDP.[15] All of them are normalized, for all countries, relative to their specific 1500 level. The descriptive evolution for these outcome variables is displayed in Figures A.1 to A.3 in the Appendix to this paper.

[12] Álvarez-Nogal et al. (2016) show that both methods tend to lead to similar results.

[13] There are somewhat different methodologies to estimate the non-agricultural sector in these methods; Palma and Reis (2019) show these tend to lead to similar results.

[14] For the case of France, population is based on Dupâquier (1988); for Portugal, it is based on Palma et al. (2020).

[15] We measure the price level in silver, rather than in local monetary units, to avoid confounding prices rises related to fiscal policy, via debasements. We convert price levels to silver, when necessary, using the database collected by Karaman et al. (2020).

# 3 Results

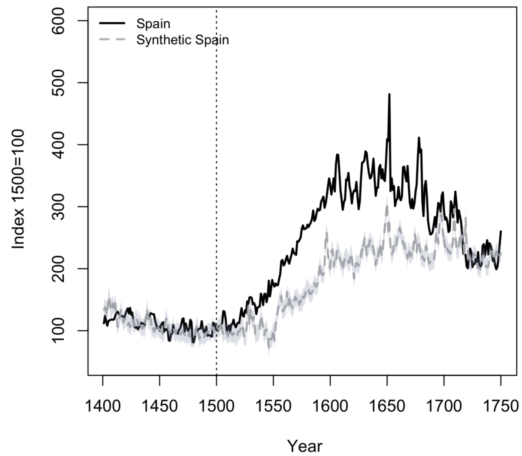
In this section, we discuss the baseline results for the price level, GDP per capita, and GDP. In the SCM graphs, the series represented by the dark solid line shows the real evolution of this indicator for the Spanish economy, whereas the light dashed line shows the estimated synthetic counterfactual. Accordingly, the difference or the gap between real and synthetic Spain represents the treatment effect. In the latter graphs, we also present the 95% confidence intervals during the treated period. Following Ben-Michael et al. (2021), our confidence intervals are calculated using the conformal inference method, as in Chernozhukov et al. (2021).

## 3.1 Price level

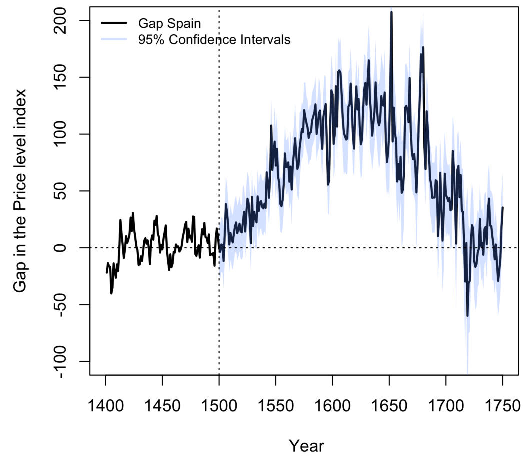
We show the baseline results for the price level in Figure 1 (a) and the corresponding gap between Spain and synthetic Spain in Figure 1 (b). As can be seen, the synthetic counterfactual is able to replicate well the pre-treatment levels for the Spanish economy during the fifteenth century, with a gap in the price level index close to zero. For the treatment period, and especially after the 1530s, our results indicate that the influx of silver and gold from the New World caused a substantial increase in the price level that lasted for about two centuries. Our estimates suggest that, during this period, the price level was up to 200% higher than it would have been. In the beginning of the eighteenth century, and for the last 50 years of our treatment sample, the gap gradually closed and was not statistically different from zero by 1750. Overall, the average treatment effect between 1500 and 1750 was 30%. Following the literature, we use different donor weights for different outcome variables, depending on the quality of their pre-treatment fit.[16]

We present the weights of the donor countries in the construction of the counterfactual for the Spanish economy in Table 2. The largest donor is England, with a weight of 41%, followed by France, with a weight of 35%, and Sweden, accounting for 25% of synthetic Spain.

[16] This is standard procedure in the literature. See, for example, Bohn et al. (2014).




(a) Price level in silver




(b) Gap of the Price level

Figure 1: Gap and the Price level in silver - index 1500=100

*Notes*: We used the Ridge Augmented Synthetic Control Method. The shaded area in the (a) figure is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period. The price level index gap in figure (b) is defined as the difference between the observed price level index and the estimated counterfactual.

Table 2: Country Weights

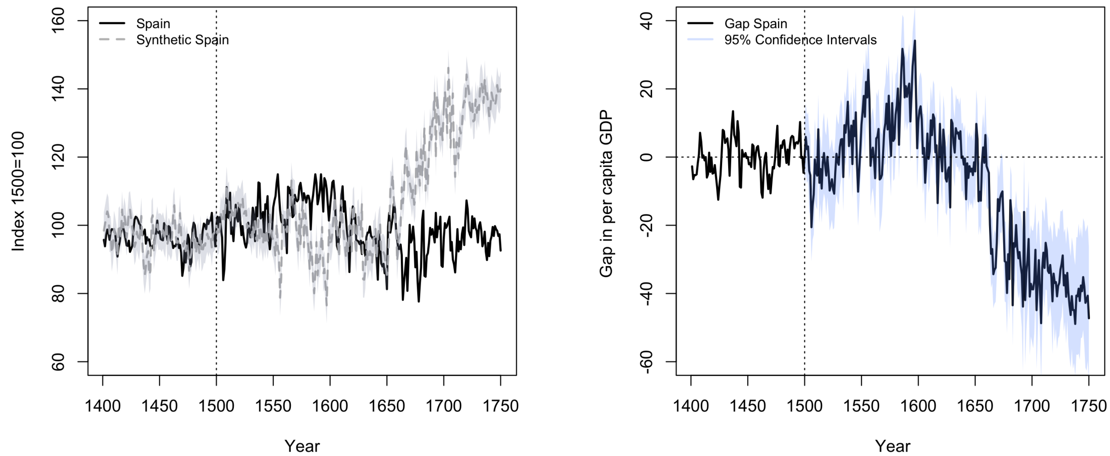
| Countries | Weights |
|---|---|
| England | 0.41 |
| Sweden | 0.25 |
| France | 0.35 |
| Italy | -0.01 |

*Notes*: Composition of the Doppelganger for the Price level of Spain using a ridge augmented synthetic control method.

## 3.2 GDP per capita

We now turn our attention to GDP per capita. We present the SCM results in Figure 2 (a) and the corresponding estimated gap (and 95% confidence intervals) in Figure 2 (b). For the treatment period, the observed pattern is twofold. First, the initial levels of growth in Spanish GDP per capita were considerably higher than in the counterfactual, especially between 1550 and 1600 (about 12%, on average). However, this growth performance was not sustainable in the long-run. In fact, the large influx of precious metals seems to have had long-run negative feedback effects. As a consequence, the pattern was completely reversed in the last one hundred years of our sample, between 1650 and 1750. For this period, our findings point towards a 17% decrease, on average, vis-à-vis synthetic Spain, and the gap increased over time. Interestingly, even considering the initial boom years, our estimates suggest that the overall average effect in our treatment period as a whole was 8% lower income level in Spain than it would have been in the absence of the shock.

The weights of the donor countries, for this particular exercise, are presented in Table 3. In this case, synthetic Spain is formed by England (73%), but also, to a smaller extent, by Sweden (12%), Italy (9%), and France (6%).




(a) GDP per capita

(b) Gap of the GDP per capita

Figure 2: Gap and the GDP per capita 1990 G-K dollars - index 1500=100

*Notes*: We used the Ridge Augmented Synthetic Control Method. The shaded area in the (a) figure is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period. The gap in per capita GDP in figure (b) is defined as the difference between the observed GDP per capita index and the estimated counterfactual.

Table 3: Country Weights

| **Countries** | **Weights** |
| --- | --- |
| England | 0.73 |
| Sweden | 0.12 |
| Italy | 0.09 |
| France | 0.06 |

*Notes*: Composition of the Doppelganger for the GDP per capita 1990 G-K dollars of Spain using a ridge augmented synthetic control method.

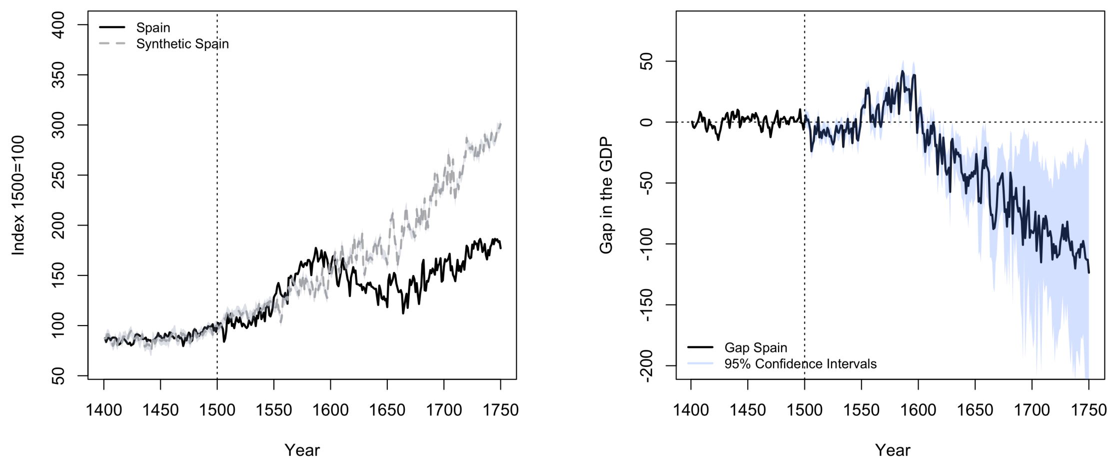
There is an alternative time series for the historical Spanish GDP (Prados de la Escosura et al., 2022).[17] This series only has annual data for agriculture, however, and is less methodologically consistent with the other GDP series than the one we use as the baseline. Nevertheless, we also examine whether our results remain robust using this alternative. Not surprisingly, given that these two alternative two time series are not substantially different, the SCM results also remain similar. The results are presented in Figure A.7 in the Appendix. As can be seen, our main findings remain unchallenged in this check. However, with respect to the previous findings, the boom is more short-lived, lasting only for about a century.

### 3.3 GDP

Lastly, we present the main results for GDP, relative to 1500 levels, in Figure 3 (a). The corresponding estimated gap is displayed in Figure 3 (b) and includes the 95% confidence intervals. As with the GDP per capita, we observe opposite patterns after 1500, but with some differences in magnitude and timing. First, in the second half of the sixteenth century, Spain's GDP grew around

[17] The price level used in this paper is that same as in (Álvarez-Nogal and Prados de la Escosura, 2013).

12% more between 1550 and 1600, on average, than it would have grown in the counterfactual. By 1550, real GDP was 50% higher, total effect which includes both intensive (i.e. per capita) and extensive (i.e. population) growth. However, from 1600 to 1750, Spanish GDP grew substantially less than its synthetic counterfactual (on average, -32%). More importantly, the negative impacts get worse over time. These opposing effects combined result in an average treatment effect of -18% during our full treatment period and an observed GDP level for Spain reaching around half that of the counterfactual by 1750. In this exercise, the country weights, as shown in Table 4, are as follows: England (57%), France (39%), and Sweden (6%).




(a) GDP

(b) Gap of the GDP

Figure 3: Gap and the GDP 1990 G-K dollars - index 1500=100

*Notes*: We used the Ridge Augmented Synthetic Control Method. We incorporate the annual population growth rate and pre-treatment outcomes as covariates. The shaded area in the (a) figure is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period. The gap in GDP 1990 G-K dollars in figure (b) is defined as the difference between the observed GDP index and the estimated counterfactual.

Table 4: Country Weights

| **Countries** | **Weights** |
|---|---|
| England | 0.57 |
| France | 0.39 |
| Sweden | 0.06 |
| Italy | -0.02 |

*Notes*: Composition of the Doppelganger for the GDP 1990 G-K dollars of Spain using a ridge augmented synthetic control method. We incorporate the annual population growth rate and pre-treatment outcomes as covariates.

Once again, we compare previous results with an alternative estimate of Spanish GDP (Prados de la Escosura et al., 2022). The results are presented in Figure A.6 in the Appendix. As can be seen, the results are quantitatively similar to our baseline. However, as expected given the data limitations for this method, the results are substantially noisier.

### 3.4 Interpretation

In the late Middle Ages, Spain's income level was one of the highest in Europe, if not the world (Palma and Santiago-Caballero, 2022; Prados de la Escosura et al., 2022). But its economic decline was beginning to be clear around 1600, and a large contemporary literature know as the *arbitristas* appeared with the goal of diagnosing the causes of the problem. The School of Salamanca had scholars such as Martín de Azpilcueta, Luis de Molina, and Tomás de Mercado who, centuries before Adam Smith, showed that a simple-minded identification of money with wealth did not make sense (Vicens Vives, 2015, p.450-53).

Spain's decline had both economic and political mechanisms. On the economic front, a dramatic decline in wool exports took place from the second half of the sixteenth century. For example, wool exports through the port of Santander consisted only of 11 ships and 605 sacks of wool annually by 1622, compared with 66 ships and 17,000 sacks just half a century before (Vicens Vives, 2015, p.438). There was widespread industrial and demographic decline in Castile, accompanying the decline of wool trading and textile manufacturing (Reher, 1990, pp.15-67). In the sixteenth century, Cuenca, for instance, was a "vibrant and dynamic middle-sized Castilian town with a vigorous economy and considerable political influence in royal affairs. It was an essential part of a network of towns in the central part of Spain which gave fifteenth- and sixteenth-century Castile a distinctly urban flavor. By the nineteenth century, Cuenca was a ghost of its former self and had become a sleepy provincial capital whose meagre industrial production was destined almost entirely for the home market. By then there was little or no urban system to be found in Castile, which apart from Madrid, had become one of the more rural regions of Western Europe" (Reher, 1990, pp.15). As Reher (1990, pp.17-18) emphasizes, the decline of Cuenca was part of a general trend of Castile, also visible elsewhere. The city of Burgos, for instance, shrunk from 20,000 inhabitants in 1575 to only 3,000 by 1646 (Vicens Vives, 2015, p.428-9). The economic and population decline affected all the cities of Castile except Madrid and reflected the export crisis, even if was also partly accompanied by the growth of Madrid as a consumption city (Gollin et al., 2016). By the final decades of the eighteenth century, "the areas which had seemed so vibrant in the sixteenth century had lost population over the course of almost 200 years ... [and] Castile's urban system had ceased to exist" (Vicens Vives, 2015, p.40).

The region where the precious metals arrived, Andalusia, suffered earlier and the most (Hamilton, 1934; Cermeño and Santiago-Caballero, 2020). The "imbalance between incoming and outgoing trade grew ever larger as the rise in Spanish prices compared to foreign ones placed the industry of Seville in a position of obvious inferiority. Guilds of shipwrights, caulkers, and rope-makers (an Andalusian specialty) almost disappeared, and the number of silk looms decreased very noticeably" (Vicens Vives, 2015, p.436, 428).[18] This was clearly the result of a Dutch Disease mechanism. As

[18]By the late seventeenth century, movement in the port of Seville fell to 10% of what it had been a century earlier (Vicens Vives, 2015, p.467, 428).

inflation took hold in Spain, sooner and with a stronger magnitude than elsewhere, the real exchange rate appreciated, hurting the tradables export sector which became less competitive (Drelichman, 2005b).

Politically, parliaments ceased to meet around the mid-seventeen century, except occasionally for ceremonial reasons only (Henriques and Palma, 2022). This was because the Crown no longer needed to negotiate taxes thanks to additional revenues, even though its share of the incoming treasure was only around 20% of the total private revenues. The Crown also allowed the state to be captured (Drelichman, 2007) and foreign interests to take over much of the foreign carry trade associated with the import of products and the export of precious metals (Stein and Stein, 2000; Vicens Vives, 2015, p.433, 428). The Habsburgs used the additional revenues associated with American silver to finance endless dynastic wars in the Netherlands and Italy, leading to multiple bankruptcies and the Crown owing more than 13 million ducats by 1592, at the end of the reign of Philip II (Vicens Vives, 2015, p.53). The ruinous policies of the Crown continued into the seventeenth century, which over time became less and less constrained by the *Cortes*, and accordingly "sacrificed the economy to the treasury, and the interests of its subjects to its own interests" (Vicens Vives, 2015, p.453). Hence, while in England the parliament would play a fundamental role in supporting the Industrial Revolution (Bogart and Richardson, 2011), such a mechanism was not present in Spain.

# 4 Robustness and Placebo tests

In this section, we conduct robustness tests to evaluate the validity of the baseline results. For each outcome variable, we present the main synthetic control method graphs under alternative assumptions. The first class of robustness tests that we consider are in-time placebos, where we investigate the sensitivity of our baseline results to considering alternatives to 1500 as our treatment date. We instead assign 6 counterfactual exercises with earlier starting treatment periods – as if our treatment period started in 1440, 1450, 1460, 1470, 1480, or 1490. The second sensitivity test is the leave-one out technique. The idea is to iterate over the baseline model and leave out one selected donor country each time. This way we can assess whether one of the donor units is pivotal in driving the previous results. In addition, we examine the robustness of our results to the inclusion of the other Iberian country in the donor pool: Portugal. This, however, implies that we must zoom in a shorter time horizon, as the Portuguese and Spanish crowns were united under the same king between 1580 and 1640. Moreover, data for Portugal are only available since 1430 (Henriques et al., 2019; Palma and Reis, 2019). A fourth robustness check that we consider consists on using 1530 as the start of the treatment period. This exercise has the advantage of taking into account a larger pre-treatment period, but comes with the cost of not properly considering potential anticipation effects. We briefly describe the results in this section, but show all the supporting Figures and Tables in the Appendix. All of our basic results hold.

## 4.1 Price level

We start by presenting the two placebo exercises for the price level. In Figure A.8 in the Appendix, we show that changing the start of the treatment period does not seem to impact our baseline conclusions for the price level. This corroborates that these Western European countries were broadly similar pre-shock. Moreover, Figure A.9 in the Appendix, highlights that our results are robust to the exclusion of each of the countries from the donor pool. Furthermore, we show that including Portugal in the donor pool leads to remarkably similar results during the boom years in a shorter time span that spans from 1430 to 1580. The results are presented in Figure A.10 in the Appendix. In this case, Portugal constitutes more than 30% of the weight of counterfactual Spain, as can be seen in Table A.3 in the Appendix, being only surpassed by England, which remained the most important country in the donor pool (with 41%). In Figure A.11 in the Appendix, we show that our results remain robust to changing the treatment period to 1530.

## 4.2 GDP per capita

For GDP per capita, the robustness checks also lead to similar results. First, we present the in-time placebo in Figure A.12 in the Appendix. As can be seen, the results for most of the in-time placebos are close to the synthetic Spain case, especially between 1500 and 1700. In the last 50 years, there is some dispersion, but all in-time placebo lines are above Spain's GDP per capita line. Second, the leave one-out exercises is presented in Figure A.13. The results replicate well the patterns observed in our baseline findings, but exhibit higher volatility, especially in the last one hundred years of our sample. This higher volatility, however, should be interpreted with a grain of salt, given that it is only possible to have, for each time, three countries in the donor pool. Third, we inspect whether our baseline results are robust to including Portugal in the donor pool. Our findings are presented in Figure A.14 in the Appendix. Adding Portugal does not change previous results. This is particularly important as Portugal had also expanded far beyond European shores, but did not have access to any remarkable quantities of precious metals prior to large quantities of gold being discovered in Brazil during the eighteenth century (Kedrosky et al., 2021). Portugal accounts for 5% of the variation of the new synthetic Spain measure, as displayed in Table A.4 in the Appendix. This is consistent with existing evidence that Spain and Portugal had different per capita income levels around 1500 (Palma and Santiago-Caballero, 2022). Finally, we examine the case where we change the start of the treatment period to 1530. As shown in Figure A.15 in the Appendix, similarly to baseline results the boom pattern materializes until around 1600. After that, however, the bust arises, with Spain growing far less than its synthetic counterfactual.

### 4.3 GDP

Regarding GDP, the in-time placebo exercises presented in Figure A.16 in the Appendix bring further confidence that baseline results remain robust if we anticipate the start of the treatment period. The leave-one-out placebo exercises for GDP also hold. We show in Figure A.17 in the Appendix that the results are robust to the exclusion of each country, with the sole exception of England. This can be explained by the importance of the Industrial Revolution – hence these results simply suggest that Spain might have done as well as England did in the absence of having been the first-order receiver of the precious metals. Including Portugal in the donor pool, as can be seen in Figure A.18 in the Appendix, shows only a modest increase in the counterfactual Spanish GDP, especially around 1550. In this case, Portugal accounts for 29% of the weight in synthetic Spain, while France looses its relative importance. Finally, in the Appendix, we also show that modifying the treatment starting period to begin in 1530 does not change baseline conclusions, as shown in Figure A.19.

## 5 Concluding remarks

The discovery of the New World directly led to the import of massive quantities of precious metals into Spain from around 1500. In this paper, we use the synthetic control method – an increasingly popular and transparent statistical approach for data-driven case studies – to study the impact of the massive influx of silver and gold from the Americas to Spain's price level, GDP per capita, and GDP. We find that prices in Spain rose much more that if Spain had been a second-wave receiver of the precious metals. Income levels initially rose more than they would have, since the economy boomed during the initial stages of receiving the precious metals, but incomes became lower in the long run. We argue that the mechanism was a resource curse, which had both an economic (Dutch Disease) and political dimension. Our results also highlight the possibility that monetary forces can have distributional and permanent consequences in the long run.

## 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.

Abadie, A. (2021). Using synthetic controls: Feasibility, data requirements, and methodological aspects. *Journal of Economic Literature*, 59(2):391–425.

Abadie, A., Diamond, A., and Hainmueller, J. (2015). Comparative politics and the synthetic control method. *American Journal of Political Science*, 59(2):495–510.

Acemoglu, D., Johnson, S., and Robinson, J. (2005). The rise of Europe: Atlantic trade, institutional change, and economic growth. *American Economic Review*, 95(3):546–579.

Álvarez-Nogal, C. and Prados de la Escosura, L. (2013). The rise and fall of Spain (1270–1850). *The Economic History Review*, 66(1):1–37.

Álvarez-Nogal, C., Prados De La Escosura, L., and Santiago-Caballero, C. (2016). Spanish agriculture in the little divergence. *European Review of Economic History*, 20(4):452–477.

Becker, S. O. and Pascali, L. (2019). Religion, division of labor, and conflict: Anti-Semitism in Germany over 600 years. *American Economic Review*, 109(5):1764–1804.

Becker, S. O., Pfaff, S., and Rubin, J. (2016). Causes and consequences of the Protestant Reformation. *Explorations in Economic History*, 62:1–25.

Ben-Michael, E., Feller, A., and Rothstein, J. (2021). The augmented synthetic control method. *Journal of the American Statistical Association*, pages 1–34.

Berman, N., Couttenier, M., Rohner, D., and Thoenig, M. (2017). This mine is mine! how minerals fuel conflicts in Africa. *American Economic Review*, 107(6):1564–1610.

Bogart, D. and Richardson, G. (2011). Property rights and parliament in industrializing Britain. *The Journal of Law and Economics*, 54(2):241–274.

Bohn, S., Lofstrom, M., and Raphael, S. (2014). Did the 2007 legal Arizona workers act reduce the state's unauthorized immigrant population? *Review of Economics and Statistics*, 96(2):258–269.

Broadberry, S. (2021). The Industrial Revolution and the Great Divergence: recent findings from historical national accounting. *The Handbook of Historical Economics*, pages 749–771.

Broadberry, S., Campbell, B. M., Klein, A., Overton, M., and Van Leeuwen, B. (2015). *British economic growth, 1270–1870*. Cambridge University Press.

Brollo, F., Nannicini, T., Perotti, R., and Tabellini, G. (2013). The political resource curse. *American Economic Review*, 103(5):1759–96.

Brzezinski, A., Chen, Y., Palma, N. P. G., and Ward, F. (2022). The vagaries of the sea: evidence on the real effects of money from maritime disasters in the Spanish Empire. *Review of Economics and Statistics*.

Cameron, R. E. and Neal, L. (2016). *A concise Economic History of the World*. Oxford University Press.

Caselli, F. and Tesei, A. (2016). Resource windfalls, political regimes, and political stability. *Review of Economics and Statistics*, 98(3):573–590.

Cermeño, A. L. and Santiago-Caballero, C. (2020). All roads lead to market integration: lessons from a spatial analysis of the wheat market in 18th century Spain. Instituto Figuerola Working Papers in Economic History.

Chen, Y., Palma, N., and Ward, F. (2021). Reconstruction of the Spanish money supply, 1492–1810. *Explorations in Economic History*.

Chernozhukov, V., Wüthrich, K., and Zhu, Y. (2021). An exact and robust conformal inference method for counterfactual and synthetic controls. *Journal of the American Statistical Association*, 116(536):1849–1864.

de Jong, H. J. and Palma, N. (2018). Historical national accounting. In *An Economist's Guide to Economic History*, pages 395–403. Springer.

De La Croix, D., Docquier, F., Fabre, A., and Stelter, R. (2020). The academic market and the rise of universities in medieval and early modern Europe (1000-1800). *CEPR discussion paper*.

Drelichman, M. (2005a). All that glitters: Precious metals, rent seeking and the decline of spain. *European Review of Economic History*, 9(3):313–336.

Drelichman, M. (2005b). The curse of Moctezuma: American silver and the Dutch disease. *Explorations in Economic History*, 42(3):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.

Drelichman, M. and González Agudo, D. (2020). The gender wage gap in early modern Toledo, 1550–1650. *The Journal of Economic History*, 80(2):351–385.

Dupâquier, J. (1988). *Histoire de la population française*. Presses universitaires de France.

Elliott, J. H. (2008). *Empires of the Atlantic World*. Yale University Press.

Fukuyama, F. (2011). *The origins of political order: From prehuman times to the French Revolution*. Farrar, Straus and Giroux.

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

Grafe, R. (2011). *Distant tyranny*. Princeton University Press.

Hamilton, E. J. (1934). *American treasure and the price revolution in Spain, 1501–1650*. Harvard University Press.

Hastie, T., Tibshirani, R., and Friedman, J. (2009). Springer series in statistics. *The elements of statistical learning*.

Henriques, A. and Palma, N. (2022). Comparative European Institutions and the Little Divergence, 1385-1800. *Journal of Economic Growth*.

Henriques, A., Palma, N., and Reis, J. (2019). A bumpy ride: economic growth in Portugal from the Reconquest to the present. Unpublished manuscript.

Hough, J. F. and Grier, R. (2015). *The Long Process of Development*. Cambridge University Press.

Humphries, J. and Weisdorf, J. (2019). Unreal wages? Real income and economic growth in England, 1260–1850. *The Economic Journal*, 129(623):2867–2887.

Karaman, K. K. and Pamuk, Ş. (2010). Ottoman state finances in European perspective, 1500–1914. *The Journal of Economic History*, 70(3):593–629.

Karaman, K. K. and Pamuk, Ş. (2013). Different paths to the modern state in Europe: the interaction between warfare, economic structure, and political regime. *American Political Science Review*, 107(3):603–626.

Karaman, K. K., Pamuk, Ş., and Yıldırım-Karaman, S. (2020). Money and monetary stability in Europe, 1300–1914. *Journal of Monetary Economics*, 115:279–300.

Kedrosky, D., Palma, N., et al. (2021). The Cross of Gold: Brazilian treasure and the decline of Portugal. Competitive Advantage in the Global Economy (CAGE).

Kersting, F., Wohnsiedler, I., and Wolf, N. (2020). Weber revisited: The protestant ethic and the spirit of nationalism. *Journal of Economic History*, 80(3):710–745.

Krantz, O. (2017). Swedish GDP 1300-1560: A tentative estimate. *Lund University, Department of Economic History. Lund Papers in Economic History 152. Department of Economic History, Lund University.*

Malanima, P. (2011). The long decline of a leading economy: GDP in central and northern Italy, 1300–1913. *European Review of Economic History*, 15(2):169–219.

Márquez-Velázquez, A. (2019). Developing countries' political cycles and the resource curse: Venezuela's case. Discussion paper, Free University Berlin.

Martinez, L. R. (2019). Sources of revenue and government performance: Evidence from Colombia. *Available at SSRN 3273001.*

North, D. C. and Thomas, R. P. (1973). *The rise of the Western World: A new economic history.* Cambridge University Press.

Palma, N. (2020a). American precious metals and their consequences for early modern Europe. *Handbook of the History of Money and Currency*, pages 363–382.

Palma, N. (2020b). Historical account books as a source for quantitative history. In *History and Economic Life*, pages 184–197. Routledge.

Palma, N. (2022). The real effects of monetary expansions: evidence from a large-scale historical experiment. *The Review of Economic Studies*, 89(3):1593–1627.

Palma, N. and Reis, J. (2019). From convergence to divergence: Portuguese economic growth, 1527–1850. *The Journal of Economic History*, 79(2):477–506.

Palma, N., Reis, J., and Rodrigues, L. (2021). Historical gender discrimination does not explain comparative western European development: evidence from Portugal, 1300-1900. CEPR Discussion Paper No. DP15922.

Palma, N., Reis, J., and Zhang, M. (2020). Reconstruction of regional and national population using intermittent census-type data: The case of Portugal, 1527–1864. *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, 53(1):11–27.

Palma, N. and Santiago-Caballero, C. (2022). Patterns of Iberian economic growth in the early modern period. In *An Economic History of the Iberian Peninsula, 700-2000 (ed. Pedro Lains)*. Cambridge University Press (forthcoming).

Pfister, U. (2022). Economic Growth in Germany, 1500-1800. *Journal of Economic History.*

Prados de la Escosura, L. (2017). *Spanish economic growth, 1850–2015.* Springer Nature.

Prados de la Escosura, L., Álvarez-Nogal, C., and Santiago-Caballero, C. (2022). Growth recurring in preindustrial Spain: half a millennium perspective. *Cliometrica.*

Reher, D. (1990). *Town and Country in Pre-Industrial Spain: Cuenca, 1540-1870.* Cambridge University Press.

Ridolfi, L. and Nuvolari, A. (2021). L'histoire immobile? A reappraisal of French economic growth using the demand-side approach, 1280–1850. *European Review of Economic History*, 25(3):405–428.

Ross, M. L. (2015). What have we learned about the resource curse? *Annual Review of Political Science*, 18:239–259.

Schön, L. and Krantz, O. (2015). New Swedish historical national accounts since the 16th century in constant and current prices. *Lund University, Department of Economic History. Lund Papers in Economic History 140. Department of Economic History, Lund University.*

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

Van Zanden, J. L., De Moor, T., and Carmichael, S. (2019). *Capital Women: The European Marriage Pattern, Female Empowerment and Economic Development in Western Europe 1300-1800.* Oxford University Press.

van Zanden, J. L. and Van Leeuwen, B. (2012). Persistent but not consistent: The growth of national income in Holland 1347-1807. *Explorations in Economic History*, 49(2):119–130.

Vicens Vives, J. (2015). *Economic History of Spain.* Princeton University Press.

Vicente, P. C. (2010). Does oil corrupt? evidence from a natural experiment in West Africa. *Journal of Development Economics*, 92(1):28–38.

# Appendix (for online publication only)

## A Descriptive Statistics

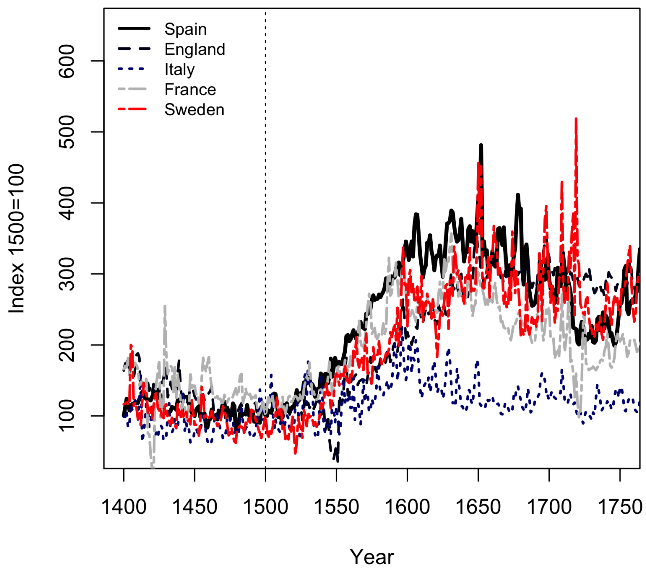



Figure A.1: Price level in silver - index 1500=100

*Notes*:Price level of Spain and the donor pool.

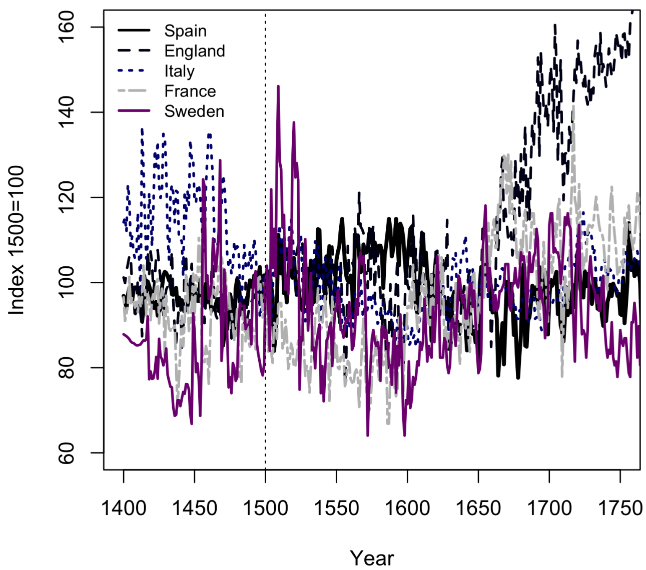



Figure A.2: GDP per capita 1990 G-K dollars- index 1500=100

*Notes*: GDP per capita of Spain and the donor pool.

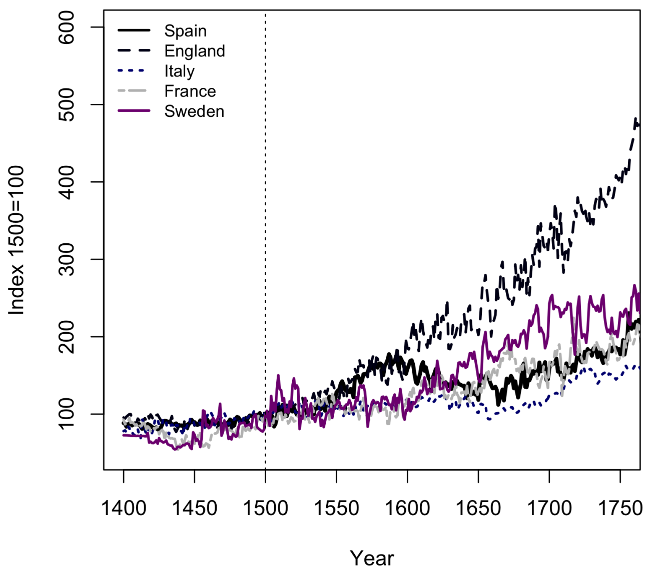



Figure A.3: GDP 1990 G-K dollars- index 1500=100

*Notes*: GDP of Spain and the donor pool.

# B Alternative time series for the Spanish GDP and GDP per capita

## B.1 Descriptive Statistics

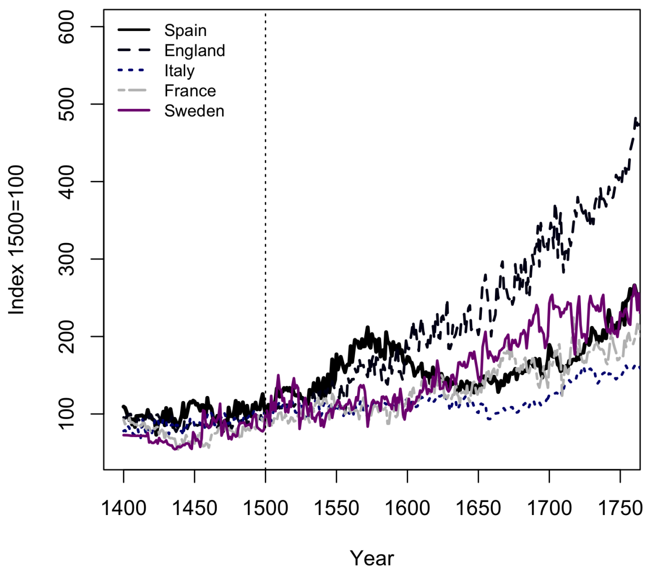



Figure A.4: GDP 1990 (alternative series) G-K dollars- index 1500=100

*Notes*: GDP of Spain (alternative series) from Prados de la Escosura et al. (2022) and the donor pool.

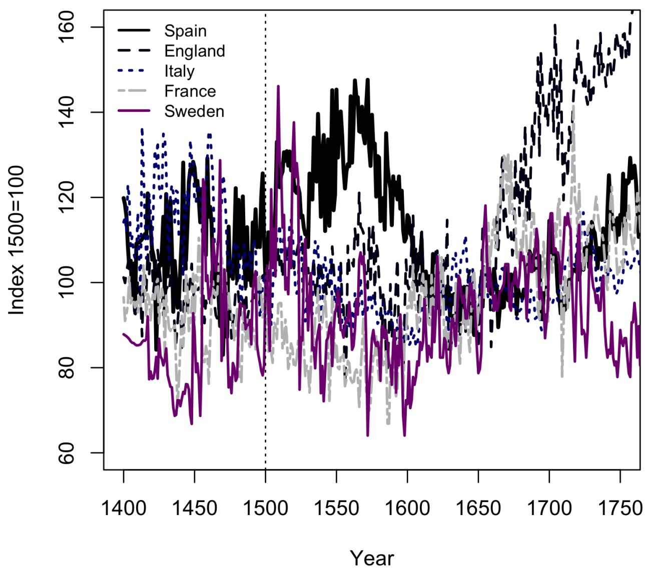
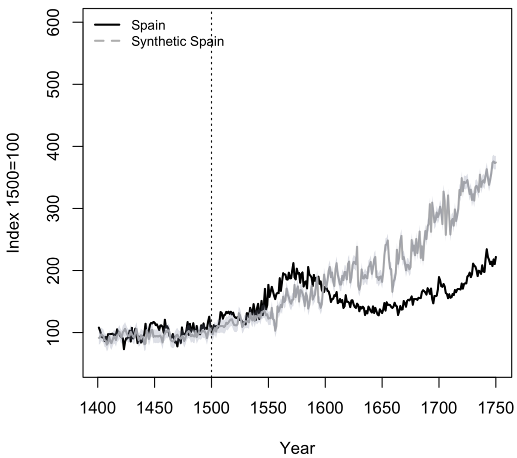



Figure A.5: GDP per capita (alternative series) 1990 G-K dollars- index 1500=100

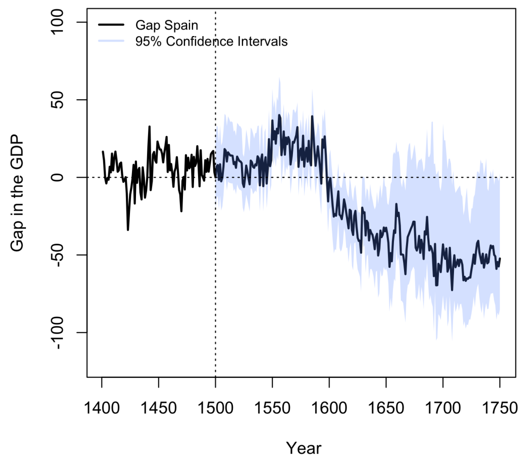
*Notes*: GDP of Spain (alternative series) from Prados de la Escosura et al. (2022) and the donor pool.

## B.2 Results

### B.2.1 GDP




(a) GDP




(b) Gap of the GDP

Figure A.6: Gap and the GDP (alternative series) 1990 G-K dollars - index 1500=100

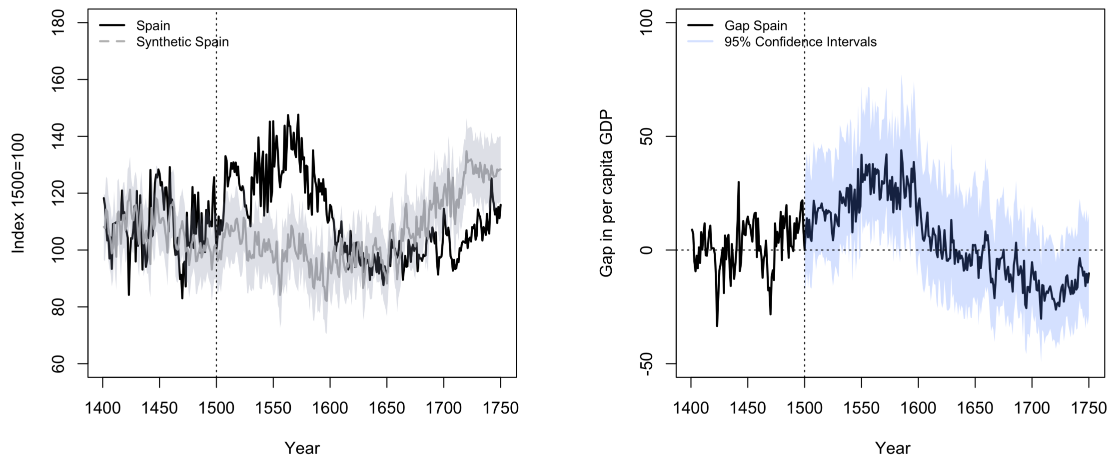
*Notes*: We used the Ridge Augmented Synthetic Control Method. The shaded area in the (a) figure is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period. The GDP index gap in figure (b) is defined as the difference between the observed price level index and the estimated counterfactual.

Table A.1: Country Weights

| **Countries** | **Weights** |
|---|---|
| England | 0.94 |
| France | 0.52 |
| Italy | -0.33 |
| Sweden | -0.13 |

*Notes*: Composition of the Doppelganger for GDP (alternative series) 1990 G-K dollars of Spain using a ridge augmented synthetic control method.

### B.2.2 GDP per capita




(a) GDP per capita

(b) Gap of the GDP per capita

Figure A.7: Gap and the GDP per capita (alternative series) 1990 G-K dollars - index 1500=100

*Notes*: We used the Ridge Augmented Synthetic Control Method. The shaded area in the (a) figure is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period. The GDP per capita index gap in figure (b) is defined as the difference between the observed price level index and the estimated counterfactual.

Table A.2: Country Weights

| **Countries** | **Weights** |
|---|---|
| France | 0.52 |
| England | 0.50 |
| Sweden | -0.01 |
| Italy | -0.01 |

*Notes*: Composition of the Doppelganger for GDP per capita (alternative series) 1990 G-K dollars of Spain using a ridge augmented synthetic control method.

# C Robustness Tests

## C.1 Price level

### C.1.1 In-time placebos

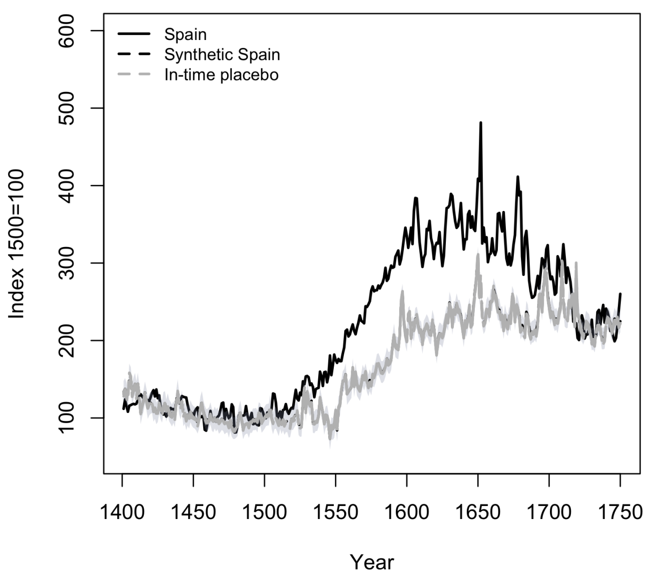



Figure A.8: In-time placebos for the Price level in silver - index 1500=100.

*Notes*: We used the Ridge Augmented Synthetic Control Method. The shaded area is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period.

### C.1.2 Leave-one-out placebos

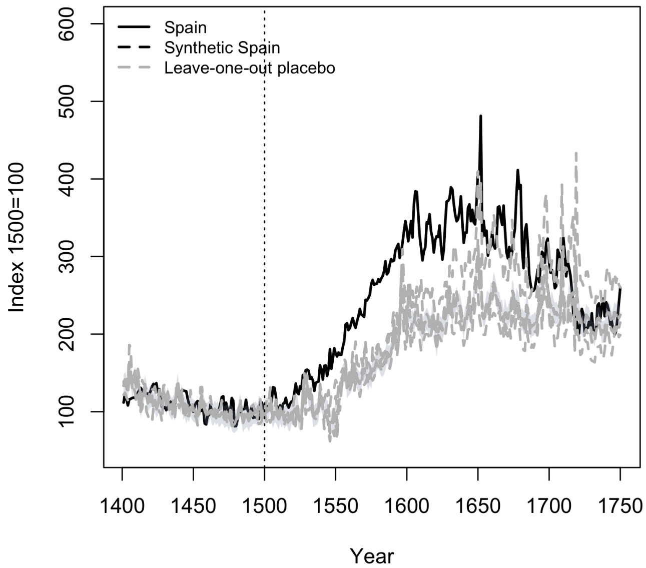



Figure A.9: Leave-one-out placebos for the Price level in silver - index 1500=100.

*Notes*: We used the Ridge Augmented Synthetic Control Method. The shaded area is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period.

### C.1.3 Including Portugal

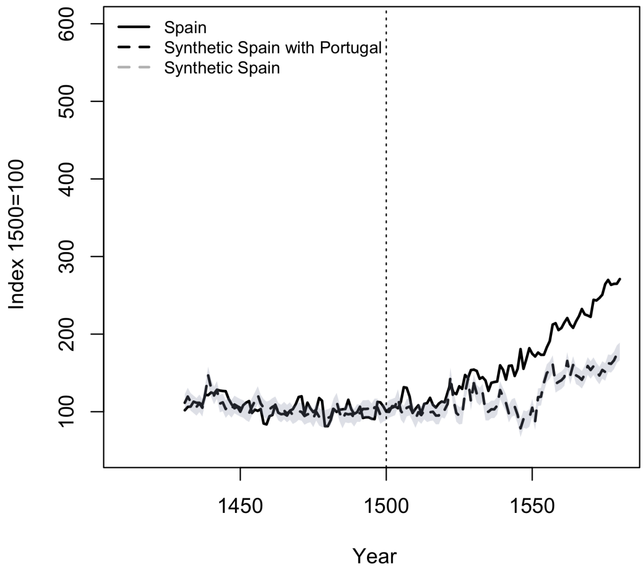



Figure A.10: Robustness test for the Price level in silver - index 1500=100.

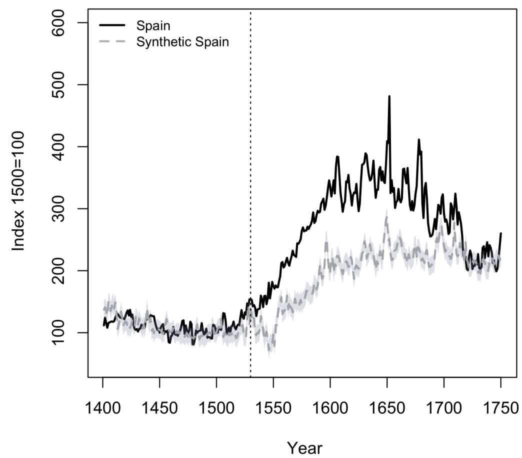
*Notes*: We used the Ridge Augmented Synthetic Control Method including Portugal in the donor pool. The pre-treatment period is between 1430 and 1500, and the post-treatment period is between 1501 and 1580. The shaded area is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period.

Table A.3: Country Weights

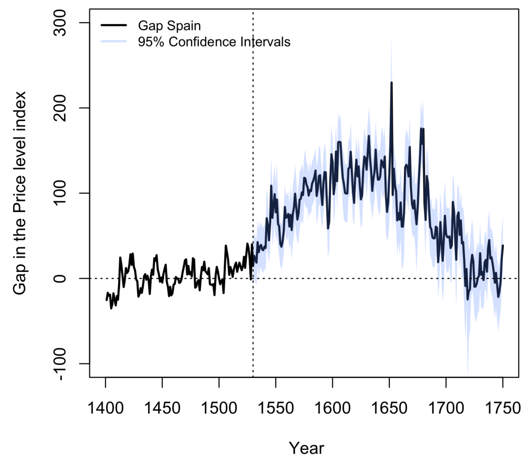
| **Countries** | **Weights** |
|---|---|
| Portugal | 0.32 |
| England | 0.41 |
| France | 0.07 |
| Sweden | 0.21 |
| Italy | -0.01 |

*Notes*: Composition of the Doppelganger for the Price level of Spain including Portugal in the donor pool.

### C.1.4 Treatment period starting in 1530




(a) Price level in silver




(b) Gap of the Price level

Figure A.11: Gap and the Price level in silver - index 1500=100

*Notes*: We used the Ridge Augmented Synthetic Control Method. The treatment period is 1530. The shaded area in the (a) figure is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period. The price level index gap in figure (b) is defined as the difference between the observed price level index and the estimated counterfactual. The country weights are England 0.44, Italy 0.034, France 0.38, and Sweden 0.14.

## C.2 GDP per capita

### C.2.1 In-time placebos

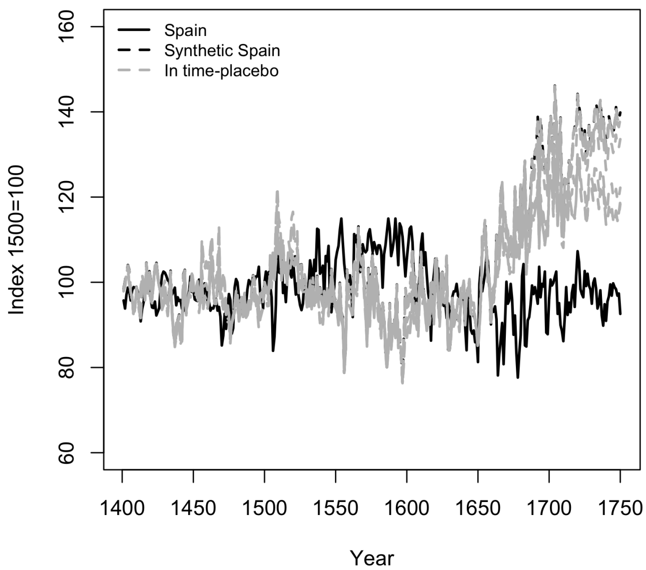



Figure A.12: In-time placebos for the GDP per capita 1990 G-K dollars - index 1500=100.

*Notes*: We used the Ridge Augmented Synthetic Control Method. The shaded area is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period.

### C.2.2 Leave-one-out placebos

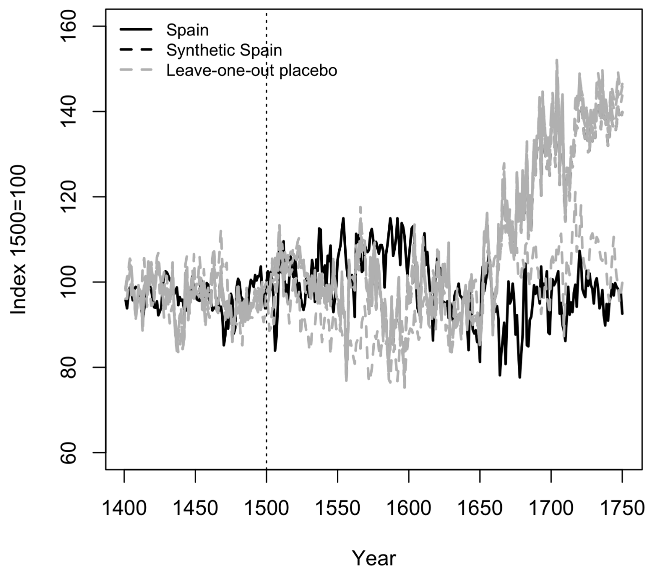



Figure A.13: Leave-one-out placebos for the GDP per capita 1990 G-K dollars - index 1500=100.

*Notes*: We used the Ridge Augmented Synthetic Control Method. The shaded area is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period.

### C.2.3 Including Portugal

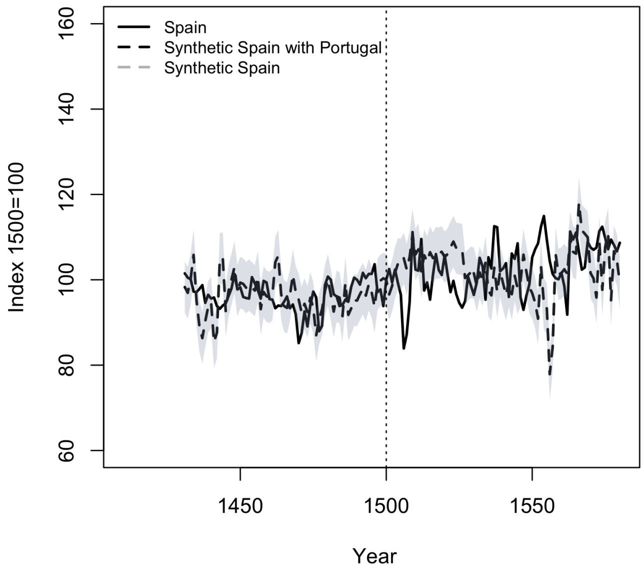



Figure A.14: Robustness test for the GDP per capita 1990 G-K dollars - index 1500=100.

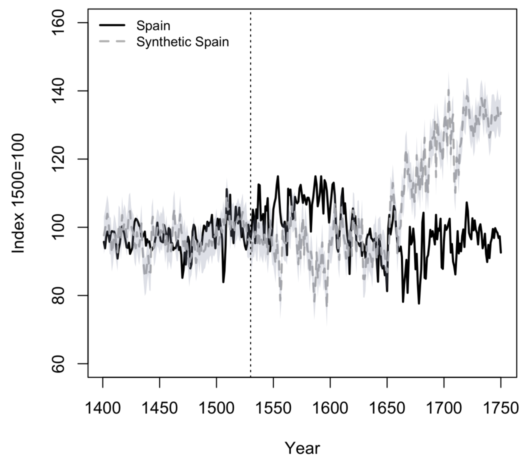
*Notes*: We used the Ridge Augmented Synthetic Control Method including Portugal in the donor pool. The pre-treatment period is between 1430 and 1500, and the post-treatment period is between 1501 and 1580. The shaded area is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period.

Table A.4: Country Weights

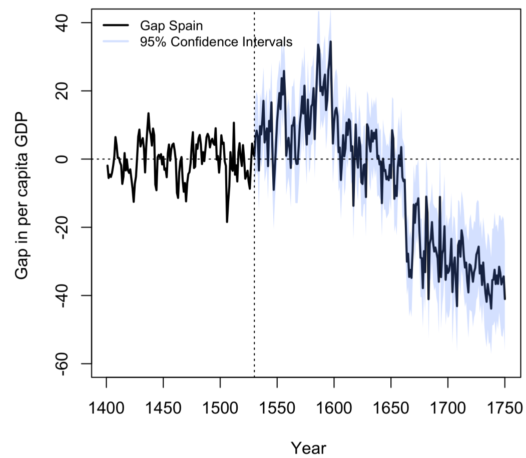
| **Countries** | **Weights** |
|---|---|
| Portugal | 0.05 |
| England | 0.87 |
| France | -0.00 |
| Sweden | 0.06 |
| Italy | 0.02 |

*Notes*: Composition of the Doppelganger for the GDP per capita 1990 G-K dollars of Spain including Portugal in the donor pool.

### C.2.4 Treatment period starting in 1530




(a) GDP per capita




(b) Gap of the GDP per capita

Figure A.15: Gap and the GDP per capita 1990 G-K dollars - index 1500=100

*Notes*: We used the Ridge Augmented Synthetic Control Method. The treatment period is 1530. The shaded area in the (a) figure is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period. The gap in per capita GDP in figure (b) is defined as the difference between the observed GDP per capita index and the estimated counterfactual.

The country weights are England 0.45, Italy 0.13, France 0.43, and Sweden -0.01.

## C.3 GDP

### C.3.1 In-time placebos

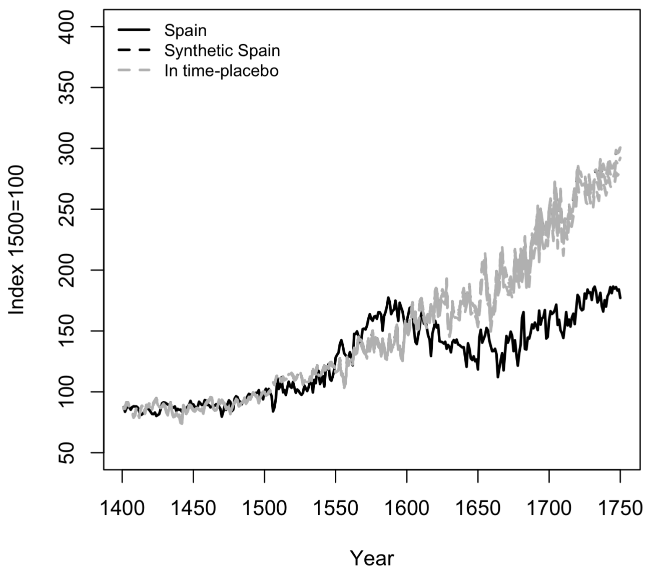



Figure A.16: In-time placebos for the GDP 1990 G-K dollars - index 1500=100

*Notes*:We used the Ridge Augmented Synthetic Control Method. The shaded area is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period.

### C.3.2 Leave-one-out placebos

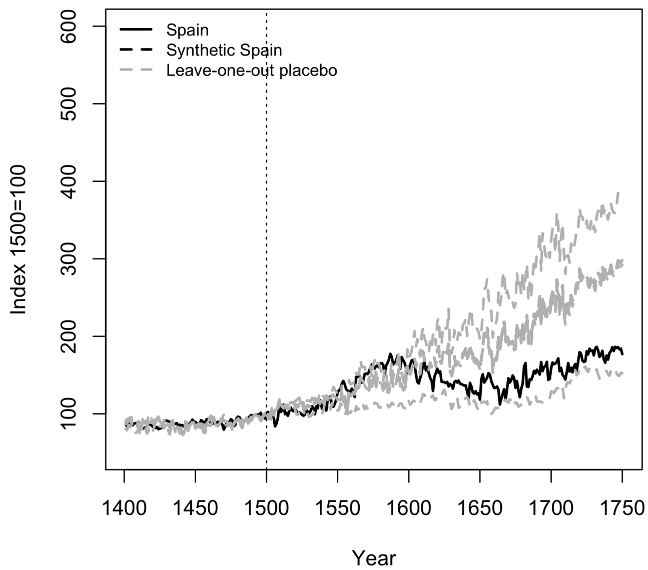



Figure A.17: Leave-one-out placebos for the GDP 1990 G-K dollars - index 1500=100

*Notes*: We used the Ridge Augmented Synthetic Control Method. The shaded area is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period.

### C.3.3 Including Portugal

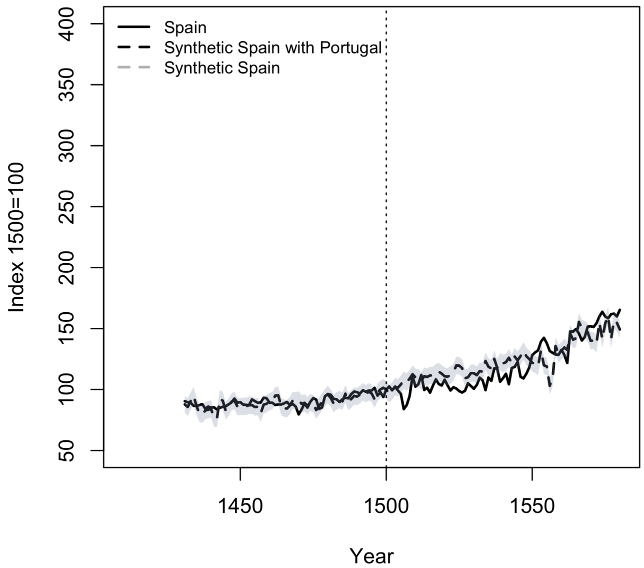



Figure A.18: Robustness test for the GDP 1990 G-K dollars - index 1500=100.

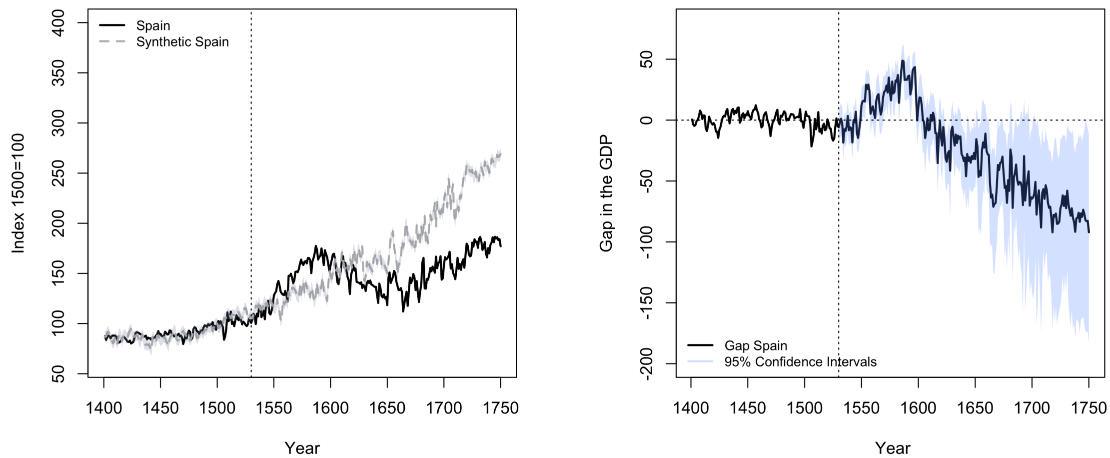
*Notes*: We used the Ridge Augmented Synthetic Control Method including Portugal in the donor pool. The pre-treatment period is between 1430 and 1500, and the post-treatment period is between 1501 and 1580. The shaded area is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period.

Table A.5: Country Weights

| Countries | Weights |
|---|---|
| England | 0.73 |
| Portugal | 0.30 |
| Sweden | 0.00 |
| France | -0.02 |
| Italy | -0.01 |

*Notes*: Composition of the Doppelganger for the GDP 1990 G-K dollars of Spain including Portugal in the donor pool.

### C.3.4 Treatment period starting in 1530




(a) GDP

(b) Gap of the GDP

Figure A.19: Gap and the GDP 1990 G-K dollars - index 1500=100

*Notes*: We used the Ridge Augmented Synthetic Control Method. The treatment period is 1530. We incorporate the annual population growth rate and pre-treatment outcomes as covariates. The shaded area in the (a) figure is one standard deviation of the difference between the outcome of interest and the estimated counterfactual during the pre-treatment period. The gap in GDP 1990 G-K dollars in figure (b) is defined as the difference between the observed GDP index and the estimated counterfactual.

The country weights are England 0.60, Italy 0.23, France 0.07, and Sweden 0.10.

# D Hyper-parameter selection

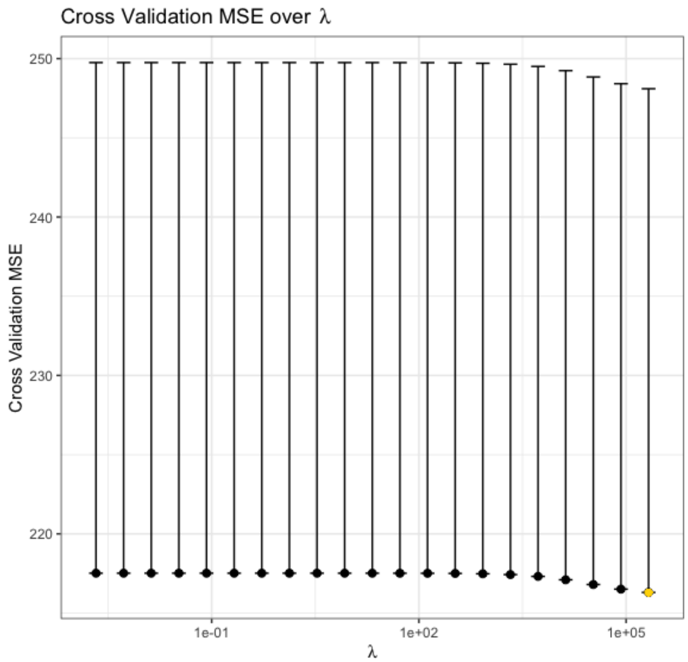



Figure A.20: Cross validation of the mean squared error (MSE) - Price level in silver

*Notes*: We selected the maximum value of the lambda with MSE within one standard deviation of the minimum MSE.

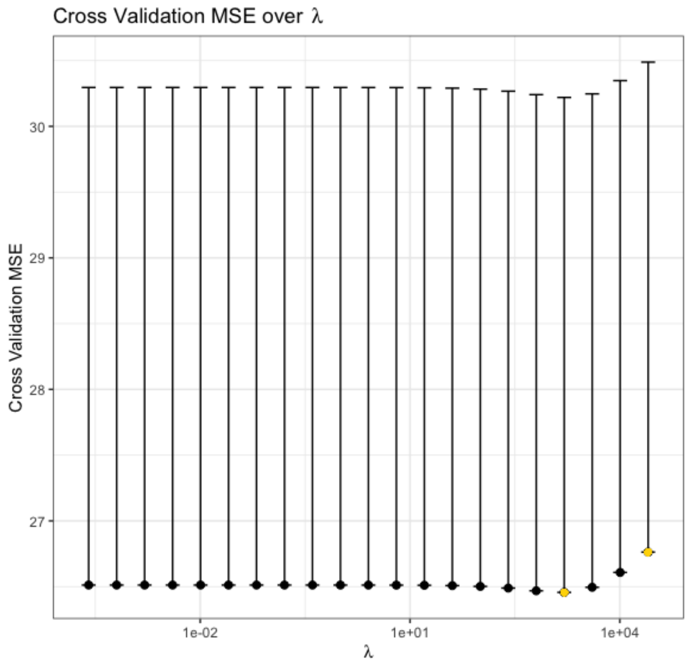



Figure A.21: Cross validation of the mean squared error (MSE) - GDP

*Notes*: We selected the maximum value of the lambda with MSE within one standard deviation of the minimum MSE.

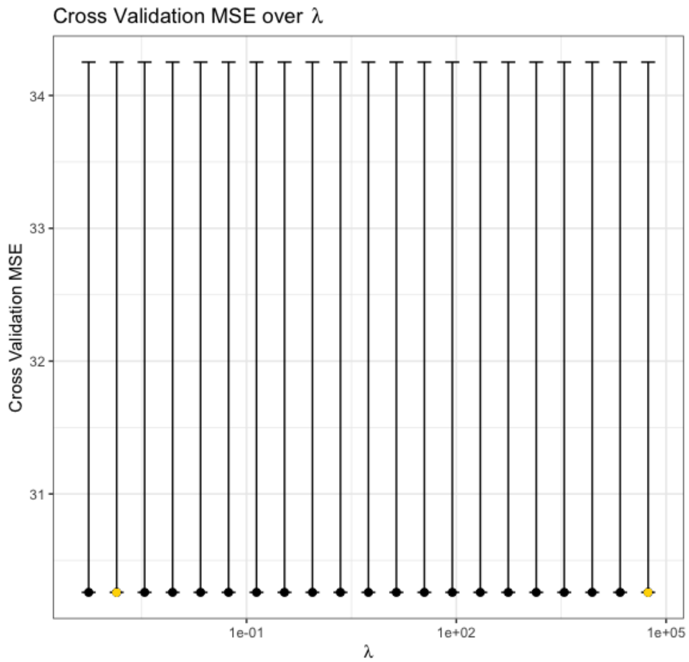



Figure A.22: Cross validation of the mean squared error (MSE) - GDP per capita

*Notes*: We selected the maximum value of the lambda with MSE within one standard deviation of the minimum MSE .