# Regimes of Fiscal and Monetary Policy in England during the French Wars (1793-1821)[1]

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**Abstract**

The French Wars (1793-1815) forced unprecedented coordination between fiscal and monetary authorities and a revolution in the role of the Bank of England. Using hand-collected data, this analysis of the fiscal and monetary policies at that time, and of their impacts on the price of the pound in the internal and the external markets, highlights how the steady overarching commitment to fiscal balance led to the extraordinary success of a flexible implementation of this principle in four sharply defined regimes between 1793 and 1821, "tax-smoothing as usual" (1793-1797), "Real Bills and war tax" (1797-1810), "whatever it takes" (1810-1810), "exit" (1815-1821).

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# I. Introduction

The French Wars of 1793-1815 were the culmination of the Second Hundred Years' War between Britain and France that began after the Glorious Revolution. Three previous episodes—the War of the Austrian Succession (1740-48), the Seven Years' War (1756-63) and the American War of Independence (1776-83)—had provided the English authorities with opportunities to perfect the tools of parliamentary monitoring, debt financing in a developed market, tax servicing of long-term redeemable annuities, and liquidity management by the Bank of England. These tools, however, were not sufficient to meet the unprecedented fiscal and financial shocks of the French Wars. For the first time since 1688, debt financing had to be supplemented by a war tax, and the convertibility of the notes of the Bank of England had to be suspended.

The critical feature of English fiscal and monetary policy during this period was that these deviations from previous practice were part of a commitment to a long-term policy: the war would be paid by future taxes, and the convertibility would be resumed with no change of the parity. Coordination between fiscal and the monetary policy was essential for success. In augmenting liquidity by an unprecedented amount, rather than by seignorage, the Bank of England's credibility rested upon the expectation of a resumption of convertibility of its notes. At times these commitments were subject to discussion and uncertainty, but eventually they prevailed. The emergencies of the war induced a crucial evolution of the Bank of England, from the private role that it had played on behalf of its stockholders and the holders of government bonds to its public role as lender of last resort.

While referring to some of the abundant writing on the period, we highlight for the first time a contrast between the overarching commitment to eventual fiscal and price stability, and the variations in the implementation of this principle through four sharply defined regimes between 1793 and 1821, the year of the resumption of the convertibility.

During the first regime (1793-97), policies were the same as in the previous wars. This was natural, since the extraordinary expenditure that would be necessary was not anticipated. But events forced a change of course and led to the second phase of the war (1797-1810), suspension of the gold standard, and the introduction of Britain's first income tax.

This second regime is of special interest because of the Real Bills policy of the Bank of England. Its balance sheet more than doubled but its public securities stayed constant with respect to the real growth of the economy. All of the extraordinary expansion was driven by the discounting of private bills. In the Real Bills regime, the Bank discounted bills that financed goods in process. New notes issued by the Bank were backed by real assets rather than government securities, which were supported only by future taxes. When the demand for credit decreased—and the goods in process were sold—the notes and the discounts would be reduced *pari passu*.

The credibility of the Real Bills regime was reinforced by a fiscal policy that ran, in the middle of the war, a primary surplus of about 3 percent. A similar regime had been implemented during the first phase of the assignats in France, as shown by Sargent and Velde (1995), and there was much discussion of that experiment in England at the beginning of the 19th century. By charting changes in the prices of goods, in the foreign exchange rate, and in the domestic silver price of the pound, we show that this policy was successful.

We also emphasize that during this regime, what can be called the monetary base—the sum of notes and deposits at the Bank of England and of the coins—did not expand as much as some previous studies claimed. This was a time of a progressive transition from coins to paper money, accelerated by the suspension of gold convertibility and the depreciation of the pound. The Bank of England temporarily provided notes of one and two pounds to substitute for the absence of circulating coins when the pound depreciated.

After 16 years of war, a further expansion of military expenditures induced a new regime, which, using modern terminology, we call the "surge": policy reverted to debt financing and the commitment to the resumption of convertibility again began to be the subject of debates. The Bank of England switched from private discounting to the purchase of government short-term bills. These purchases, however, accounted for only a fraction of government deficits. The change of policy had a strong impact on the price of the pound, with matching evolutions in the foreign exchange and in the agio.

The six years between Waterloo and the resumption in 1821 of convertibility at 1797 parity are a remarkable instance of what is now known as an exit strategy—and may be relevant to some of the policy issues after the recent financial crisis or within the eurozone. The short-

term government assets on the balance sheet of the Bank were repaid by issuing long-term bonds backed by future taxes. The balance sheet of the Bank in 1821 looked remarkably similar to that of 1797 and its overall size with respect to the economy was about the same. The price level, which had increased somewhat during the war years, albeit much less than the circulation of notes, had returned to the 1797 level.

At the end of the Restriction, the intertemporal fiscal balance had restored the price level as in a textbook case of the Fiscal Theory of the Price Level (Cochrane 2019). However, the extraordinary success of the grand scheme of fiscal balance and monetary accomodation depended on the feasibility of the post-war deflation. In this respect, the structure of the economy—where the agricultural sector was still dominating at that stage of the industrial revolution— and the political circumstances—less than 2 percent of the population could vote—provided a favorable context.

## II. Setting the stage: Monetary and fiscal policy 1730-1792

The Bank of England was not a central bank in the modern sense.[1] It had been created in 1694 as a private financial institution to facilitate government financing of the new parliamentary regime at the beginning of what would turn out to be the so-called "Second Hundred Years' War" against France.[2]At the time of its creation, it was assigned two functions, the provision of liquidity and the operational guaranteeing of the government's long-term annuities of which it held a large proportion. These annuities were funded by earmarked taxes, which necessitated Parliament's *ex ante* assent. The Bank's Foundation Act[3] prevented it from lending directly to the government by discounting short-term bills. The Bank was thus protected against any government attempt to bypass the parliamentary process by seeking direct Bank funding. The Act and the mediation of bond holdings through an institution generated a coalition of bondholders against possible government default and thus helped to lower the borrowing cost for the government (North and Weingast 1989). The East India Company (created in 1700) and the South Sea Company (created in 1711) served a similar

[1] It was not nationalized until 1946.

[2] Buffington, 1929.

[3] 5 and 6 William and Mary, c.10.

function of mediation and representation, in addition to other activities. The share of these three companies in the national debt remained at almost 60 percent in the 1720s. As the public debt became very large, this share fell below 40 percent in the 1730s, and gradually declined to about 15 percent in the 1760s (Quinn 2008). After winning its struggle against the challenge of the South Sea Company, which overbid for government bonds in the South Sea Bubble, the Bank established itself as the main debt-holder and the principal institution representing the interests of bondholders. This representation bolstered its independence from the government, both in defense of the pound and against any reduction in the profits of bondholders. Throughout the wars of 18th century, it maintained the convertibility of its notes at the parity of £4.25 per fine ounce that had been set by Isaac Newton.

The representation of bondholders by the Bank against the government, representing taxpayers, was exemplified during the two attempts to reduce the interest on the national debt. Such a reduction of the coupon was not a default, because it rested on the willingness of bondholders to convert their redeemable bonds. However, a coalition of bondholders insisting on a cash redemption instead of the conversion could block the reduction and the institutions facilitated this coordination. In 1737, when most of the stock of the debt was at 4 percent, the government tried to reduce the coupon but lost the coordination game through poor strategy. In 1750, despite the resistance of the Bank and other institutions (Dickson 1967), the then Prime Minister, Henry Pelham, won the game because of a better strategy and the Bank of England's smaller share in the debt (Chamley 2011). The entire debt was reduced to the 3 percent redeemable perpetuals that from 1752 onwards were referred to as "consols".

During the 18th century, the Bank's interactions with the Treasury changed, as short- rather than long-term debt became their primary concern. The Bank's operational guarantee of the government's long-term annuities became less important. At the end of the French Wars, the Bank's share of the public debt fell to less than 2 percent. The already usual practice of advancing funds for Exchequer bills without parliamentary authorization or funding was explicitly legalized as soon as Britain went to war in 1793.[4] We will see that until 1810, the government did not make much use of the possibility to discount government bills with the Bank and the expansion of the Bank's notes was primarily driven by the discount of private securities. In the last phase of the war, after 1810, the government borrowed massively from

[4] 33 Geo. III, c. 32.

the Bank, driving the latter's balance sheet expansion.

The three major wars between 1740 and 1790 had been financed according to a "modern" principle of tax smoothing (Barro 1979, 1987; Chamley 1985). Each expenditure surge was financed by long-term bonds funded by earmarked taxes, which were voted by parliament for debt service (Brewer 1988; Nye 2007). Each war thus led to a higher plateau of commodity taxes. In peace time, the debt-to-GDP ratio decreased, through budget surpluses and economic growth, as shown in Figure 1.

FIGURE 1

The Debt-to-GDP Ratio and the Primary Deficit/Surplus: 1740-1830

We will see that at the beginning of the French Wars, Pitt the Younger favored issuing new debt at a rate higher than 3 percent against the wishes of the financial interests. This debate had historical precedents. The 1749 interest reduction had been stimulated by the simultaneous reduction of the large 4 percent debt from previous wars. The Seven Years War began in 1756 with no such debt overhang. In order to avoid later difficulties, the 4 percent bonds (about 40 percent of the new war debt), included a clause that reduced the coupon to 3 percent after 1781. During the American war (1776-83), the consol had become the main instrument for newly issued debt. The gradual shift of the debt financing towards 3 percent bonds in the course of the three main wars of the 18th century is summarized in Table 1.

By the end of the American War, the public debt had grown to 150 percent of GDP. A few months after the Treaty of Paris in 1783, William Pitt the Younger became Prime Minister at age 24. In this position, which he combined with that of Chancellor of the Exchequer, he was the driving force behind the regime of fiscal and monetary policy during his first tenure until 1801, and his second, from 1804 to 1806 when he died in his office. His personal integrity and his steadfast insistence on fiscal rigor had a major impact on the credibility of the fiscal and monetary policy that was essential during the French wars. He immediately renewed the commitment to a "Sinking Fund" of £1 million per year, a separate account which was established for the repurchase of government bonds. Such a commitment, 10 years before the French Wars, established a tradition on which policy makers could lean later in the war.

Table 1: Composition of the deficit financing in three wars[5]

| | Austrian (42-49) | Seven Years (56-63) | American (76-84) |
|---|---|---|---|
| TOTAL | 29.2 | 63 | 75.5 |
| Loans (coupon rate) | | | |
| 3% | 21.9 % | 35.7 % | 63 % |
| 3.5% | | 7.1 % | |
| 4% | 69.2 % | 41.6 % | 37 % |
| Life annuities & others | 8.9 % | 15.6 % | |

During the decade after the American war, market expectations could be evaluated by the difference between the premium of the 4 percent annuity over the 3 percent annuity which is equal to the present value of the payments of the additional coupon, namely one pound, as long as the 4 percent is not redeemed. Following previous experience in the 18th century, that redemption would take place either gradually through the flow of budget surpluses, or on the entire stock of the 4 percent annuities when the interest rate would be stable at its peace level around 3 percent, as mentioned above. The premium depended therefore on the expectation about future interest rates and budget surpluses. Since fiscal policy was driven at the time solely by military expenditures, the premium provided, in the fiscal regime of 18th century England, an indication about the expectations of future military expenditures.

At the beginning of 1784, a decline of the long-term interest rate back to 3 percent was expected to be too far in the future to have an impact on the price of the 4 percent: it was nearly equal to four thirds of the 3 percent, with a premium of 25 between the prices of the two annuities. At the beginning of the summer of 1791, the long-term interest rate had decreased to 3.5 percent (with a consol price of 85), but the premium was still around 20. In the next

[5]The numbers include the refinancing of short-term debt (e.g., navy bills) at the end of war.. For the Austrian War, the total is from Grellier (1812), p. 190, 217. For the composition of the deficit during this war, see Chamley (2011) and the referenced sources. For the Seven Years War, the numbers are the differences of the components of the debt in Grellier 1810, p. 240, 260, 261. For the American War, the numbers are the amounts raised in the years 1776-84 (Grellier 1810, 1812). Some of the debts were refinanced during or shortly after the wars. Deficits are smaller than increases of the debt because some bonds were issued below par.

few months however, it was cut in half as the market reacted strongly to the revolutionary turmoil in France that completely disorganized the administration and the army: regular tax revenues collapsed, inflation was taking off with the expansion of the *assignats*. The market reflected the views of contemporary observers that the events in France would durably weaken its strategic position, and that for England a new era of peace was coming.

FIGURE 2

Long-term interest rate: ratio between 3 and the price of the consols

## III. The three regimes during the French Wars

### *A. The first regime: tax-smoothing as usual (1793-1797)*

On 20 April 1792, the French National Assembly declared war on the Austrian emperor, Francis II. The rapid increase of the premium of the 4 percent over the 3 percent showed that the financial market anticipated the entry of England that took place the following year.[6] At the beginning of the war, policy makers, like most people, did not anticipate the *levées en masse* in France, nor the rise of an obscure captain with the name of Bonaparte, so there was no reason to alter the course that had been followed in all the previous wars, that is: a tax-smoothing policy with debt finance.

Pitt "based his financial policy (...) on the assumption that the conflict would be over relatively soon." (Cooper 1982, p.96). He insisted that the new debt should be issued with a high coupon, to be converted or refinanced soon after the war when the interest rate would be lower. In 1794, the prices of the 3 percent and the 4 percent were 67.7 and 83.8, respectively. With this price difference of 16, Pitt's preference for the 4 percent is consistent with expecting of a short war and therefore the continuation of the tax-smoothing policy of the previous wars.[7]

[6]Between April and December 1792, the consol fell from 95 to 78 and the premium of the 4 percent over the 3 percent doubled from 7 to 14 (Figure 2).

[7]Under a refinancing policy as in 1749 (Chamley 2011), the 4 percent is less costly for an interest reduction in less than 12 years. Of course, the war lasted much longer than expected. The long-term interest rate exceeded 4 percent in any year before 1822.

Pitt was opposed by the "money men" who argued for the 3 percent.[8] They may have been motivated less by expectations about a long war than by the procedures for issuing new loans in which they played a critical role (see the extensive discussion in O'Brien 2006, pp. 4-38). Eventually, Pitt yielded[9] and the consol (at 3 percent) became the dominating instrument for the loans of the French Wars.[10]

As borrowing increased over the years in size and in frequency, the price of consols gradually declined. In 1797, it reached an all-time low of 51 which, with a coupon of 3 percent, corresponds to a market yield of 6 percent (Figure 3). Bonaparte, now a general, crushed the armies of the Habsburg in Italy and his march on Vienna was stopped only by a peace treaty. Military expenditures surged to nearly 20 percent of GDP, a level that was matched only in the final two years of the French Wars (see below). The primary deficit reached 9 percent of GDP, four times its highest level in any other war. The first regime of tax smoothing had become unsustainable. The change in policy would be triggered by a bank run.

FIGURE 3

Prices of 3 percent consols, 1755-1830

### *B. The second regime: suspension, real-bills and war tax (1797-1810)*

The second regime began in 1797 with a bank run in February, and its two components were gradually established in the course of the year. On the monetary side, the Bank suspended the gold convertibility of its notes and expanded their quantity by discounting private securities

[8]The expression of "money men" is from Dickson (1987) who emphasized their role in the development of debt financing in England.

[9]For 1793, Grellier (1812 p. 57), reported: "It was originally intended to have raised the loan on 4 or 5 percent stock; but, the embarrassed state of commercial credit having caused a scarcity of cash, the minister received offers from one set of subscribers only; and, as they preferred 3 percent, it was judged expedient to conclude the bargain in that stock, on the above terms, which were between 4 percent and 5 percent under the market-price. The minister [Pitt] admitted that the terms of the loan were much more disadvantageous than might have been expected; but that, having done every thing in his power to excite a competition among the moneyed men without effect, they were the best he could procure."

[10]Table 3 in the appendix presents the long-term loans issued during the French Wars.

in a real bills regime. On the fiscal side, war taxation replaced the tax-smoothing and deficit financing of the first regime.

*The suspension of the convertibility*

In the first phase of the war, the Bank had been anxious to maintain the convertibility of its notes into gold at the price that had been set by Isaac Newton in 1717. The market price of gold had hardly diverged from the mint price during the previous three wars, and through the pyramid of deposits, convertibility helped to maintain the stability of the entire monetary system. Here, the private interests of the Bank's stockholders and the long-term national interest had coincided. But now divergences began to appear regarding short-term policies. The Bank warned the government against loans to the Austrian Emperor, and tensions grew over the discounting of public short-term bills, which the Bank repeatedly tried to limit (Grellier 1810, p.381).

Between 1794 and 1796, the Bank's bullion reserves fell by two thirds. In February 1797, a run on country banks spread rapidly through the North-East of England and reached London amid rumors of French invasion (Fetter 1965, p.21). On Saturday, February 23, the consol was down to 50 1/4. The Bank claimed to have lost nearly a million in specie during the past week, leaving it with £ 1.3 million in bullion, for a circulation of approximately £ 10 million.[11] That Sunday, the suspension of the convertibility was decided in a crisis meeting between the Governors and Pitt, and it was announced the next day.

In this national emergency, bankers and merchants all over Britain declared that they would support the new payment system and public credit by accepting the Bank's inconvertible notes in their transactions. To reach a broader public, these declarations were published in the press bearing the signatures of hundreds of leading business houses. The business community reinforced the acceptability of money for transactions—the essence of the value of money—facilitating a smooth transition from convertible money to inconvertible paper money (Shin, 2015). Moreover, the Bank's notes became receivable in the payment of taxes. The suspension was ratified in Parliament by the Bank Restriction Act (May 3, 1797),[12] which

[11] At that time, the Bank did not target a particular coverage ratio. Governors of the Bank declared that the safe level of bullion reserves depended on economic and political circumstances (Clapham 1944).

[12] 37 Geo. III, c. 45.

authorized the suspension for a short period of time, until June 24.

After the suspension, in the new regime of the "Restriction", the financial turmoil subsided quickly: the consol jumped from 50 1/2 to 52 1/2; the Bank saw its metallic reserve improving rapidly (Clapham 1944, Vol. I, p.272), and it was ready to resume convertibility (Feavearyear, 1963, p.190). But it was opposed by the Prime Minister who appears to have had great foresight about the new policy regime. It has been cogently argued that by taking the lead on the suspension, Pitt allowed the Bank to signal its soundness freely by its request to restore convertibility.[13] A new parliamentary act, on June 22, extended the suspension to the next session of parliament, and on November 30, Parliament mandated that the "Restriction was further continued until one month after the conclusion of the war by a definite treaty of peace" (38 Geo. III, c. 3).[14] Eight further limited extensions would follow until the resumption in 1821. However, none of them stated a parity for the resumption. These limited extensions, in the context of military uncertainty, reinforced the credibility of the commitment to resume convertibility.[15] We will see below that the market value of the pound remained fairly stable.

*The regime of Real Bills*

After the Suspension, the Bank focused on maintaining liquidity in the short-term credit and on preventing rises in the short-term rate. This policy led to a large increase of its notes, which was further required by the substitution of paper money for coins during this period (see below). But the increase in notes was *not* generated by purchase of government short-term securities. Figure 4 shows the levels of the main assets in the balance sheet of the Bank, with the ratio between the holding of public securities and a trend real GDP scarcely changing. The increase of the notes was entirely driven by the growth of private securities.[16]

[13]See *The North American Review* (unsigned) 1867, p.399.

[14]Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments, Journal of the House of the Lords, 1819. Vol. 52, p.342ff.

[15]See in the Journal of the House of the Lords, the entry for May 7, 1819 (pages 342 and following) that provides an enlightening summary of the sequence of the parliamentary acts and actions of the Bank of England with respect to its gold reserves.

[16]The sharp increase for the year 1810 is due to the intervention of the Bank in the financial crisis of that year.

FIGURE 4

Public and private assets held by the Bank of England

The management of the Bank knew that it was implementing a Real Bills regime. New notes issued by the Bank were backed by real assets representing commercial transactions of the highest quality.[17] When the demand for credit decreased and the goods in process were sold, the notes and the discounts would be reduced *pari passu*. In theory, such a regime should not be inflationary and that was the Bank's position.[18]

The Real Bills regime of 1797-1810 can be compared to the first phase of the assignats in France, 1790-1793. The assignats were initially created against the real counterpart of the national domains that had been confiscated. During that phase, the assignats were issued first in large denominations, then in small notes that could be used as currency, with no significant impact on the price level. Inflation started only when the pressure of war financing and the collapse of regular tax revenues led to a quantity of assignats well in excess of their real counterpart (Sargent and Velde 1995). The spectacular inflation from the end of the Terror's price control in 1794 until the end of the experiment in February 1796 was very present in the discussions of policy makers and economists in Britain. But the context was completely different. Taxes had not collapsed. On the contrary, they had been increased to generate a primary surplus (as shown below), and the Bank's notes issue during this second regime were not the result of direct lending to the government.

Although the Bank was a private institution, because of its central place in the banking system of England, the sum of its deposits, notes, and of the coins, can be used as a measure of the monetary base. After the suspension of the convertibility, the circulation of coins began to fall. This withdrawal was small at first because the value of the pound was steady until 1800. The Bank actually redeemed some notes in gold. However, contemporaries reported

[17] Discounters had to be introduced by large shareholders, or directors, of the Bank. Their bills were examined by a committee. The internal checks kept losses on discounted bills negligible (Clapham 1944, vol.II, pp.12-15).

[18] Report from the Select Committee on the High Price of Bullion; witness evidence by John Whitmore and John Pearse, Governor and Deputy Governor of the Bank of England; p.123.

that by 1810 coins had vanished from circulation. And not only because the value of the pound was below par: it was a time of economic changes, in England and in other counties, and one of these was the substitution of paper money for coins.[19] The business leaders' announcement immediately after the suspension that they would accept the Bank's notes was possible because of this trend—and reinforced it.

In order to alleviate the shortage of coins, the Bank started to issue small denomination notes, of one and two pounds. Hence, the sum of the deposits and notes overstates the expansion of the monetary base.[20] We therefore make an adjustment by subtracting notes of one and two pounds. These small denomination notes were issued only during the time of the Restriction. We also adjust for the real growth of the economy and deflate all amounts by an index of real GDP (Broadberry *et al.* 2011). The evolution of the adjusted monetary base is shown in Figure 5. The small denomination notes are also presented as a fraction of the sum of deposits and all notes. With these corrections, the monetary base did not increase by more than 30 percent at its peak, and much of the increase was due to the rapid expansion in the first years of the Real Bills regime.

FIGURE 5

Adjusted money supply (Bank of England)

The Real Bills policy was validated by the prices of the pound in the internal and the external market, shown in Figure 6, with prices normalized to 100 in January 1797. The external exchange rate is measured by the rate in Hamburg, which is available for the entire span of the French Wars.[21] No gold prices are available between 1805 and 1809,[22] so for the pound's

[19] In the initial phase of the assignats, when there was no inflation, banks stepped in to intermediate between the assignats of high denomination and smaller deposits (Sargent and Velde 1995.)

[20] An example is found in Bordo and White (1994).

[21] In Hamburg, the reference currency was the shilling that was defined in silver. Britain was on a bimetallic standard until April 1816, when the gold standard was adopted by the Coinage Act of 1816, 56 Geo. III, c. 68.

[22] Antipa (2016).

internal value—which was fixed in terms of gold and silver—we give silver prices that we collected from Castaing's Course of the Exchange. This increases the number of available bi-weekly observations for the Restriction Period (1797-1821) by a third. During most of the Real Bills regime, and especially between 1803 and 1810, the pound did not loose more than 5 percent of pre-suspension value. The 10 percent loss in 1801-02 has been ascribed by prominent contemporary economists to particularly bad harvests (Thornton 1802, pp.214; Tooke 1824, vol.I, pp.213-225).

FIGURE 6

The prices of the pound–exchange rates into silver, gold, and Hamburg Schilling

*War taxation and commitment to long-term fiscal balance*

The price of the consols had stopped to decline after the suspension of the convertibility but they remained at a discount of almost 50 percent for the rest of 1797 (Figure 3). The previous low had been 55, in 1784, but that was at the end of the American War—a war that England had lost.[23]

In November 1797, Pitt proposed a general tax on income "in order to prevent the depreciation of national securities."[24] A year later, Parliament voted Britain's first income tax. The tax was announced as a war tax, to be abolished at the end of the war. It meant a radical departure from the traditional strategy of funding wars by borrowing (O'Brien 1988, pp. 12-13 and 20-22; Daunton 2001, pp.43-45.)

There are two reasons to see the income tax as a war tax that departed from tax-smoothing. First, in the context of political economy, the tax met with strong opposition because it was targeted at the rich. It passed only because of the national emergency and the expectation that once this had passed, it would be abolished. That was the case during the short-lived

[23]It was the only time in the 18th century when the long-term rate in England was at the same level in as in France. It is common to view the lower rates in England as a sign of the higher credibility of a parliamentary institution. One may also argue that these low rates may be related to the fact that, except for the American war, England won all its wars. As pointed by Sussman and Jaffee (2006), the Austrian empire benefited from low rates in the Amsterdam market.

[24]Hansard's Parliamentary Debates, Vol. 33, pp. 104 ff.

Peace of Amiens (March 1802 to May 1803), when the primary surplus became a deficit. But in 1803, the Prime Minister, Addington, introduced an improved version of the tax. A year after the British victory at Waterloo, the tax was definitively abolished.

The second reason for seeing the tax as a departure from tax-smoothing is the time profile of the primary surplus. The new tax proved very productive, especially in its improved form after 1803, generating, in the peak years, 18 percent of total revenues, about the same amount as customs. As shown in Figure 7, the average levels of expenditures were about the same in the first and the second regimes, but the primary surplus ranged between 2 and 4 percent in each year from 1804 to 1811. Under a tax-smoothing policy in wartime, a positive primary surplus of that size requires the anticipation of a significant increase of expenditures and a primary deficit in the future. There was a surge of expenditures in the final years of the war, but the primary deficit remained moderate at around 2 percent.

FIGURE 7

Fiscal aggregates in the four regimes

The commitment to eventually pay for the war by taxation only, without seignorage, was reinforced by preserving the sinking fund during the war years of large fiscal deficit in spite of higher borrowing costs. Gladstone criticized, in 1854, the practice of "continually buying up stock at 3, 4, or 5 per cent below the rate at which you were simultaneously creating stock in order to find the money to make the purchase".[25]

The policy innovations implemented in 1797—departing from the gold standard and the tax-smoothing approach—proved effective in reversing the depreciation of public securities. Figure 8 illustrates the success of the second regime. Each war is represented by a segment between two points. The first depicts the debt-to-GDP ratio on the ordinate and the long-term interest rate (beyond the 3 percent consol) on the abscissa at the beginning of the war. The second point displays the debt-to-GDP ratio at the end of the war and the interest rate's highest value during the war.[26] The segments thus make it possible to gauge how changes in the debt-to-GDP ratio in the previous wars affected interest rates on public debt. Since 1740,

[25] Silberling (1924a), (1924b).

[26] In each case, interest rates fell towards the end of the war thanks to expectations of the return of peace.

each war had brought a higher debt-to-GDP ratio and a higher long-term interest rate. By 1797, the interest rate on British public debt had reached 6 percent— before the most intense of the war began. The point for the year 1818 represents the debt-to-GDP ratio in that year and the highest long-term interest rate after 1797. Despite increase the debt-to-GDP ratio increasing to 2.6 during the Restriction, the interest rate never reached its peak of the first regime (Figure 3).

FIGURE 8

Debt levels and long-term interest rates in four wars

### *C. Third regime: the surge (1811-1815)*[27]

In May 1809, Napoleon was beaten for the first time on the continent in the Battle of Aspern-Essling but the alliance led by Austria and Britain against France was decisively defeated at the Battle of Wagram in July 1809. Spain began to revolt in May 1808. By the end of 1810, Wellington had made good progress in the Iberian Peninsula, from which he started a long march that would lead him to final victory.[28]

We date the third regime of the French Wars from around the end of 1810, when the Bank introduced into its balance sheet a report of the Exchequer bills that it was purchasing to support their price. The third regime was to be characterized by a resumption of deficit financing of war, and the replacement of the Real Bills policy by an active support of the price of short-term government bills in the credit market.

#### *A debt-financed expenditure surge*

Although the exact limits of taxable capacity were hard to know, the widespread feeling was that revenues had reached a limit (Acworth 1925, p.38). New taxes had been introduced and the rates on existing taxes had been increased. The British had become one of the most

[27] This third regime was interrupted by the short-lived peace between the First Treaty of Paris (signed 30 May) and the resumption of hostilities during Napoleon's return (between March and July 1815).

[28] Knight (2013) provides a superb and detailed account of the British efforts during the French Wars.

heavily taxed people in Europe (O'Brien 1988, p.4). But the annihilation of the *Grande Armée* in Russia in the Fall of 1812 significantly raised the expected return on military expenditures. In this context, the debt financing of the expenditure surge appeared rational.

Between 1811 and 1815, debt issues rose from £12m to £49m, peaking at 11.7 percent of GPD (Table 3 in the appendix). Yields increased from 4.4 percent in 1810 to 5.1 percent in 1813. They did not reach the level of the first regime because the policy was different. Deficit finance now relied also on short-term bills (last three columns of Table 3) which were issued in anticipation of tax incomes and took the form of Navy, Transport, Victualing and Exchequer bills, a fraction of which was backed by earmarked taxes. Exchequer bills—by far the most common public short-term bill—had a maturity of not more than one year and new issues were often used to retire outstanding bills. In the surge years, annual short-term debt issues represented an average of 31 percent of total government income. [29]

While short-term debt issues increased in scale, the yield that the Treasury had to pay on them remained remarkably stable, as can be seen in the last column of Table 3 because the Bank was free from the contraints of the convertibility and switched its discounting from private to government bills.

*The Bank of England policy: "whatever it takes"*

The main feature of the third regime is the Bank' determination to do "whatever it takes" to keep the price of the exchequer bills above the par.[30] This was not announced in the fanfare of a speech,[31] but the financial backstop provided by the Bank was common knowledge. Figure 4 shows the substitution from private to public bills in the balance sheet of the Bank after 1810.

The effectiveness of the new policy is illustrated in Figure 9.[32] During the Real Bills regime, the price of Exchequer bills hovered around the par because of the actions of the Bank in the

[29] Public Income and Expenditure (1869) and authors' calculations.

[30] Exchequer bills carried a daily interest of 3.5 pence per day. A rough estimation for an annual equivalent interest rate is 5.3 percent.

[31] Unlike the commitment of Mario Draghi, president of the European Central Bank, in a speech in London on July 26, 2012, to sustain the prices of the governments bonds of troubled countries.

[32] Using newly collected daily prices.

market for private securities and the substitutability in the market between private and public securities. From around 1810 Exchequer bills were quasi-systematically priced at a premium.

This policy of the Bank was the first explicit price support of government securities by the Bank of England. It may be compared to the price support policies during World War II when the Federal Reserve pegged the ninety-day Treasure bills at 3/8 of a percent (Woodford 2001) from April 1942 to June 1947. The Federal Reserve also supported the price a twenty-five-year Treasury bonds at 2.5 percent. Of course in the early 19th century, the structure of capital markets, of institutions, and of the economy were different and the Bank of England did not intervene in the price of long-term bonds which could be as low as 60 percent of the par.

FIGURE 9

Price of Exchequer Bills in the London Money Market and Funding Operations

The price support of the Exchequer bills could be achieved only because of the large purchases by the Bank (Figure 4). Since its foundation, the Bank had advanced funds against bills on the security of the malt and land taxes sanctioned by Parliament. The Exchequer then gradually reimbursed the Bank upon the reception of tax revenues (Philippovich 1911, p. 110). In the decisive phase of the war, the level of issued bills remained approximatively the same as in the previous two regimes, except for a short period after Napoleon's final defeat when the war-related malt tax was abandoned along with the income tax.[33]

Starting in 1810, the books of the Bank record the new policy by making a distinction between the previously described bills, now called *issued* bills and the *purchased* bills that were acquired to support their market price. When issuing a new batch of bills, the Government Broker would first ask agents in the money market about their reservation price. Whenever that price was below par, as happened when the warfare and the financial pressure intensified, the Bank would buy these bills at face value and would not resell them later to the market.[34]

[33]Data before 1810 are taken from the Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments of 1819, appendix 5, p.492.

[34]Report from the Secret Committee, appendix 3, p.489.

FIGURE 10

The Bank's holdings of Exchequer bills

The data shown in Figure 10, newly collated by us, demonstrates the large expansion of the *purchased* bills during the decisive last years of the war, when the Bank advanced an average of £14m each year. Advances peaked in the autumn of 1814 at £26m or roughly 6.5 percent of GDP. This is to be compared to an average of below £4m for the first two phases of the wars. The short-term unfunded debt was of course rather larger than the Bank's holding of the short-term bills. Between 1811 and 1815, the Bank held about half of the unfunded debt (Figure 11).

FIGURE 11

The share of short-term government debt held by the Bank

Contemporaries were well aware that the Bank's purchases of bills reduced the probability of a self-fulfilling refinancing stop of the short-term public debt.[35] The risk for the Bank was very small. Either the government would refinance the short-term debt by long-term bonds issued on future taxes or there would be a devaluation of the currency, in which case the nominal liabilities of the Bank would be reduced *pari passu*. Beginning in 1811, legal directives mandated that the Bank's notes be accepted in payment of any sort of debt.[36]

The Bank's support of the Exchequer bill price and the supply of liquidity had of course an impact on the market for private short-term credit. London banks could offer terms that were better than the 5 percent rate at the Bank for the discounting of private bills.[37]

*Debt-management: from the short to the long end*

Supporting the price of Exchequer bills was helped by refinancing operations into long-term

[35]Report from the Secret Committee; testimony of Samuel Thornton.

[36]Lord Stanhope's Act or 51 Geo. III, c. 127.

[37]Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments, 1819; testimony of George Dorrien.

bonds that were funded on specific taxes approved by the Parliament. These operations, which could not wait for the end of the war, are represented in Figure 9 by vertical lines proportional to their respective amounts. They became larger and more frequent when the war intensified after 1808. For the surge years, funding operations accounted on average for 24 percent of long-term debt creation.[38]

While *ex ante* parliamentary authorization and earmarked taxes were necessary for issuing standard long-term debt, parliament *ex post* intervention occurred only to sanction the creation of long-term debt through funding operations. If bills were converted into four or five percent bonds during war-time, they also became convertible into three percent perpetuals (consols) with the return of peace. Since these conversions potentially reduced the Government's interest costs, they were never opposed in Parliament. Investors appreciated funding operations as much. Holders of convertible bills decided freely whether or not to accept the conversion of the bills into long-term bonds and operations were often oversubscribed.[39] The Bank stood ready to cash the bills of those holders not willing to convert. The frequency and size of funding operations contributed to effectively stabilizing the market price of Exchequer bills, as shown in Figure 9.

## IV. The Real Bills doctrine versus the Bullionist view

Since 1797, the price of goods had been increasing (Figure 12).[40] Although Britain was leading the Industrial Revolution, the agricultural sector still dominated the economy and had a strong influence on other prices, as can be seen in the GDP deflator spike in the years of bad harvest, 1802 and 1813-14. The war considerably limited the supply of goods, particularly due to Napoleon's Continental blockade of 1806-09 and the American Embargo of 1807-09.[41] Real shocks affected commodity prices outside Britain, and many contemporaries

[38]Report by the Secretary and Comptroller General of the Proceedings of the Commissioners for the Reduction of the National Debt, 1891. We only consider funding operations in Exchequer bills. A total of £19 m Navy, Transport, and Victualing bills were funded in 1794, 1795, and 1796. Afterwards, funding operations only concerned Exchequer bills.

[39]Report from the Select Committee on the Manner of Funding Exchequer Bills, 1810.

[40]They had started increasing in the first years of the war, well before the suspension.

[41]Crouzet (1964), Frankel (1982).

believed that prices were being significantly affected by these.

Figure 12

Price indices (1797=100)

The variation of prices caused many discussions by policymakers and economists, and led to the Bullion Committee and its Report (Cannan 1919). These discussions began before the Bank switched from the regime of Real Bills to that of doing "whatever it takes" to support the prices of the Exchequer bills. The policy debate set proponents of Real Bills against the Bullionists who followed the Quantity Theory.[42] According to the former, which included the Bank of England, real disturbances (war restrictions, crops and fund transfers) induced price increases.[43] The Bullionists, who included David Ricardo,[44] argued that the devaluation of the pound was caused by the Bank's excessive issuing of notes. These opposed views had implications for the resumption of convertibility. If prices increased mostly because of temporary war shocks, then they would decrease once the shocks had passed, and convertibility should be resumed at the parity of 1797. The Bullion Committee's analysis rested on a relation between the Bank's note issue, the money supply, and changes in prices along the lines of the Quantity Theory. The Committee recommended resumption of the gold standard over two years, but policymakers decided not to implement this recommendation until a final decision was made in 1819.

Another important price to observe is that of the pound in the internal market for gold and in the foreign market in Hamburg. In 1809, the pound's internal and external value began depreciating (Figure 6). This was due to two factors. The first is the market expectation about the future fiscal policy and the value of the pound when convertibility was resumed. In this respect, the public debate that led to the Bullion Report may have had an adverse impact. The second factor is the level of expenditures by Britain on the continent.[45] With

[42]For a normative analysis of the two views within the context of overlapping generations models, see Sargent and Wallace (1982).

[43]See Gayer et al. (1953).

[44]Ricardo's position was also that the convertibility should be resumed at the same parity but that an one time capital tax should be levied to reduce the government debt.

[45]Neal 1991, pp.197-198

perfect capital markets, the first factor should dominate. Expenditures in precious metal on the continent or subsidies could be financed by letters of credit.[46] Given our lack of information on market imperfections, the impact of that second factor is difficult to evaluate. Expenditures on the continental British army rose steadily from a negligible amount in 1807 to a maximum of about £16m in 1813.[47] In addition, subsidies to allies amounted to £8m in 1813 and peaked at 10m in 1814, by which time army expenditures had started to fall. The data of Sherwig (1969) is reproduced in Figure 13.

Figure 13

Expenditures on the continental army and subsidy payments to the allies (£)

The previous evidence on prices, the actual increase of the monetary base, the context of war and the discussions about fiscal policy cast doubt on the findings of previous studies which side with the Bullionist view.[48] We believe that the market valuation of the pound was mainly affected by fiscal policy and the composition of the balance sheet of the Bank rather than expansion of notes (Wallace 1981, Sargent 1982, Chamley and Polemarchakis 1984, Sims 1994, and Woodford 2001).

# V. Exit

## *A. Fulfilling the promise*

The professed objective of the exit strategy was the return to the "old normal". Three issues therefore dominated policy debates during the exit phase: the budget surplus, conversion of short- into long-term debt, and resumption of the gold standard. The first called for fiscal retrenchment and was achieved relatively easily. During the war, military expenditures charges had accounted for almost two-thirds of the annual total. As these fell from 20 to 5

[46] In the second half of the 16th century, the metal to pay the army of Philip II in Flanders was raised in Flanders, or in nearby places of trade, by Genoese bankers who had established a triangular system of credit between Spain, Flanders and Italy (Álvarez-Nogal and Chamley 2019.)

[47] In1812, United Kingdom GDP was around £330M. Defense spending amounted to £54m.

[48] Bordo and Schwartz (1981), Bordo and White (1991).

percent of GDP after Waterloo, the primary surplus jumped to more than 9 percent (Figure 7). Budget surpluses continued for the century to come and reduced the debt-to-GDP ratio to 25 percent on the eve of World War I (Crafts 2014).

The second issue for policymakers was the conversion of short- into long- term debt. Funding operations were undertaken in 1815, 1818 and 1820, giving the newly converted debt an explicit tax backing. The three funding procedures during this exit phase increased taxpayers' future liabilities by 3, 9 and 2 percent of one years' GDP, respectively.

Funding operations had to include the loans from the Bank. One of the essential elements of the "grand scheme" during the Restriction was that the Bank should improve the liquidity of the credit market by advancing funds against future incomes, for both private and government bills. Private discounts fell almost immediately to their 1793, pre-war level (Figure 4). This was the Real Bills doctrine at work, as these were paid back to the Bank. The private discount business also contracted due to the post-war recession that was aggravated by deflationary policies either implemented or merely announced.

However, the Bank's holding of public securities increased after 1816. The abolition of war-related malt taxes along with the repeal of the income tax in this year obliged the government to go on borrowing short-term after the end of the war. So much so, that an average of 40 percent of public revenues originated in the issue of short-term debt between 1815 and 1821.[49]These securities were not intended to provide war finance. If the loans from the Bank were to be considered as real assets and not seignorage, they needed to entail claims on future tax revenues from the government. The formal link to these revenues was established by converting the bills the Bank had purchased into long-term bonds funded by specific taxes. So quite naturally, the Bank insisted that resuming the gold standard was possible only if the government reimbursed a substantial amount of debt.[50]

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Four years after the end of the war, good progress had been made on the balance sheet of the Bank of England but the "old normal" had not yet be reestablished (Table 2). When the resumption of convertibility at the old parity was firmly decided in 1819, the market

[49]Chisholm Report, vol.I, pp.202-224 and vol.II, pp.8-50, authors' calculations.

[50]Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments of 1819.

Table 2: Balance sheets of the Bank of England (summaries)

| Assets | 1797 | | 1815 | | 1819 | | 1821 | | Liabilities |
|---|---|---|---|---|---|---|---|---|---|
| Bullion | 12.9 | 51.6 | 10.3 | 103 | 13.8 | 89.6 | 39.8 | 76.2 | Circulation |
| Public Securities | 50.9 | 31.4 | 97.7 | 46.1 | 84.9 | 22.6 | 54.8 | 19.7 | Deposits |
| Private Securities | 36.3 | 17 | 71.2 | 30.1 | 27.4 | 14 | 12.9 | 11.6 | Capital/earnings |
| Total | 100 | | 179 | | 126 | | 108 | | Total |

All the balance sheet items for all years are first normalized such that the total level of assets in 1797 is equal to 100. Then the items in 1815 and 1821 are divided by 1.32 and 1.52, respectively, which are the constant compound growth rate of real GDP from 1797 to these years, respectively (Broadberry et al. 2015 and authors' calculations). Likewise for the year 1819.

immediately set the internal price of gold at its 1797 value. But the actual implementation had to wait for another two years. First, in order to restore the balance sheet of the Bank to a state comparable to that before suspension, Parliament ordered a government reimbursement to the Bank of £10m short-term securities.[51]. Second, the price level was still 25 percent above the 1797 value and it was subject to an agricultural shock.[52] Finally, when the convertibility was actually resumed, on May 1, 1821, the overall balance sheet of the Bank and its short-term loans to the government had been restored to pre-suspension levels (Table 2), and a large bullion reserve had been built up as a precaution after the reimbursement of private securities.[53]

### *B. Monetary and fiscal contraction: political economy and redistributive effects*

The successful resumption of convertibility was greatly helped by the post-war fiscal retrench-

[51] 59 Geo. III, c. 76.

[52] The price indices that have been computed in the modern time were not available in the early 19th century. However, people could observe agricultural price shocks.

[53] The Bank's bullion reserve increased substantially. In order, to rebuild its stock in view of resuming convertibility, the Bank bought gold at a loss.

ment and the deflation that was induced by a fall in aggregate demand. For example, without the wartime demand for ammunition, the metal industry's output fell by 15 percent between 1815 and 1816 (Broadberry et al. 2012). The slump included the textile sector, too, as exports to the war-ridden continent declined. The postwar depression of 1816-17 was further magnified by substantial demobilization and winter unemployment in agriculture (Acworth 1925). The unemployment rate rose to the unprecedented level of 17 percent, from an average of 5 percent for the period 1770-1815 (Feinstein 1998). By the end of 1817, numerous country banks had gone bankrupt and deflation further contributed to harming the real economy; prices had fallen 16 percent since their suspension peak in 1814 (Gayer et al. 1953).

The Birmingham School of currency reformers, including Thomas Atwood, considered that the deflation caused by the return to the old parity was the cause of England's economic difficulties and of the successive crises, which shook its social and political structure at that time (Atwood 1816). Thus, they advocated paper money—or at least a reduction in the metallic content of the pound—and an important increase in the Bank's note circulation (Checkland 1948, Fetter 1965). On 13 April 1816, when the suspension of convertibility was reiterated for the first time after hostilities had ceased, *The Times* reported that the proprietors of the Bank had considered the possibility of never resuming cash payments.

The harshness of the downturn was politically admissible because of the political organization of Britain at that time. The right to vote in parliamentary elections or become a Member of Parliament was linked to property requirements, and only 1.5 percent of the population were registered to vote. The electoral system provided no representation of low-income subjects who were most affected by the situation and the "remedies" applied to it.

Owners of the public debt were well-off and had a strong interest in the real appreciation of the nominal debt through deflation. Public debt certificates came only in large denominations. Consols and Exchequer bills were not issued for sums under £100. In 1819, yearly average salaries ranged from £39 for farm laborers to £219 for highly paid government officials.[54] but consols and Exchequer bills were not issued for sums under £100. This guaranteed an important intersection between creditors of public debt on the one hand, and MPs and registered voters on the other.[55]

[54]Lindert and Williamson (1983).

[55]Johnston (2013).

Politicians aimed to return to the "old normal" in terms of redistribution as well. The income tax—paid exclusively by the affluent—was abolished in 1816, wartime increases in the excise—paid by the less well-off on domestically produced goods and services—were maintained. Taxation became more regressive while remaining high,[56] as shown in Figure 7 (Regime 4).

The suspension of the gold standard had afforded advantages to merchants and industrialists at the expense of landholders and public creditors. "The wealth was taken in part from those who did not actively employ it, and given to those who did; but whatever increase to the general riches was thus effected, was at the expense of injustice to those classes whom it was the duty of the legislature to protect".[57]

The new Corn Laws induced a redistribution toward landholders by imposing severe restrictions on imported corn and other cereals that formed the basis of the diet of the poor. As long as British corn prices remained below a given threshold, imports of foreign wheat were prohibited,[58] and the pervasive deflation before and after the resumption of the gold standard meant that the threshold was never reached, so British producers remained free from international competition.

It was argued in mercantile and industrial circles that the law would raise wages and thus reduce exports. The urban poor resented the law as a *pacte de famine* between the landed aristocracy and the administration. When popular discontent took to the streets, repression ensued. In particular, following the "Peterloo Massacre"—a demonstration for parliamentary reform in August 1819 that cost the lives of at least 15 people—the government acted to prevent any future disturbances by introducing the so-called Six Acts. These attempted to censor radical newspapers, prevent large meetings, and reduce what the government saw as the possibility of armed insurrection.[59] In a system characterized by limited political representation, social upheaval was repressed without political cost.

[56] Daunton (2001), pp.47-57.

[57] Hansard HL Deb 21 May 1819 vol 40 cc 640-641.

[58] Hilton (1977), pp.6-7.

[59] The Combination Acts of 1799 and 1800 had made trade unions and collective bargaining illegal. *Habeas Corpus* the principle requiring that a person under arrest be brought into court in order to safeguard prisoners against unlawful detentions was suspended in 1817 (57 Geo. III, c. 3).

# VI. Conclusion

Britain's fiscal and monetary policy during French Wars of 1793-1821 is only one data point in the set of past policies. We leave it to others to draw lessons for the present time but we can emphasize four points. The main point standing out is the force of a strong commitment to fiscal balance when the budget is subject to an extreme shock. That commitment was repeatedly emphasized through various means, (*e.g.*, short-term extensions of the suspension, repurchase of the debt through the sinking fund with some additional cost on the budget, war taxation, no discount of public securities until the last phase of the war). A remarkable consequence of the credibility of the fiscal commitment is that it provided some freedom for the practical implementation of the policies that had to adapt to unexpected shocks.

The Bank, free from the constraint of the gold standard and under the protection of the fiscal commitment, to which it contributed by the implementation a Real Bills policy instead of the discounting of public securities was able to provide sufficient liquidity and interest rates that were moderate in the context of the greatest war that Britain had experienced. The experiment does not contradict the view that the composition of the balance sheet of the Central Bank may matter more than the total amount of its liabilities and that the impact of monetary policy is strongly dependent on the commitment to fiscal balance. That is an issue which is currently debated.

In the last four years of the war, when the war pressure was the most intense, the Bank replaced the Real Bills policy by a price support of the short-term government bills and that policy was very successful in keeping the interest rate in the short-term credit market below 5 percent. Here too the fiscal commitment was reaffirmed through large refinancing operations of Exchequer bills that issued long-term bonds funded through earmarked taxes with parliamentary sanction.

The fourth point is about the resumption of the convertibility of the pound. The explicit commitment came only in 1819—it had only been implicit before—four years after the end of the war when the policy course was completely clear. The pound regained immediately its gold value on the internal market and it appreciated even more in the exchange market. However the GDP deflator was still 25 percent higher than it had been before the suspension and it

would indeed fall by that margin in the next few years.[60] The experience thus convinced policy makers about the soundness of the grand scheme of temporary suspension of the convertibility and strong commitment under an extreme fiscal shock. But after WW I, when the same readjustment was attempted, they may have neglected that the deflation after 1815 had been facilitated by two factors in addition to the inevitable post-war recession, the structure of an economy in the early stage of industrialization and the restricted political representation of those who were most affected by the readjustment.

[60] For an analysis of the difference between the adjustments of the prices of commodities and in the exchange market after a change in the parity of the currency, without war, see Velde (2009).

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## FIGURES

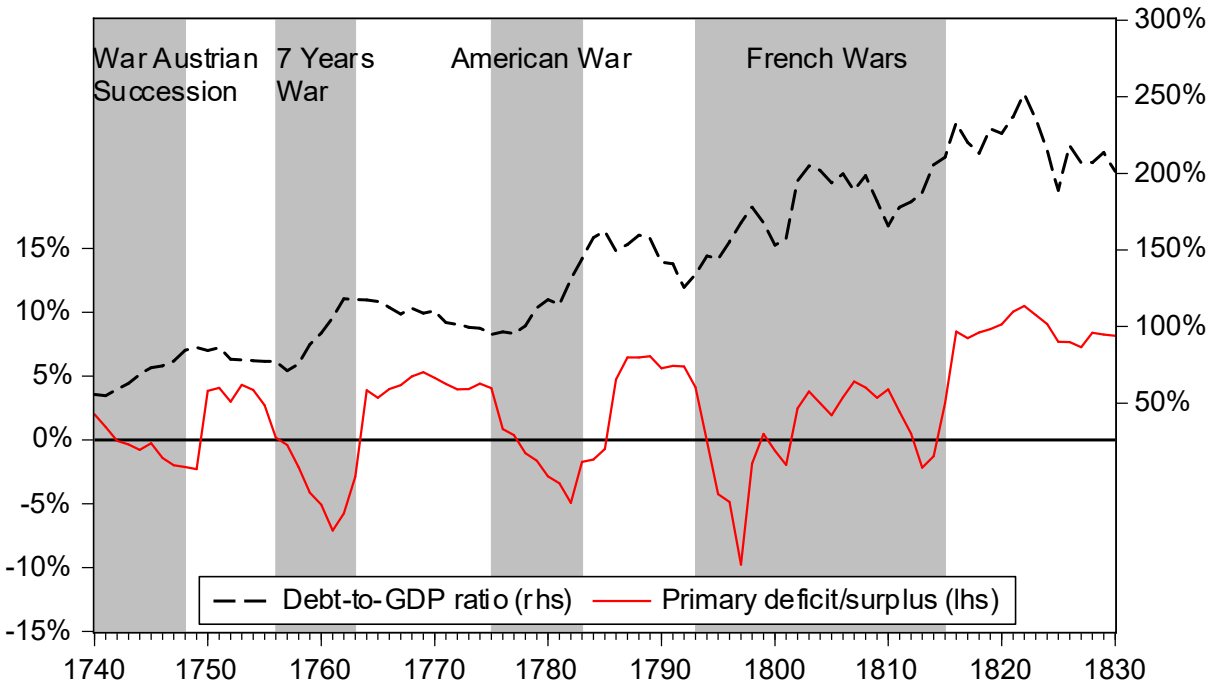


Figure 1: The Debt-to-GDP Ratio and the Primary Deficit/Surplus: 1740-1830

Source: Sessional Papers of Parliament 1868-9, n°35, Public Income and Expenditure (1869), Broadberry et al. (2011), authors' calculations.

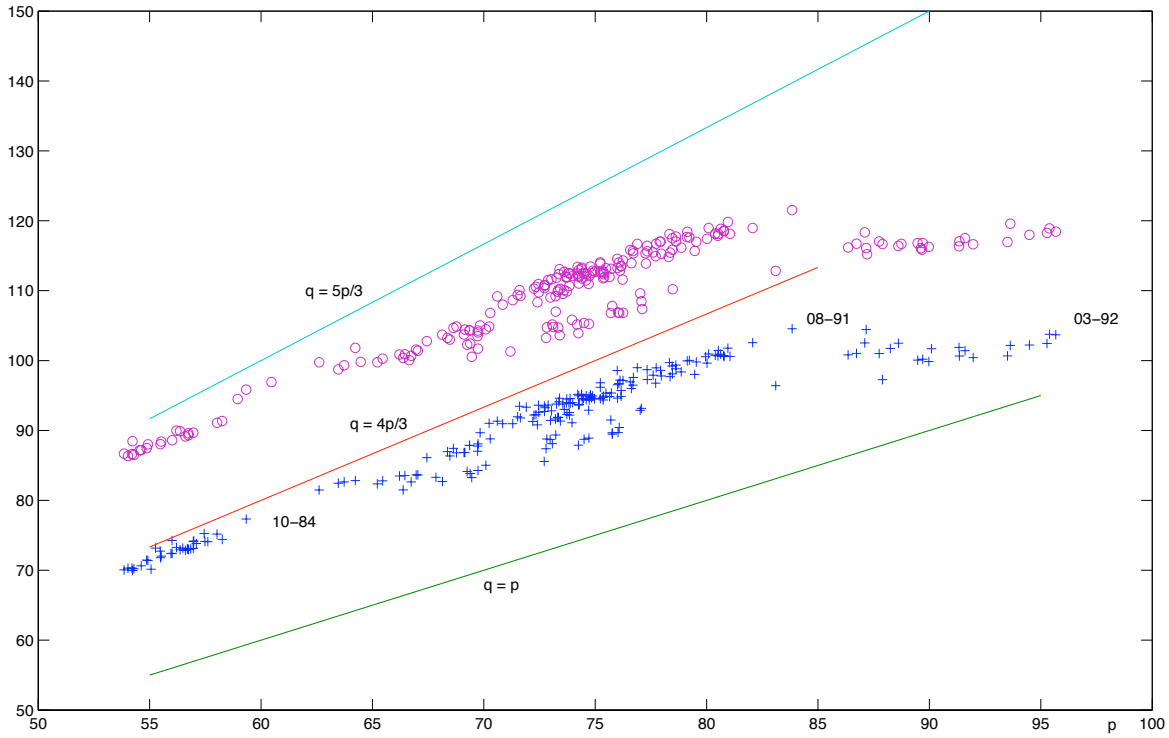


Figure 2: Prices of the consols (3 percent) and of the 4 percent annuities

Source: Bimonthly averages from daily prices in the Gentleman's Magazine.

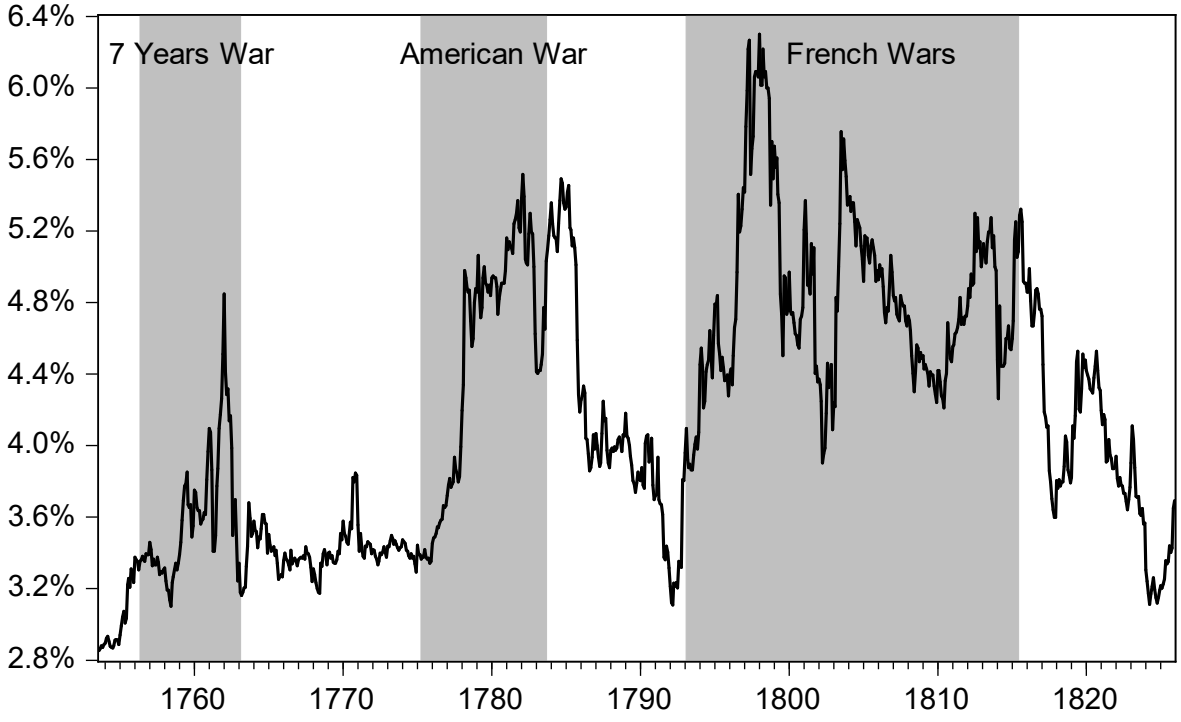


Figure 3: Long-term interest rate: ratio between 3 and the price of the consols

Sources: Neal 1990, Gentleman's Magazine.

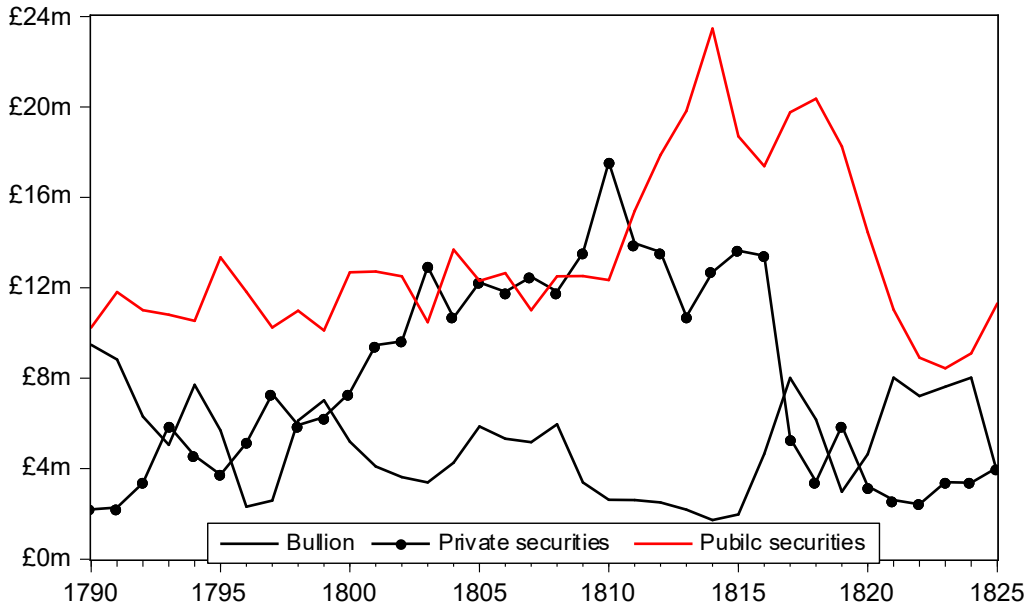


Figure 4: Public and Private Assets held by the Bank of England

Nominal amounts of asset holdings are deflated by the annual growth rate of real GDP. Sources: Broadberry et al. 2012, Mitchell 1988.

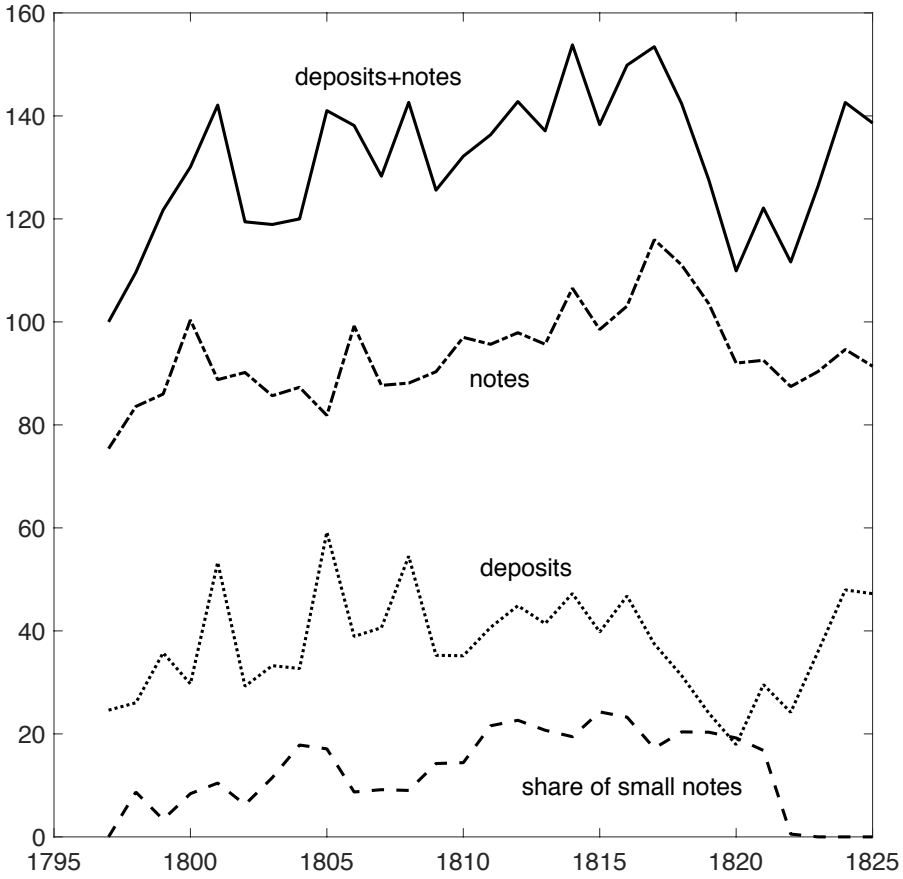


Figure 5: Adjusted money supply (Bank of England)

Notes are defined as notes minus notes of one and two pounds. The sum of deposits and notes are calibrated such that they are equal to 100 in the year 1797. For each year after that sum is divided by a real GDP index (Broadberry et al. 2015) that is normalized at 1 in 1797. The share of small notes (one and two pounds) is with respect to the sum of deposits and all notes (including small notes).

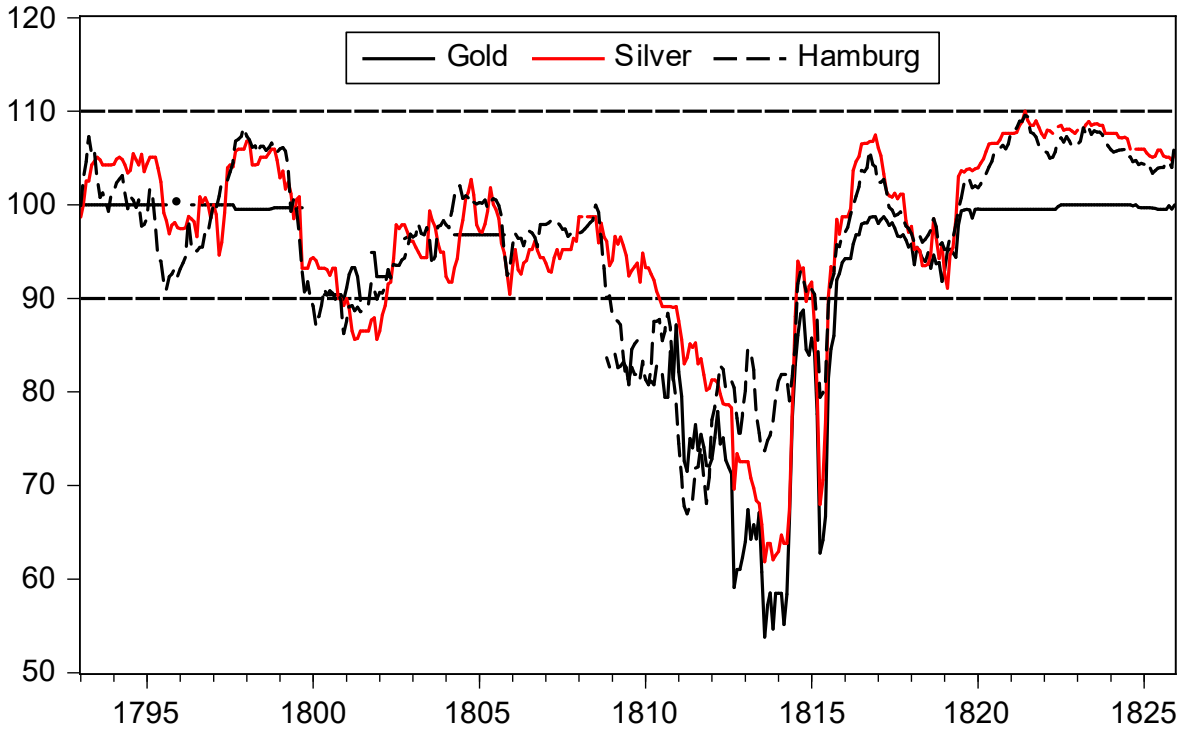


Figure 6: The prices of the pound–exchange rates into silver, gold, and Hamburg Schilling

The premia on silver and gold are calculated as the percentage deviation from their respective mint prices. All three indices are set to 100 in January 1797, the last month before the suspension of the gold standard. Sources: Boyer-Xambeu et al. 1994, Castaing's Course of the Exchange, and authors' calculation.

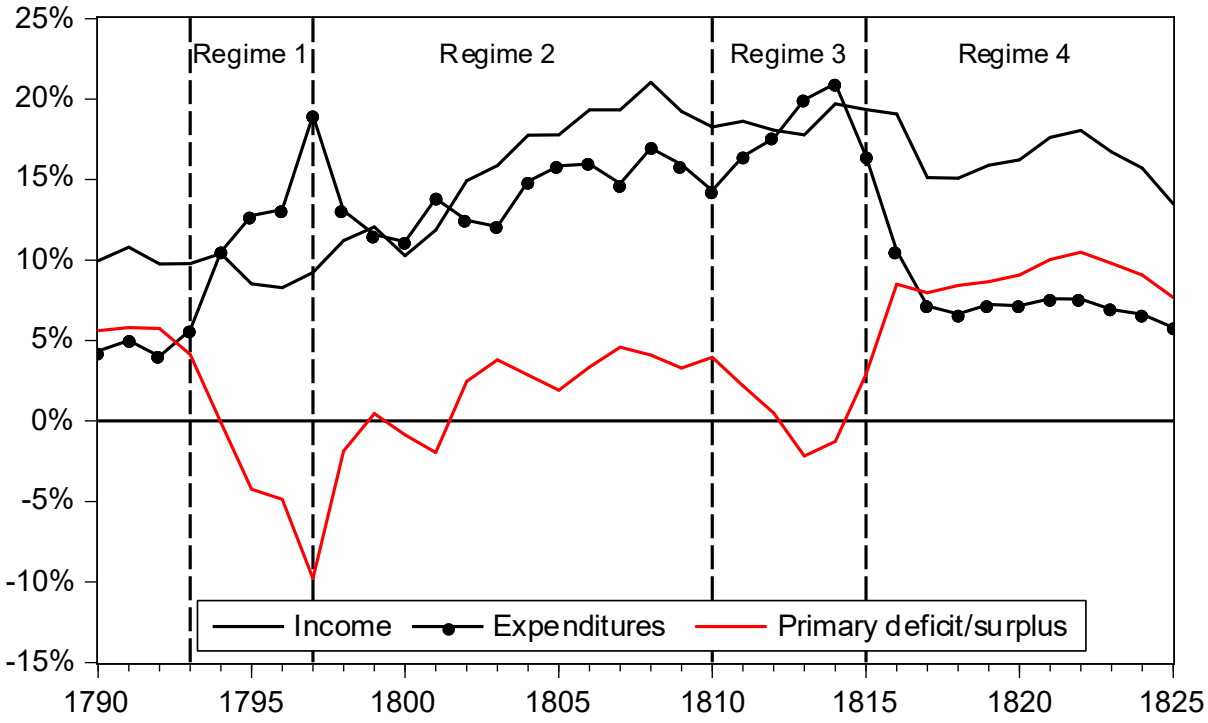


Figure 7: Fiscal Aggregates in the four regimes

All numbers are in percentage of GDP. Vertical dashed lines separate the four regimes. Sources: Sessional Papers of Parliament 1868-9, n°35, Public Income and Expenditure (1869) and authors' calculations.

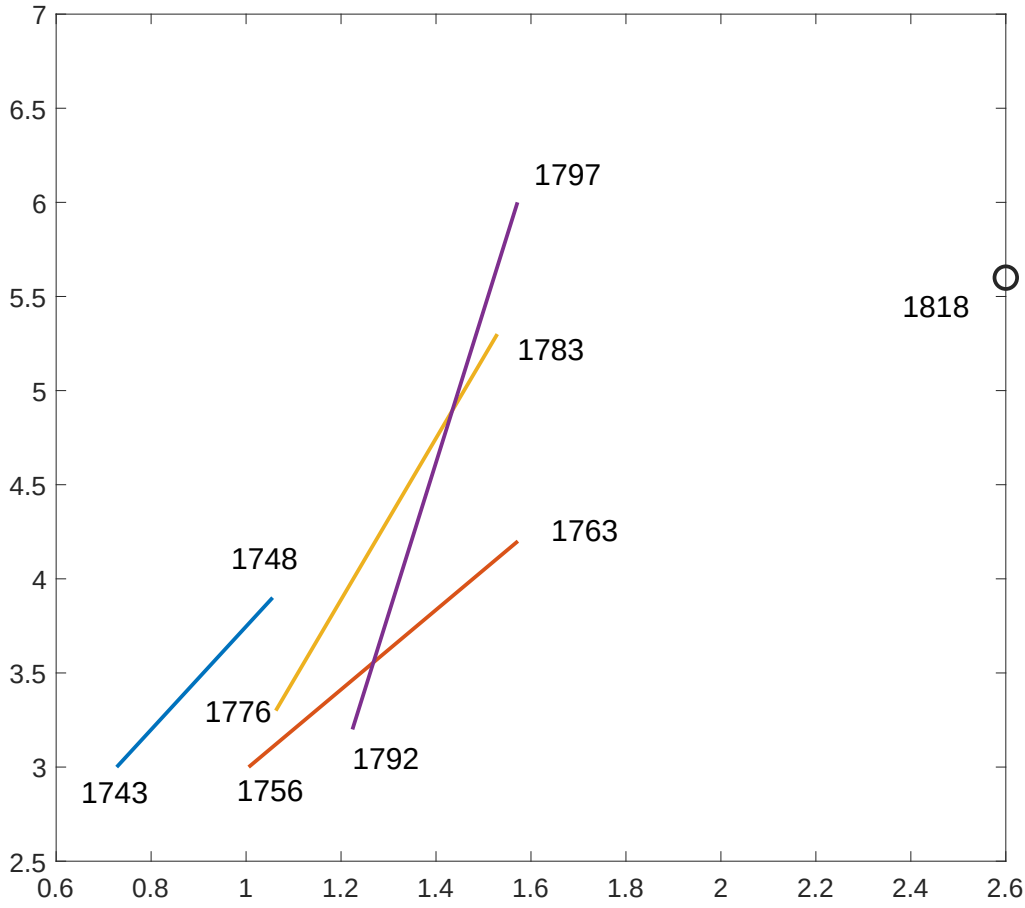


Figure 8: Debt levels and long-term interest rates in four wars

Source: Gentleman's Magazine and authors' calculations.

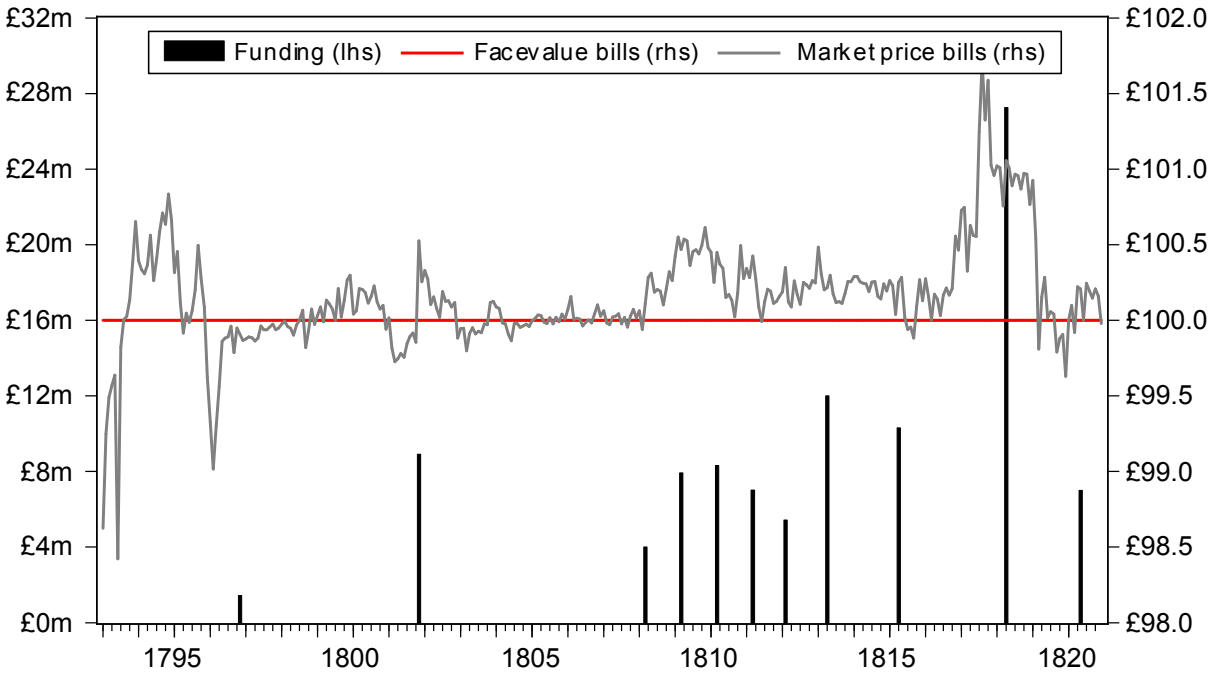


Figure 9: Price of Exchequer Bills in the London Money Market and Funding Operations

Source: Gentleman's Magazine, authors' calculations.

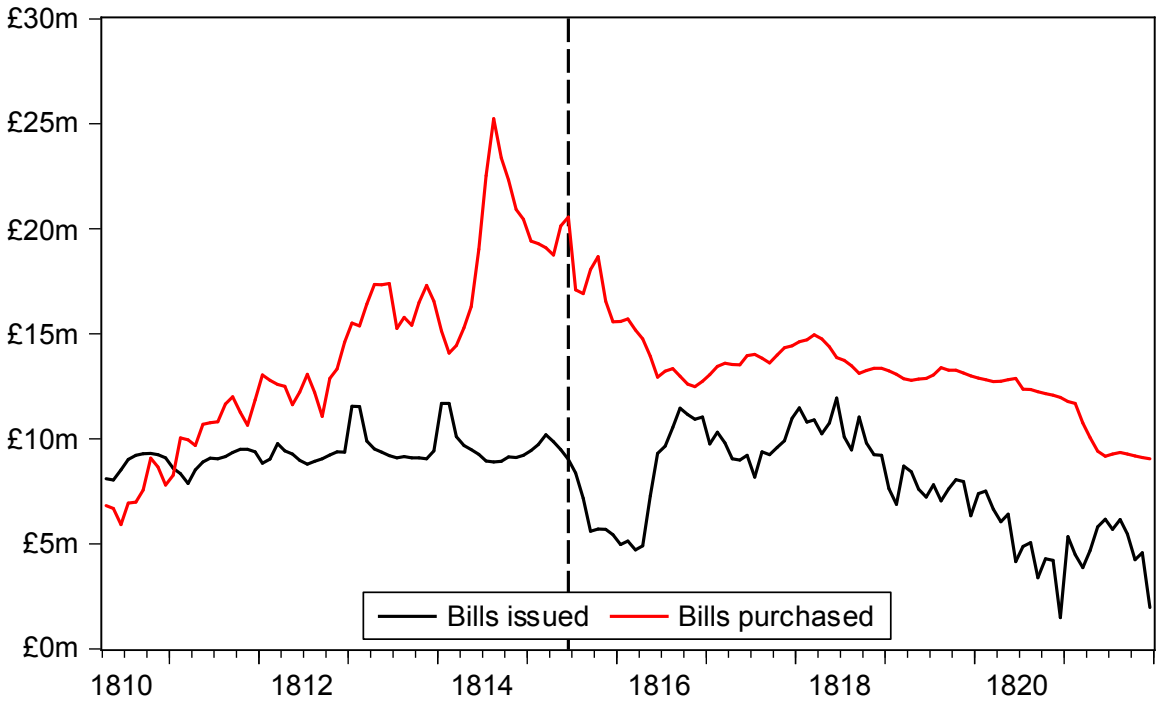


Figure 10: The Bank's holdings of Exchequer bills

The dashed line in Figure marks the end of the French Wars after the battle of Waterloo in June 1815. Series were seasonally adjusted using X12.

Source: Bank of England Archives, authors calculations.


Figure 11: The share of short-term government debt held by the Bank

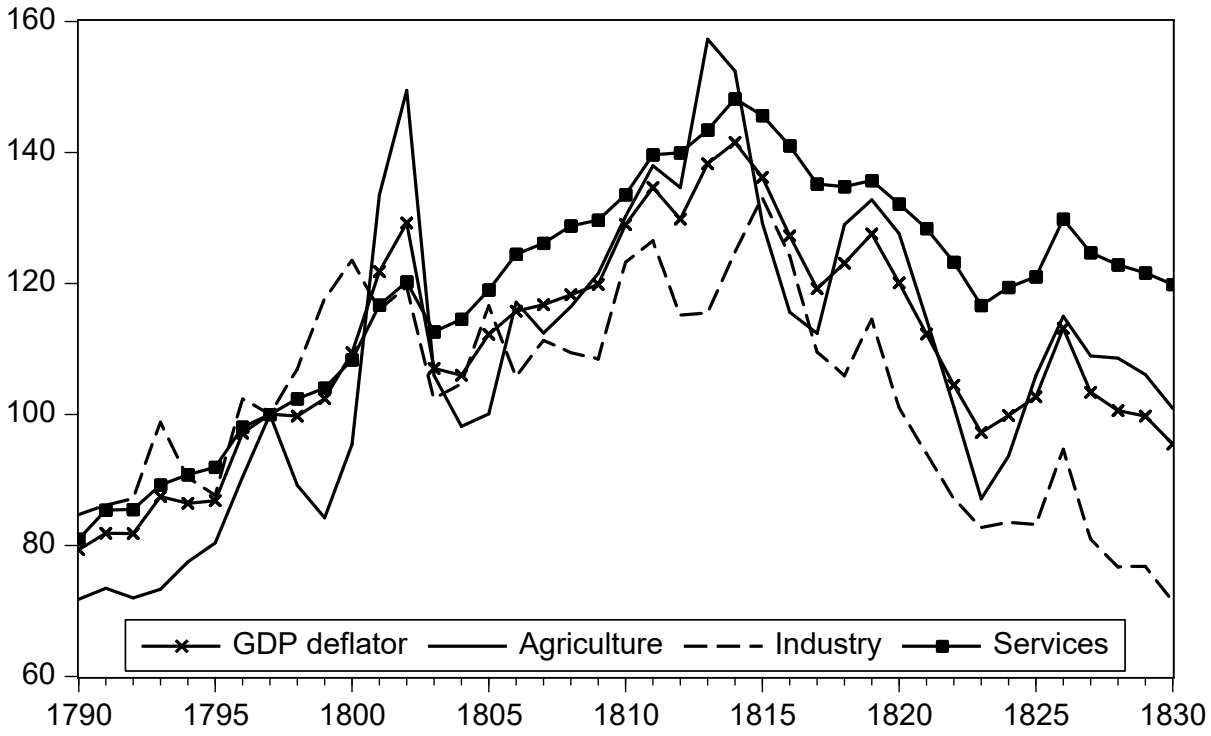


Figure 12: Price indices (1797=100)

Sources: Broadberry et al. 2015, authors' calculations.

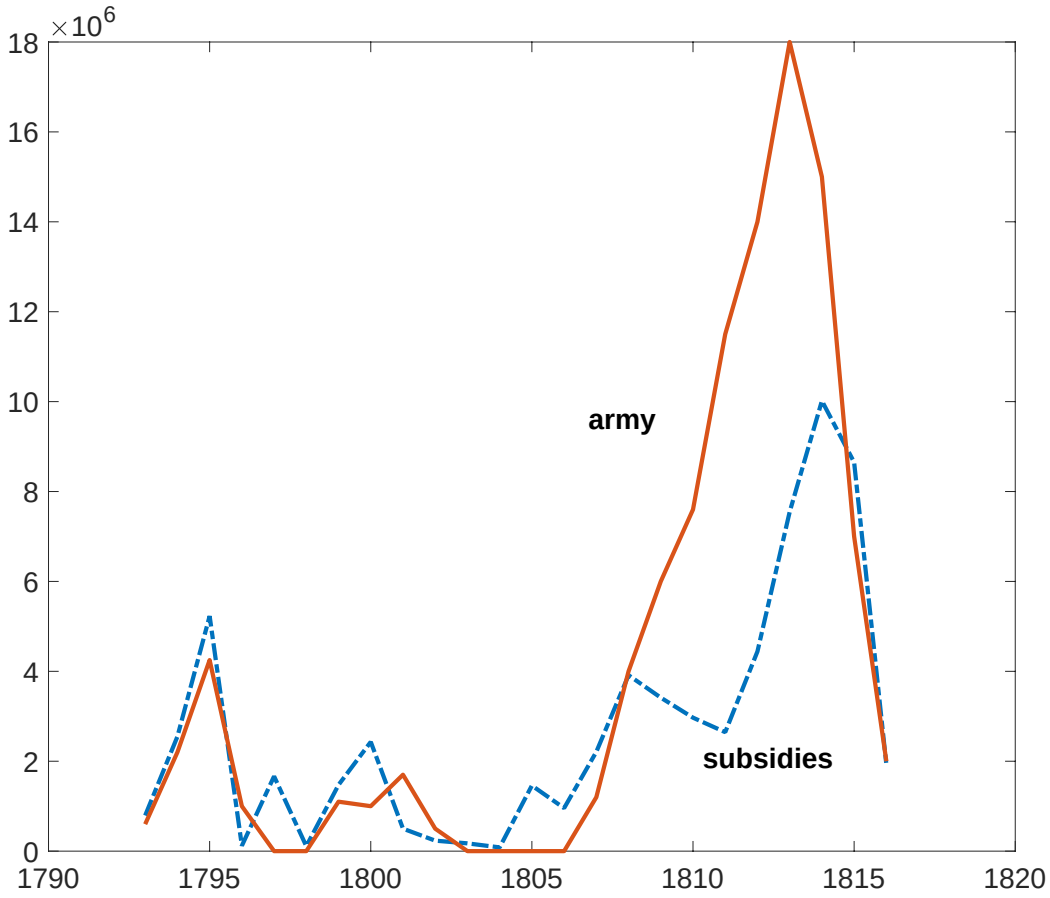


Figure 13: Expenditures on the continental army and subsidy payments to the allies (£)

Source: Sherwig (1969).

## APPENDIX

Table 3: Loans Issued by Public Subscriptions, 1793-1821

| | | Funded debt | | | Unfunded debt | | |
|---|---|---|---|---|---|---|---|
| | Date | £m | % GDP | Yield* | £m | % GDP | Yield* |
| Regime 1 | 1793 | 4.5 | 2.4 | 4.0 | 8.0 | 4.3 | 5.3 |
| | 1794 | 11.0 | 6.1 | 4.4 | 11.8 | 6.5 | 5.3 |
| | 1795 | 18.0 | 8.1 | 4.8 | 11.4 | 5.1 | 5.3 |
| | 1796 | 25.5 | 10.9 | 4.4 | 11.6 | 5.0 | 5.3 |
| | 1797 | 32.5 | 14.0 | 5.1 | 12.3 | 5.3 | 5.3 |
| Regime 2 | 1798 | 17.0 | 7.1 | 6.1 | 15.3 | 6.3 | 5.3 |
| | 1799 | 18.5 | 7.0 | 5.5 | 21.0 | 8.0 | 5.3 |
| | 1800 | 20.5 | 6.7 | 4.8 | 26.0 | 8.4 | 5.3 |
| | 1801 | 28.0 | 8.5 | 4.8 | 33.0 | 10.0 | 5.3 |
| | 1802 | 25.0 | 9.1 | 4.4 | 23.9 | 8.6 | 5.3 |
| | 1803 | 12.0 | 4.5 | 4.7 | 19.3 | 7.2 | 5.3 |
| | 1804 | 14.5 | 5.1 | 5.4 | 20.3 | 7.2 | 5.3 |
| | 1805 | 24.0 | 7.8 | 5.0 | 22.6 | 7.3 | 5.3 |
| | 1806 | 20.0 | 6.4 | 5.0 | 28.1 | 9.0 | 5.3 |
| | 1807 | 15.7 | 4.7 | 4.9 | 29.9 | 8.9 | 5.3 |
| | 1808 | 10.5 | 3.2 | 4.7 | 37.9 | 11.7 | 5.3 |
| | 1809 | 14.6 | 4.1 | 4.5 | 39.0 | 10.8 | 5.3 |
| | 1810 | 12.0 | 3.0 | 4.4 | 42.0 | 10.5 | 5.3 |
| Regime 3 | 1811 | 12.0 | 3.1 | 4.6 | 43.4 | 11.4 | 5.3 |
| | 1812 | 22.5 | 5.8 | 4.9 | 43.1 | 11.1 | 5.3 |
| | 1813 | 49.0 | 11.7 | 5.1 | 44.8 | 10.7 | 5.3 |
| | 1814 | 24.0 | 6.1 | 4.4 | 54.7 | 13.8 | 5.3 |
| | 1815 | 36.0 | 8.8 | 4.7 | 49 | 12.0 | 5.3 |
| Regime 4 | 1816 | 0.0 | 0.0 | 4.9 | 58.7 | 16.2 | 5.3 |
| | 1817 | 0.0 | 0.0 | 4.5 | 45.2 | 11.8 | 3.8 |
| | 1818 | 27.3 | 6.8 | 3.8 | 60.0 | 15.2 | 3.0 |
| | 1819 | 12.0 | 3.3 | 3.9 | 44.6 | 12.2 | 3.0 |
| | 1820 | 5.0 | 1.4 | 4.4 | 39.5 | 10.7 | 3.0 |
| | 1821 | 0.0 | 0.0 | 4.2 | 30.5 | 8.7 | 3.0 |

*Sources: Parliamentary Papers (BPP 1898), Gentleman's Magazine, authors' calculations.*

Table 4: Loans Issued by Public Subscriptions, 1793-1797

| Date | Amount £m | Instruments | Yield* | Price** |
|---|---|---|---|---|
| 1793 | 4.5 | 3% | 3.44 | 87.09 |
| 1794 | 11 | 3%, 4%, 66.25y. | 4.26 | 70.50 |
| 1795 | 18 | 3%, 4%, 65.25y. | 4.82 | 62.29 |
| 1796 | 18 | 3%, 3% red., 64.25y. | 4.39 | 68.32 |
| | 7.5 | 3%, 3% red., 63.75y. | 4.38 | 68.47 |
| 1797 | 18 | 3%, 3% red., 64.25y. | 5.30 | 56.59 |
| | 14.5 | 3%, 3% red., 4%, 64.25y. | 5.93 | 50.63 |

** Yield equals the coupon of the 3% consols divided by their market price.*

*** Average price of consols for the month before terms of loan are fixed.*

*We refer to consols as they constituted the by far largest part of the loans.*

*Sources: Parliamentary Papers (BPP 1898), Grellier (1810, 1812), authors' calculations.*

This loan provided for £100 a portfolio including the following: 3 percent annuities (consols and reduced) with total face and market values of £175 and £87.5, respectively; 4 percent annuities with a face value of £20, worth £12.8 in the market.The package was put together before the issuance of the loan for a total market value slightly above £100. Final adjustments were undertaken to render the package sufficiently attractive for the entire period of subscription. These adjustments depended on the most recent market conditions; for the 1797 loan they took the form of an additional long-term annuity of £0.33 (6s 6d) that was priced at £4.55. Taken together, £195 of outstanding debt were created for each £100 subscribers lent to the government. For the £14.5 million loan of 1797, taxpayers inherited £28.3 million of public liabilities. For the first period as a whole, the government obtained close to £100 million in loans, while increasing the debt burden by £140 million.

Table 5: Market Value of the Second 1797 Loan

| Amount | Type | Market value |
|---|---|---|
| 125 | 3 percent Consols at 50 | 62.5 |
| 50 | 3 percent Reduced at 50 | 25 |
| 20 | 4 percent Consols at 64 | 12.8 |
| 0.325 | Long annuities at 14 years purchase | 4.55 |
| | Total | 104.85 |

*Sources: Grellier (1810, p.412.)*