

Regimes of Fiscal and Monetary Policy in England during the French Wars (1793-1821) *

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Abstract

The national emergency and the pressure of the French Wars (1793-1815) constrained the government and the Bank of England to an unprecedented coordination between fiscal and monetary policy during which the Bank of England operated its transition from bond holders' protector to a central bank. Using hand-collected data about the Bank of England, we provide a new detailed analysis of the fiscal and monetary policies at that time, and of their impact on the price of the pound in the internal and the external markets. We distinguish four regimes during the French Wars, business as usual (1793-1797), real bills and war tax (1797-1810), "whatever it takes" (1810-1810), "exit" (1815-1821). The meaning and the success of each of these regimes depended on the overarching commitment of the policy makers long-term policy goals.

Keywords: Interactions between monetary and fiscal policies, central bank balance sheet, unconventional monetary policy, open market operations.

JEL: N13, H63, E58, E62.

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Introduction

The French Wars (1793-1815) were the climax of the Second Hundred Years War between England and France that had started after the Glorious Revolution. Three previous episodes (the War of the Austrian Succession, 1740-1748, the Seven Years War, 1756-1763 and the American War, 1776-1783) provided challenges and opportunities to perfect the tools of parliamentary monitoring, debt finance in a developed financial market, tax servicing of long-term redeemable annuities, and liquidity management by the Bank of England. These tools were not sufficient to meet the unprecedented fiscal and financial shocks of the French Wars. For the first time, 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 the fiscal and monetary policy of England at that time, which is emphasized in this paper, is that these deviations from previous practice were part of a commitment to the long-term policy: the war would be paid by future taxes, the convertibility would be resumed with no change of the parity. Coordination between the fiscal and the monetary policy was essential for success. The fiscal policy had to be credible for the expectations of a resumption of the convertibility. The credibility of the Bank of England in augmenting liquidity, by an unprecedented amount, rather than seignorage rested on the expectations of the resumption of the convertibility of its notes.

The emergencies of the war induced a pivotal 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 toward a new function as the lender of last resort that would be central afterwards. The remarkable success of a policy where the long-term commitment is strongly affirmed despite short-term deviations left an imprint on policy that lasted for more than a century. After World War I, the past success of a steady commitment—and what is a long-term commitment if it is not steady?—provided the context for the resumption of the Gold Standard, which, things having really changed, proved to be a failure.

In this paper, after taking stock of the policy inheritance at the beginning of the French Wars from the previous wars in the 18th century, we decompose the analysis of the fiscal and monetary policies between 1793 and 1821, the year of the resumption of the convertibility, into four regimes. Sometimes, as we will see, these commitments were discussed and subject

to some uncertainty, but eventually they prevailed.

In the first phase, policies were the same as in the previous wars. That was the natural thing to do since the extraordinary future spending could not be anticipated. Events forced a change of course and led to the second phase of the war (1797-1810) with the suspension of the gold standard and the instauration of Britain's first income tax. This phase is of special interest because of the real bills policy of the Bank of England. Its balanced sheet more than doubled but its public securities stayed constant with respect to the real growth of the economy. All the extraordinary expansion was driven by the discount 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 and not by government securities, which were only supported 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*. A credible policy should not be inflationary. It is related to the Modigliani-Miller neutrality argument of monetary expansion (Wallace, 1981, Chamley and Polemarchakis, 1984). The credibility was reinforced by the 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). Indeed, there was much discussion of that experiment in England at the beginning of the 19th century. Using the evolution of the prices on goods, in the foreign exchange rate and in the domestic silver price of the pound, we show that this policy was successful.

After 16 years of war, a further expansion of military expenditures induced a new phase, which, using modern terminology, we call the “surge”: policy reverted to debt financing and the debate on the commitment to the resumption of convertibility was renewed. The Bank of England switched from private discounting to the purchase of government short-term bills. These purchases were but a fraction of the government deficits. The change of policy had a strong impact on the price of the pound which followed almost identical evolutions in the foreign exchange and in the agio.

The six years between Waterloo and the resumption of convertibility of the pound in 1821, at the 1797 parity, present a remarkable first case of an “exit strategy,” to use another modern expression, and its example may be relevant to some of the policy issues after the recent financial crisis or within the Euro zone. The short-term governments assets on the balance

sheet of the Bank were repaid by the issuance of long-term bonds that were backed by future taxes. The balance sheet of the Bank looked remarkably similar in 1821 to the one in 1797 and its overall size with respect to the economy is exactly 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. One can understand how the success of the commitment to long-run fiscal and price stability left such a strong mark on the mindset of policy makers in the next challenge of World War One. The comparison between the two cases will be the subject of our next work.

The remainder of this article is organized as follows. To set the stage, the next section briefly describes the state of Britain’s public finances before the French Wars. Section three then presents the sequence of regimes that were implemented to meet escalating financing needs. Here we draw on new hand-collected and hitherto unexploited data regarding the Bank of England’s balance sheet and the public short-term debt market. A last section concludes briefly.

I. Fiscal policy before the French Wars

By the beginning of the French Wars, Britain was equipped with formidable tools of fiscal and financial policy. These had been developed and honed to meet the challenges of the “Second Hundred Years’ War” (Buffinton, 1929), which started immediately after the Glorious Revolution in 1688 between the new political regime in Britain and the old regime in France. Britain financed its three major wars between 1740 and 1790 according to a “modern” principle of “tax smoothing” (Barro 1979, 1987; Chamley 1985). Each expenditure surge was financed by long-term bonds that were funded by ear-marked taxes, especially the excise but also import duties, which were voted by parliament for debt service (Brewer 1988; Nye 2007). Each war thus led to a higher plateau of commodity taxes.¹ In peace time, the debt-to-GDP ratio decreased, through budget surpluses and economic growth (Figure 1).

FIGURE 1

¹The only tax for which the increase was canceled after a war was the land tax (Brewer 1988).

The Debt-to-GDP Ratio and the Primary Deficit/Surplus: 1740-1840

While each of the three wars followed the same pattern of deficit financing, the financial instruments differed from war to war, as summarized in Table 1. In the 1730s, most of the public debt was issued in redeemable bonds with a 4% coupon. The long-term interest rate was 3%, a standard value for peace time in 18th century England. The flows of budget surpluses were used to redeem the bonds at their face value. A refinancing of the stock of the entire debt at the lower rate, a “reduction” of the interest rate, was not an easy operation: it could only be achieved through a voluntary subscription of individual bond holders and it generated a coordination game (Chamley 2011).

In 1737, the bond holders won the game against the government (representing the tax payers), with the strong support of the Bank of England and other institutions. The government’s attempt to reduce the interest rate on outstanding bonds failed. In 1749, after the war of the Austrian succession (for England 1743-1748), a more skillful government used the context of a larger debt and less powerful institutions to convert the entire debt (new and old) to long-term redeemable bonds at 3 percent. These became in 1751 the “consols” of the consolidated debt that are still in the market today, with a reduced coupon. These episodes influenced the choices of financial instruments in the subsequent wars.

TABLE 1²

Deficit financing in three wars

At the beginning of the Seven Years War (1756-63), there was no debt overhang with a coupon higher than 3 percent. The main part of the deficit was financed by 3 percent bonds and for

²For the Austrian War, the data is from Chamley 2011. 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). The shares of 3 percent and 4 percent are pro-rated according to the conditions of the loans. Increases of the debt are higher. For example, in 1782 an actual payment of £100 would get £100 (nominal) in 3 percent and £50 in 4 percent. A large fraction of the deficit was financed by unfunded debt that was refinanced after the war (in annuities at 3 percent and 5 percent).

the new 4 percent bonds, a contractual clause scheduled a reduction of the coupon to 3 percent after 1781. During the American war (1776-83), the consol had become the main instrument for newly issued debt.

By the end of the American War in 1783, the public debt had attained 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 until the end of his first tenure, in 1801. His personal integrity and his constant insistence on fiscal rigor had a major impact on the credibility of the fiscal and monetary policy that was so important during the French wars. He immediately established a “Sinking Fund” of £1 million per year for the repurchase of government bonds.

The Sinking Fund was preserved even during the war years of large fiscal deficit in order to provide an additional signal of the government’s commitment to long-run fiscal sustainability.³ Such a commitment would turn out to be especially important during the suspension of the convertibility of the pound when market expectations about the resumption of convertibility would depend on the prospects for long-run fiscal balance (Antipa 2016; Sargent 1982). In modern economies, separate accounts have also been used to reinforce future commitments, such as the separate tax for social security in the US.

During the decade after the Treaty of Paris, the rate of interest decreased gradually, as one would expect in peacetime. Figure 2 presents the prices of the 4 percent bond as functions of the price of the consol, between 1784 and 1794. The premium of the 4 percent annuity over the 3 percent is the present value of the payments of the additional coupon of the 4 percent over the 3 percent, namely one pound, as long as the 4 percent is not redeemed. Following previous experience in the 18th century, this redemption would take place either gradually through the flow of budget surpluses, or on the entire stock of the 4 percent annuities, as in 1749 (Chamley 2011). The premium depends on the market’s 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 index

³Gladstone 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” (Silberling 1924).

about the expectations of future military expenditures.

At the beginning of 1784, the price of the 4 percent was nearly 4/3 of the 3 percent, with a premium of 25 (Figure 2). A decline of the long-term interest rate back to 3 percent was too far in the future to have an impact on the price of the 4 percent. 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. One can observe in Figure 2 the precipitous decline of the premium that was cut in half in the following months as the market reacted 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

Prices of the consols (3 percent) and of the 4 percent annuities

I. The first regime (1793-1797): debt financing as usual

On 20 April 1792, the French National Assembly declared war on the Austrian emperor, Francis II. At the beginning of the war, policy makers, like most people at the time, did not anticipate the *levées en masse* in France, nor the rise of an obscure captain with the name of Bonaparte. Pitt “based his financial policy (...) on the assumption that the conflict would be over relatively soon.” (Cooper, 1982, p. 96). There was no reason to alter the course that had been followed in all the previous wars, that is, debt finance and service of the new bonds through earmarked commodity taxes, voted by the Parliament.

The choice of debt instrument was, however, hotly debated in the first phase of the French Wars. Pitt preferred bonds 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% and the 4% were equal to 67.7 and 83.8, respectively. The difference of 16 is significant. The preference for the 4% shows that Pitt expected a relatively short war.⁴ However, the war turned out to be much longer than expected. The long-term interest rate exceeded 4% in any year before 1822. *Ex post*, the loans that had been issued with a coupon of 3% in the first phase of the French Wars turned out to be less costly than redeemable bonds at 4%.

New loans were marketed by a relatively small number of contractors who would could have better opportunities for capital gains and apply some market pressure on the government. They were opposed to any issue that was different from the consol at 3%.⁵ The consol was the dominating financial instrument in the market and provided more liquidity than the bonds at 4 and 5 percent that had a less active market.⁶ Pitt yielded and the consol became the dominating instrument for the loans of the French Wars.

Table 1 contains the long-term loans issued during the first phase of the wars. Borrowing increased over the years in size and in frequency. The last two years of this first phase each saw two substantial loans. As debt issues augmented, the price of consols gradually declined. Falling prices for public debt placed a rising burden on future taxpayers. For instance, the second loan of 1797 was raised in annuities with coupons of 3 and 4 percent and an additional annuity of 14 years, as shown in Table 2. A subscriber received for £100 a portfolio including the following: 3 percent annuities (consols and reduced) with total face and market values of

⁴Under a refinancing scheme with a premium of £4 per 100 as in 1749 (Chamley, 2011), the 4% is less costly for a war of not more than 12 years.

⁵See the documented discussion of O'Brien (2006, p. 34-38). 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."

⁶ For that reason, the term annuities that had been created during the Seven Years War had the same term year.

£175 and £87.5, respectively; 4 percent annuities with a face value of £20, worth £12.8 in the market.⁷ 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 1: 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.

Table 2: 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.)

⁷The 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.

In 1797, the price of consols reached an all-time low of 51 (Figure 3). This carried the market yield to approximately 6 percent. At the same time, an unknown general, Bonaparte, crushed the armies of the Habsburg in Italy and his march on Vienna was only stopped by a peace treaty. Military expenditures surged to nearly 20% of GDP, a level that was matched only in the final two years of the French Wars (see below). The primary deficit reached 9% of GDP, four times its highest level in any of other war years. The first regime of tax smoothing had become unsustainable. The change in policy would be forced by a bank run.

FIGURE 3

Prices of 3 percent consols, 1755-1830

II. The second regime (1797-1810): a bank run and two policy innovations

The second regime was triggered by a bank run and would be gradually implemented during the year 1797. It consisted of two components. On the monetary side, the Bank of England suspended the convertibility of its notes into gold. On the fiscal side, war taxation replaced the tax-smoothing and deficit financing of the first regime. As these policy innovations were implemented, the Bank expanded its liabilities by discounting private securities—not government bills—operating a real bills regime. We now turn to these measures and their effect on prices.

A. The Bank of England suspends the convertibility of its notes into gold

The Bank of England was not a central bank in the modern sense. It had been created in 1694 as a financial institution that would facilitate government financing of the new parliamentary regime in its war against France.⁸ By protecting bond holders, it contributed to lowering the borrowing cost for the government (North and Weingast 1989). As a *private* company, it acted in the interest of its shareholders and bond holders more broadly when it opposed or resisted the attempts of the government to reduce the interest on outstanding debt (Chamley 2011). In the French Wars, the national emergency required a close collaboration between

⁸Bean, 1978, p. 4.

the Bank and the government in monetary and fiscal policies. This collaboration would also have a major and permanent impact on the role of the Bank and on its evolution towards a central bank in the modern sense, which we will discuss along with the third regime.⁹

In the first phase of the war, the Bank was anxious to maintain the convertibility of its notes into gold, as had been the case in all the wars since 1694. Since 1717, Sir Isaac Newton had fixed the monetary or mint price of gold at £3. 17s. 10 1/2d. Each of the previous three wars had hardly implied a difference between the market price and the mint price.¹⁰ Convertibility of paper money into gold enhanced the credibility of the Bank's notes and of the entire monetary system of England. Here the private interests of the Bank's stockholders and the long-term national interest had coincided. But some divergences had begun to appear about the short-term policy: the Bank warned the government against loans to the Austrian Emperor and repeatedly tried to limit its short-term lending to the government.¹¹ Tensions grew between the Bank and the Treasury over the discounting of short-term bills.

Between 1794 and 1796, bullion reserves of the Bank decreased quickly, from £ 6.9 million to £ 2.6 million (Figure 8). In February of 1797, a run on country banks spread rapidly through the North-East of England and reached London amid rumors of French invasion (Fetter 1965 **). On Saturday, February 25, the 3 percent was down to 50 1/4. The next day, one of the most important in the history of the Bank of England, a crisis meeting took place between the Governors and Pitt. The Bank claimed to have lost nearly a million in specie during the past week, leaving it with £ 1.3 million in cash and bullion, for a circulation of approximately £ 10 million.¹²

The suspension of the convertibility was announced on Monday. In this national emergency,

⁹The Bank was nationalized only in 1946.

¹⁰Newby (2007) reports that the Bank of England restricted gold withdrawals through payments in shillings and sixpences. (See pages 9-10).

¹¹ "The court of directors, on the 16th of April [1794], again directed the governors to wait on Mr. Pitt, and mention the uneasiness they felt on being left so long in advance to so large an amount on the treasury-bills. Mr. Pitt, appearing fully convinced of the propriety of the representation, said, he would order 1.2 million to be paid to the Bank on that account immediately" (Grellier 1810, p. 381).

¹² 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).

bankers, and merchants all over Britain declared that they would support the new payment system and public credit, and that they would accept 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 transaction, which is the key property for the value of money, and thus facilitated a smooth transition from convertible money to inconvertible paper money (Shin, 2015).

The suspension was ratified in Parliament by the Bank Restriction Act (May 3, 1797) and the government contributed to the acceptance of the Bank's notes making them receivable in the payment of taxes (37 Geo. III, c. 45). The act granted the suspension for a short period, until June 24. The suspension had been triggered by a standard bank run on the whole banking system of Britain that came at a particularly bad time. After countering the run, the financial turmoil subsided quickly: the 3 percent jumped from 50 1/2 to 52 1/2. The Bank's metallic reserve began to improve almost at once (Clapham 1944, Vol. I, p. 272).

As the crisis had passed, the Bank signaled that it was ready to resume convertibility (Feavearyear, 1963, p. 190). That was opposed by the Prime Minister who showed good foresight. 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).¹³

These limited extensions have to be considered in the context of the uncertain military developments. They also reinforced the credibility of the commitment to resume convertibility. Indeed, the market value of the pound exceeded the mint value until 1799 and the Bank of England actually "paid cash" on some of its notes of one, two and five pounds before 1800.¹⁴

B. War taxation

Suspending the Bank's notes' convertibility into gold halted the consol's decline at the be-

¹³See Appendix B and the Journal of the Lords.

¹⁴In the Journal of the Lords, the entry for May 7, 1819 (pages 342 and following) provides an enlightening summary of the sequence of the parliamentary acts and actions of the Bank of England with respect to its gold reserves. See the appendix.

ginning of the second regime. However, at the end of 1797, consols remained at a discount of almost 50 percent (Figure 3). The previous low point had been at 55, in 1784, but that was at the end of the American War, which England had lost.¹⁵

FIGURE 3

Prices of 3 percent consols, 1755-1830

In November 1797, Pitt proposed a general tax on income “in order to prevent the depreciation of national securities.”¹⁶ A year later, the Parliament voted for the first income tax in Britain’s history. The tax was announced as a war tax, to be abolished at the end of the war. It was a “radical departure from Britain’s traditional strategy of funding wars by borrowing” (O’Brien, 1988, p.21).¹⁷

Two arguments support the interpretation of the income tax as a war tax that departs from the tax-smoothing. The first is the political economy. The income tax was targeted on the rich and was met with strong opposition. It could pass only because of the national emergency. One could expect that once the emergency had passed, the tax would be abolished. Indeed, it was suspended during the short lull of Peace of Amiens (March 1802 to May 1803), and the primary surplus became negative in that period. In 1803, the new Prime Minister Addington reintroduced an improved version. A year after Waterloo, it was abolished.

The second argument for the departure of tax-smoothing policy is the time profile of the primary surplus. The new tax proved very productive, generating in the peak years of the war about the same amount as customs, 18 percent of total revenues. The primary surplus was positive between 2 and 4% in each of the years between 1804 and 1811, years of intensive

¹⁵It 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 have something to do with 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.

¹⁶Hansard’s Parliamentary Debates, Vol. 33, pp. 104 ff.

¹⁷O’Brien (1988) provides a rich discussion of the history and the political economy of taxation during the French Wars. For the income tax, see 12-13, 20-22. See also Daunton (2001, pp. 43-45).

warfare. Figure 5 presents the profiles of the expenditures, which were at the same level, on average, as in the first phase of the war. Under a tax-smoothing policy, a positive primary surplus can be explained only by the anticipation of a significant increase of expenditures in the future. There was a surge of expenditures in the final years of the war, but the primary deficit was still relatively small, around 2 percent.

FIGURE 5

Fiscal aggregates in the four regimes

During the second regime, the size of long-term debt issues quasi-continuously declined, as presented in Table 7 in the appendix. This hinged on the large primary surpluses brought about by the introduction of the income tax and was particularly the case after 1803, when Addington's improved version of the income tax was introduced.¹⁸

Figure 4 illustrates the success of the second regime. Since 1740, each of the wars had implied a higher debt-to-GDP ratio and a higher long-term interest rate. Each war is here represented by a segment between two points for each war. The first point depicts debt-to-GDP ratio on the ordinate and the long-term interest rate (3 over the consol price) 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 each particular war. The segments in Figure 4 thus allow to gauge how fiscal tensions affected interest rates on public debt, given evolutions in the debt-to-GDP ratio.¹⁹ By 1797, the interest rate on British public debt had reached six percent. But the year 1797 was not the end of the war. It was just the beginning. After six years of unsuccessful warfare against Revolutionary France, the standard policy of debt financing with gradual tax increases had reached a limit.

Figure 4 adds a point for the year 1818 (which policy makers could of course not anticipate in 1797). After the French Wars, the debt to GDP ratio would peak at 2.6 whereas the interest rate would never again reach the level of the first phase of the war (Figure 3). The policy

¹⁸Despite the budget surplus for these years debt issues remained necessary, as the surplus was not large enough to also cover debt-related expenditures.

¹⁹We chose the highest rather than the final interest during a war, since interest rates at the end of the war are reduced by the expectation of the war's end.

innovations—departing from the gold standard and the tax-smoothing approach—implemented in 1797 proved effective in reversing the depreciation of public securities. Our next sections discuss their effects on prices.

FIGURE 4

Debt levels and long-term interest rates in four wars

C. Real bills

The suspension of the convertibility created a payment system that was based on the Bank's notes, the supply of which the Bank and the Treasury controlled. Throughout the second regime, the Bank's balance sheet increased substantially. This calls for two qualifications that we put forward in turn. First, the increase in the Bank's liabilities, i.e. its notes, answered the demand for means of payment as other monies, notably specie, vanished from circulation. Second, the type of assets that backed these liabilities mattered no less than the latter's expansion.

Long lines of debate and research have looked into the evolution of the Bank's note issue and its effects on prices during the suspension period.²⁰ All of these analyses have equated the Bank's note issue with the overall money supply. We construct a broader measure of the money supply that is equivalent to the modern definition of high powered money, i.e. the money supply includes the central bank's note issue, deposits with the central bank, and coins in circulation. Our measure of the money supply provides a more accurate and nuanced characterization of monetary conditions and induces a radically different interpretation of the period from what is found in the literature. Given the growth of the economy, the overall money supply did not increase. It is thus difficult to see how the quantity of notes issued *per se* could have caused inflationary tensions.

The evolutions in our measure of the money supply and its components are presented in Figure 6 (see the appendix for details regarding the computation). Quite quickly after the

²⁰Eminent political economists David Ricardo (1817) and Thomas Tooke (1824), respectively argued in favor of monetary and real reasons behind inflation. More recently, Bordo and Schwartz (1981) emphasized the importance of monetary factors for price level determination against Lewis (1978) and Rostow (1948).

suspension, the amount of coins in circulation diminished. Even for small differences between the mint and the market price of gold it made sense to sell gold on the market rather than have it transformed into coins at the mint. Delays in the transformation of specie into coins of up to six weeks—before the suspension, contemporaries circumvented this issue by exchanging specie at the Bank—further reduced mint output. The turning point in mint output occurred in 1817, after the Coinage Act of 1816 officially adopted gold as the sole measure of value, abandoning bimetallism.²¹

FIGURE 6

The money supply and its components

Deposits at the Bank increased substantially after 1797. They were almost exclusively public and their evolutions were driven by those in the public payroll. This explains their collapse after 1815, when payments to the Army and Navy ceased with the end of hostilities.

The Bank's note issues rose, also because the Bank started issuing small denominations to counteract the shortage of metallic currency. Following usual practice—the Bank had introduced £10 and £15 notes in 1759 during the Seven Years' War—it introduced the £5 note with the beginning of the French Wars in 1793 and the £2 and £1 note with the suspension in 1797 (Bank of England 1969). These smaller denominations were used in everyday payments and made up an important part of overall issues.²² For the years for which data on note issues by denomination exists, £1, £2, and £5 notes accounted for an average of 45 percent of the Bank's issues.²³ An important part of the increase in the Bank's note issues thus simply remedied the shortage in metallic currency, induced by the wars and the suspension.

These nominal evolutions in the money supply do not account for the growth of the economy. According to the quantity theory, increases in the money supply should only be inflationary if their rate of growth exceeds that of real GDP.²⁴ Figure 7 depicts the “nominal” and “real”

²¹56 Geo. III, c.68.

²²In 1819, yearly average salaries ranged from £39 for farm laborers to £219 for highly paid government officials (Lindert and Williamson 1983).

²³Lords' Report, appendices B1 and B2.

²⁴Fisher's (1933) expression of the quantity theory states that increases in the money supply cause inflation if—for a constant velocity of money—the money supply grows faster than real GDP.

measures for the money supply, where “real” implies that we have deflated the money supply by the growth rate of real GDP (provided in Broadberry et al. 2015, pp.187-244). In real terms, the money supply did not expand. Until the end of the wars in 1815, it simply kept pace with the growth of the economy. It lacked behind during the high-growth years leading up to the 1825 bubble burst (Neal 1998).

Can we say anything about fluctuations in the demand for money or the latter’s velocity? In 1793, 1797, 1810-11, and 1816-1818 severe liquidity shortages shook the economy. These liquidity crises were broadly acknowledged and alleviated by putting out further means of payment. In particular, at all occasions the Treasury issued Exchequer bills on top of the notes provided by the Bank (Clapham 1944, vol.I, pp.263-265 and vol.II, pp.33-34, Flinn 1961). The 1810-11 episode is a particularly interesting case in point as price pressures over the period triggered the Bullion Report (see next section). The Bank’s circulation peaked in 1810, when the burst of the South American bubble induced wide spread panic, business failures, and the contraction of country banks’ note issue.²⁵ While the evolutions in 1810 were by some interpreted as evidence for the Bank issuing too much, we argue they reflected the typical pattern of financial boom and bust, during which the Bank acted as a lender of last resort. Taken together, none of the above pieces of evidence suggest an over-abundant issue of notes by the Bank.

FIGURE 7

The money supply and the growth of the economy

We now turn to the second qualification regarding the expansion in the Bank’s liabilities. This one concerns the type of assets that backed the expansion. Figure 8 illustrates the two striking features of the policy of the Bank in the second regime of the war: (i) the holding of public securities is constant with respect to the trend of the real GDP; (ii) there is a large expansion of new notes that are backed by the discounting of private bills. This policy can be described as a Real Bills policy.

FIGURE 8

²⁵(Hansard HC Deb 7 March 1811 vol 19, pp. 249-58.)

Public and private assets held by the Bank of England

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 and not by government securities, which were only supported 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*. In theory, such a regime should not be inflationary and that was the Bank's position.²⁶

The Real Bills regime implemented for the years 1797-1810 can be related to the first phase of the assignats in France, in 1790-1792. The assignats were initially created against the real counterpart of the national domains that had been confiscated.²⁷ 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. The spectacular inflation after the Terror's price control until the end of the assignats in February 1796 (Sargent and Velde, 1995) 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 would be increased (see next section) to generate a primary surplus and the Bank's notes in this second regime before 1811 were not the result of direct lending to the government.

How did the value of the pound and prices more broadly evolve during the Real Bills regime? Figure 9 displays the evolutions in the pound's internal and external exchange rates, both of which can also be thought of as a measure of the agents' confidence. For the external exchange rate, we present the rate on Hamburg because it is available for the entire span of the French Wars.²⁸ For the pound's internal value—fixed in terms of gold and silver—we present hand-collected silver rather than gold prices, as this increases the number of available

²⁶Report 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.

²⁷See the illuminating exposition by Sargent and Velde (1995).

²⁸In 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.

biweekly observations for the Restriction Period (1797-1821) by 30 percent.²⁹ During most of the Real Bills regime, and especially between 1803 and 1810, the value of the pound stayed within the 5 percent range around the pre-suspension value. The 10 percent loss in 1801-1802 has been ascribed by prominent contemporary economists to particularly bad harvests (Thornton 1802, pp.214; Tooke 1824, vol.I, pp.213-225).

FIGURE 9

Hamburg exchange rate and agio

Figure 10 shows three price indices—for agriculture, services and the GDP deflator—along with our nominal and real measure of the money supply. The most volatile of them is the agricultural index, which was driven by supply shocks. The latter included bad harvests, war shortages, and heightened transport costs that caused prices to increase in Britain, but also on the Continent, and in the United States (Cole 1938, Oliver 1941, Pfister 2010). The gradual increase in prices had hence begun well before the Real Bills regime (Schumpeter 1938). Extraordinary war conditions, i.e. the widespread use of commercial warfare, further weighed on prices during the second phase of the wars. The years from 1806 to 1809 saw Napoleon’s Continental blockade, the American Embargo and British counter offensives (Crouzet 1964; Frankel 1982). Thus, most contemporaries agreed that real disturbances affected prices substantially.

FIGURE 10

Price indices and notes in circulation

Agricultural prices also affected other prices in the economy, as can be seen from Table 5. The correlation between agricultural prices and the aggregate price level measured by the GDP deflator was close to unity. In this early stage of the industrial revolution agriculture dominated the economy. The correlation between prices in the services sector and those of agricultural products was only a tad lower. Wages drove prices in the services sector and wages

²⁹No gold prices are available between 1805 and 1809 (Antipa, 2016).

evolved in line with agricultural product prices. On the contrary, correlations between our measures of the money supply and the three price indices are low or negative, corroborating further that changes in the money supply were not the primary impetus behind evolutions in the aggregate price level.

TABLE 5

Correlations between agricultural prices and other price indices

Overall, prices increased somewhat during the second regime. Real, mostly war-related shocks, affected the general price level in Britain, but the same was true elsewhere. At the same time, the Bank of England's note issue replaced specie in circulation. According to what we think is a more complete measure of the money supply, the latter did not increase. For the second regime, we thus do not find evidence that the Bank's note issue caused inflationary tensions.

III. The third regime (1810-1815): an inflationary balance sheet expansion

A. A debt-financed expenditure surge

The outcome of the war in 1809/1810, was mixed for the Allies.³⁰ While further efforts to beat Napoleon were necessary, there was strong political resistance to further taxes. In addition, in 1812, the annihilation of the *Grande Armée* in Russia emboldened the Allies to envision the end of the war. The tax fatigue, paired with this change in expectations, generated a shift to a new fiscal policy, which meant that military expenditures would reach the highest level of the war.

Although the exact limits of taxable capacity were difficult to establish, the widespread feeling was that taxation had reached a limit (Acworth 1925, p.38). New taxes had been introduced and the rates on already existing taxes had been increased. During the French Wars, the British had become one of the most heavily taxed people in Europe (O'Brien 1988, p. 4).

³⁰Napoleon was beaten for the first time in 10 years in the battle of Aspern-Essling in May 1809. However, the Austrian- and British-led alliance against France was decisively defeated at the battle of Wagram in July 1809, and by the end of that year, the French imposed control on most of the Iberian Peninsula.

The political momentum was not favorable for more taxation. In addition, tax smoothing under the expectations of an approaching end commanded a surge of the deficit.

Thus, debt issues reached new heights with the surge. As can be seen from Table 3, between 1810 and 1815, issues rose from 12 to 49 million £, peaking at 11.7 percent of GDP (Table 7 in the appendix recapitulates all debt issued—short and long—during the French Wars). Rising yields accompanied increased debt issues, as had been the case during the first regime (see Table 1). Yields augmented from 4.4 percent in 1810 to 5.1 percent in 1813. The year 1814 marked a halt in this trend, since it saw the short-lived peace between the First Treaty of Paris (signed 30 May) and the resumption of hostilities during Napoleon’s 100 days (between March and July 1815).

Table 3: Loans Issued by Public Subscriptions, 1810-1815

Date	Funded debt			Unfunded debt		
	£m	% GDP	Yield*	£m	% GDP	Yield*
1810	12.0	3.0%	4.4	42.0	10.5	5.3
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	49.0	12.0	5.3

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

Deficit finance differed from the first regime in that it now also relied on the issue of short-term bills, shown in columns five to seven in Table 3. Short-term or unfunded debt was issued in anticipation of tax incomes and took the form of Navy, Transport, Victualing and Exchequer bills, a fraction of which was backed by ear-marked taxes. Exchequer bills, the by-far most used public short-term bill, had a maturity of not more than one year and new issues were often used to retire outstanding bills. The increase in bills issued hence implied that a rising share of expenditures was financed by short-term debt. For the surge years, annual short-term debt issues represented on average 11.6 percent of GDP, peaking at 13.8 percent in 1814. For

this phase of the wars, 31 percent of the government’s total income originated in issues of short-term debt.³¹

While short-term debt issues increased in size, the yield the Treasury had to pay on them remained remarkably stable (column seven in Table 3). Our next section details how the Bank’s intervention in the London money market was critical in keeping the bills’ prices high and their yields low.

B. The Bank of England policy: “whatever it takes”

In 1810, the Bank started purchasing large amounts of public securities and through these purchases expanded the circulation of its notes (Figure 8). At the same time—and we do not think that this is a coincidence—the Bank started recording its interventions in the public debt market at a weekly frequency. We collected and digitized this data and display the Bank’s holdings of public short-term debt in Figure 11.

FIGURE 11

The Bank’s interventions in the public debt market

Exchequer bills made it onto the Bank’s balance sheet through two alternative channels and it is important to distinguish them as only one channel implied that the Bank’s increasing exposure to public short-term debt became common knowledge.

In the first channel, the Bank *issued* bills, depicted by the black line in Figure 11. These bills originated in interactions between the Treasury and the Bank that had been standard practice since the late 17th century. In particular, at the beginning of each year, the Bank advanced funds against bills on the security of the malt and land taxes, sanctioned by Parliament. The Exchequer gradually reimbursed the Bank upon reception of tax revenues. When acquiring *issued* Exchequer bills, investors thus purchased a tax-backed share of what the government owed the Bank (Philippovich 1911, p.110). As can be seen in Figure 11, bills *issued* remained broadly stable throughout the decisive phase of the wars, as they had been in the previous

³¹Public Income and Expenditures (1869) and authors’ calculations.

regimes as well.³² The only exception were the months after Napoleon’s final defeat, during which the number of bills *issued* actually declined as the war-related malt tax was abandoned along with the income tax.

In the second channel, the Bank *purchased* bills (the red line in Figure 11) in the primary market, that is directly from the Treasury’s intermediary, the Government Broker. Before selling to the Bank, the Government Broker would inquire in the money market at what prices investors were willing to acquire a given batch of bills. Whenever it was not possible to sell bills in the market at a premium—with intensified warfare and heightened financing needs this was becoming increasingly difficult—the Bank would buy the bills at face value. The Bank never resold *purchased* bills to the market, as this would have induced a discount on them.³³ In a time of severe fiscal tensions, this funding method meant for the Treasury that it sold Exchequer bills in the worst of cases at face value and at a premium otherwise. Of course, it also implied that investors knew which batches of bills the Bank would buy.

Figure 11 shows the important increase in the number of bills *purchased* during the decisive phase of the wars. During each year of the latter, the Bank advanced on average £14m. Advances peaked at £26m or roughly 6.5 percent of GDP in the autumn of 1814. This is to be compared to an average of below £4m for the first two phases of the wars.³⁴ The Bank’s policy during the third regimes was to do “whatever it takes” to keep the price of the exchequer bills above par. This was not announced in the fanfare of a speech,³⁵ but as we have seen, the financial backstop provided by the Bank was common knowledge.

The Bank’s growing public debt holdings implied a more risky balance sheet position. During the second regime, the Bank’s assets consisted primarily of private securities, representing commercial transactions of the highest quality.³⁶ Now, the biggest portion of the Bank’s

³²Data 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.

³³Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments of 1819, appendix 3, p. 489.

³⁴Data 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.

³⁵Commitment 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.

³⁶Discounters had to be introduced by large shareholders—directors—of the Bank, and their bills were examined

assets were made up of public short-term debt, the reimbursement of which hinged on the wars' outcome. To make matters worse, the Bank was hardly in a position to refuse even forced loans, its charter—granting it the monopoly of issue in the London area—being negotiable at any time.

At the same time, the Bank notes' internal and external value started depreciating, as presented in Figure 9. The premium on silver started to exceed 10 percent in June 1810. The exchange rate in Hamburg depreciated earlier—in January 1809—which may be related to the substantial expenditures for the Peninsular campaign and the subsidies to the allies on the Continent (Neal 1991, pp. 197-198).

These evolutions led to many discussions by policy makers and economists, and triggered the Bullion Committee and Report in 1810/11. The policy debate opposed the proponents of the Real Bills doctrine and the Bullionists. According to the former, real disturbances induced price increases. For the latter, including David Ricardo, the Bank's over-issue caused the devaluation of the pound. A reduction of the Bank's note circulation was necessary to return to the pre-war parity of the pound. The Committee recommended to resume the gold standard over a period of two years. Policy makers decided to not implement the committee's recommendation and maintained the suspension of the gold standard until 1819.

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. Evolutions in the money supply, depicted in Figures 6 and 7, do not indicate an over-abundance of means of payment. And the Bank's note issue had been increasing ever since the suspension in 1797, as notes were replacing other means of payment. Variations in the quantity of notes do not seem to have caused the appearing price tensions. What changed with the third regime was the type of asset backing the Bank's notes.

The Bank's liabilities—its notes—persistently devalued when the Bank's assets came under pressure as the war's progress cast doubts on the sustainability of public finances. As the Bank incurred the utmost risk in this intricate system of public finance, the value of its notes gave under the pressures emanating from the war and the Treasury. While the market value by a committee. The internal checks and balances of the Bank kept losses on discounted bills negligible (Clapham 1944, vol.II, pp.12-15).

of Bank notes declined, legislation made sure the system performed efficiently. Beginning in 1811, legal restrictions imposed that the Bank's notes be accepted at face value in payment of any sort of debt.³⁷

C. Debt-management: from the short to the long end

Selling to the Bank rather than to the London money market supported the price of Exchequer bills at a time of extreme fiscal pressures. The hand-collected daily prices for Exchequer bills in Figure 12 display clearly that beginning around 1810 bills were quasi-systematically priced at a premium. This jump in prices coincides with the Bank's rising holdings of Exchequer bills.

FIGURE 12

Price of Exchequer Bills in the London money market and funding operations

Figure 12 also depicts—as black vertical bars—so-called funding operations. These operations consisted in converting short into long-term debt and were engineered whenever prices for short-term debt depreciated because of over-abundant supply. Short-term debt, namely Exchequer bills, was used as an instrument for temporary financing. Bills were not necessarily backed by specific taxes and carried a higher interest charge than long term bonds; coupons were of about 5.3 percent for the former against 3, 4 or 5 percent for the latter.³⁸ When outstanding bills accumulated in the context of war emergencies, they could not be repaid by a budget surplus and had to be refinanced by long-term bonds. Long-term bonds were serviced by specific ear-marked taxes, voted by Parliament. Such refinancing therefore meant that the short-term debt was also, implicitly, backed by the future taxes. The anticipation of refinancing was essential for the perception that the Bank's government debt holdings were not seignorage and should therefore not be inflationary.

Funding operations were similar to interest reductions of long-term bonds at 4 or 5 percent.

³⁷Lord Stanhope's Act or 51 Geo. III, c. 127.

³⁸Exchequer bills carried a daily interest of 3.5 pence per day. A rough estimation for an annual equivalent interest rate is 5.3 percent.

While *ex ante* parliamentary authorization and ear-marked taxes were necessary for issuing standard long-term debt, parliament only intervened to *ex post* sanction the creation of long-term debt through funding operations. If bills were converted into four or five percent denominations of bonds during war-time, they also became convertible into three percent perpetuals, consols, when peace was concluded. 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 over-subscribed.³⁹ The Bank stood ready to cash the bills of those holders not willing to convert.

Long-term refinancing could not wait for the end of the war. Because of the exceptional accumulation of short-term debt, funding operations had to take place well before the end of the war. They became the rule when the war intensified after 1808. Operations accounted sometimes for as much as 40 percent of yearly long-term debt creation, as in 1796, 1809, and 1810.⁴⁰ For the surge years, funding operations accounted on average for 24 percent of long-term debt creation.⁴¹ The frequency and size of funding operations contributed to effectively stabilizing the market price of Exchequer bills, as can be seen in Figure 12. Public short-term debt did not suffer the price declines long-term debt had endured during the first debt-financed regime. The low rate at the short end of the yield curve was also thought to keep up the prices of public long-term debt.⁴² Both of these effects reduced future tax liabilities.

D. The making of a central bank

On the surface, the measures implemented during the third regime of the wars seem to reflect a modern division of tasks between the monetary and fiscal authorities. By standing ready

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

⁴⁰We 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.

⁴¹Report by the Secretary and Comptroller General of the Proceedings of the Commissioners for the Reduction of the National Debt, 1891.

⁴²Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments, 1819; testimony of Samuel Thornton and Charles Pole, respectively.

to absorb Exchequer bills, the Bank regulated the quantities and thus the price of bills in the money market. On the other hand, the fiscal authorities guaranteed the long-term sustainability of outstanding government bills by providing an explicit tax backing. But this interpretation misses the point that by granting unlimited funding to the Treasury, the Bank acted as the ultimate backstop to public finances in a period of severe fiscal tensions. The Bank's increasing involvement in fiscal policies also sealed its transformation into Britain's central bank and was at the origin of the pound's devaluation during the third regime.

At the time of its creation, the Bank was assigned two functions, the provision of liquidity and the operational guarantee for the government's long-term annuities. As we have noted before, long-term annuities were funded by ear-marked taxes, which necessitated Parliament's *ex ante* assent. The Bank's Foundation Act⁴³ further prevented it from lending directly to the government by discounting short-term bills. The Bank was thus protected against any government that would attempt to bypass the parliamentary process by seeking direct funding from it.

During the 18th century, the Bank's interactions with the Treasury changed in that short rather than long-term debt became their primary object. Its operational guarantee for the government's long-term annuities became less important. The steady growth of the public debt in the century reduced the share held by the Bank. The French Wars completed this evolution, carrying the Bank's share from 5% to less than 2%. At the same time, the already usual practice of advancing funds for Exchequer bills without parliamentary authorization or funding was officially legalized as soon as Britain went to war in 1793.⁴⁴

Until 1810, the government had not made much use of the possibility to discount government bills with the Bank and the expansion of the Bank's notes during the first two regimes was primarily driven by the discount of private securities. Some discounting of government bills had taken place in the previous regimes. In the last two regimes of the war, the restrictions on direct government lending were more clearly abandoned (Figure 8). In particular, the monetary policy innovation implemented in the third regime lay in the size of the Bank's discounting of government bills.

⁴³5 and 6 William and Mary, c.10.

⁴⁴33 Geo. III, c. 32.

The counterpart of the Bank's growing and successful interventions in the public debt market was a reduction in its interactions with private agents in the London money market. The yields on Exchequer bills acted as a floor in the London money market (O'Brien 2006). High prices and low yields on Exchequer bills granted favorable financing conditions for London banks and merchants. The demand for the Bank's own discounting declined, whenever companies were able to easily discount with private banks.⁴⁵ As presented in Figure 8, private discounts at the Bank decreased indeed after 1810.

Moreover, the Bank had effectively ceased to compete with London banks for the business of discounting private assets. Bank rate—the Bank's discount rate—stayed at the legal maximum of 5 percent between 1797 and 1822 (Clapham, 1944, vol.II, appendix B). This high rate would only become attractive in times of financial distress. This was precisely the definition of a lender of last resort.

The Bank's portfolio became less diversified as it tied its financial fate to that of the Treasury. As public assets backed a growing part of the Bank's liabilities, (war-related) expectations regarding fiscal sustainability affected the value of the Bank's notes. We find strong evidence that fiscal policy and expectations thereof affected the value of liabilities issued by a monetary authority owned by private shareholders. For a modern central bank, whose balance sheet is effectively merged with that of the fiscal authority, the pass-through from fiscal policy to price stability may be stronger.

IV. The fourth regime (1815-1821): exit strategy

In June 1815, the allied victory at Waterloo brought a definite end to the French Wars. In this joyous situation, the debt-to GDP ratio stood at 210% while the pound was devalued by around 20%. Policy makers had only few options to cope with the adjustment, and they all came with dire side-effects. While something had to be done about the colossal amount of outstanding debt, the country had reached the limits of taxable capacity, or at least so went the political consensus. To make matters worse, the long-promised return to the gold standard would imply deflation, mechanically increasing the real debt burden. As during the

⁴⁵Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments, 1819; testimony of George Dorrien.

European debt crisis, policy makers ultimately faced the choice between restructuring a debt overhang and returning (maintaining) to a fixed exchange rate.

In particular, three issues dominated policy debates during the exit phase: the budget surplus, the conversion of short- into long-term debt, and the resumption of the gold standard. The sequence of measures implemented indicated fiscal predominance, as had been the case during the earlier phases of the wars. Monetary stabilization ensued when measures guaranteeing fiscal sustainability were carried out successfully. The chosen exit strategy, i.e. the policy choice of topping up fiscal retrenchment with monetary contraction hinged on Britain's political organization and manifested in important economic and social tensions. We will discuss these issues in turn.

A. Adjustment to the “old normal”

The professed objective of the exit strategy was the return to the “old normal”. This meant fiscal retrenchment in order to reduce public expenditures to their pre-war level. For the war years, military charges had accounted for almost 2/3 of total expenditures. As military expenditures collapsed from 20 to 5 percent of GDP, the primary surplus jumped to more than 9% (Figure 5). 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 policy makers were concerned with was the conversion of short- into long-term debt. Funding operations were undertaken in 1815, 1818, and 1820 (Table 7 in the appendix). Through these operations, the newly converted debt obtained an explicit tax backing and commanded therefore a lower interest rate. The three funding procedures carried out during the exit phase increased tax payers' future liabilities by 3, 9, and 2 percent of GDP, respectively.

Funding operations had to include the loans from the Bank. One of the essential elements of the suspension's “grand scheme” was that the Bank improved the liquidity of the credit market by advancing funds against future tax incomes. It was not to provide war finance by note issues *per se*. If the loans from the Bank were to be considered as real asset 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 that were funded on specific taxes.

Thus, quite naturally, the Bank directors insisted that the resumption was only possible if the government reimbursed a substantial amount of debt to the Bank.⁴⁶ For the Bank, the exit strategy was the restoration of a balance sheet that was similar to the one before the suspension. However, at least during the first years after Waterloo, the Treasury did not seem to work towards that same aim.

Table 4 displays the evolutions in the Bank’s balance sheet between the suspension of the gold standard in 1797 and the end of the wars in 1815. We scaled balance sheet items by the average growth rate over the period to roughly abstract from evolutions that might have occurred regardless of the suspension of the gold standard. On the asset side, the increase of the balance sheet was driven to equal parts by the Bank’s holdings in private and public securities; lower bullion holdings reflected the payments of troops on the continent in specie. In terms of the Bank’s liabilities, deposits had risen in line with the Bank’s handling of public war-related flows of funds and so had the Bank’s gains. The note issue had increased by 50 percent.

Table 4: Bank of England Balance Sheet, 1797-1815 change in percent, scaled*

Assets		Liabilities	
Public Securities	43.4	Circulation	49.0
Private Securities	46.6	Deposits	9.5
Bullion	-40.2	Net gains	32.7
Total	33.8	Total	33.8

**The balance sheet items were divided by 1.76 which is the growth multiplier of real GDP between 1797 and 1815, based on Broadberry et al. 2012.*

These evolutions stand in contrast with the Bank’s balance sheet position when resumption was decided in 1819, as presented in Table 5. Despite the end of the wars, the Bank’s bal-

⁴⁶Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments of 1819.

ance sheet increased slightly. The balance sheet’s composition was even more striking. While bullion holdings rose, the Bank had lowered the amount of private securities held. The expansion of the balance sheet after the wars was primarily driven by the Bank’s holdings in Exchequer bills that were now almost 80 percent above their pre-suspension level. As can be seen on the liability side, government debt holdings were the counterpart to the Bank’s note issue, that exceeded the pre-suspension level by 85 percent. The abolition of war-related malt taxes along with the repeal of the income tax in 1816 entailed that the government continued to borrow short-term even 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 1821.⁴⁷

Table 5: Bank of England Balance Sheet, 1797-1819 change in percent, scaled*

Assets		Liabilities	
Public Securities	78.1	Circulation	85.0
Private Securities	-19.5	Deposits	-23.3
Bullion	14.7	Net gains	-11.9
Total	34.5	Total	34.5

**The balance sheet items were divided by 1.31 which is the growth multiplier of real GDP between 1797 and 1819, based on Broadberry et al. 2012.*

When the gold standard was fully restored on 1 May 1821, the Bank’s balance sheet was back to its pre-suspension level, as shown in Table 6. Along with the resumption of the gold standard, Parliament had also imposed that the government reimbursed the Bank £10 million, or 55 percent of government short-term debt held on its balance sheet.⁴⁸ The Bank’s public security holdings were therefore slightly below their pre-suspension level. The private discount business contracted massively due to the commercial distress caused by deflationary policies. The Bank’s bullion reserve had rarely been higher. In order, to rebuild its stock in view of resuming convertibility, the Bank had been buying gold at a loss. On the liability side, deposits and net gains were down. While prices had reached their pre-suspension level, the Bank’s note circulation was still 32 percent above that reference point.

⁴⁷Chisholm Report, vol.I, pp.202-224 and vol.II, pp.8-50, authors’ calculations.

⁴⁸59 Geo. III, c. 76.

Table 6: Bank of England Balance Sheet, 1797-1821 change in percent, scaled*

Assets		Liabilities	
Public Securities	-3.7	Circulation	32.0
Private Securities	-68.1	Deposits	-43.8
Bullion	177.2	Net gains	-38.6
Total	-3.8	Total	-3.8

**The balance sheet items were divided by 1.61 which is the growth multiplier of real GDP between 1797 and 1821, based on Broadberry et al. 2012.*

How did prices behave precisely?

The main issue for the government was the refinancing of the short-term war loans into long-term term funded debt. A similar conversion had taken place, on a smaller scale, after 1783 and the end of the American War. Therefore, large amounts of long-term loans were issued after 1815.

In the first three years after the resumption of peace, most of the private discounts were paid back to the Bank of England (Figure 8), and the amount of notes in circulation was reduced by the about the same amount. We can see the Real Bills doctrine at work . During that initial phase, the discounts by the Bank to the government kept at about the same level.

TABLE 6

Long-term loans (1815-1821)

The refinancing of the short-term debt had to include the loans from the Bank of England. Let us recall that one of the essential elements of the “grand scheme” of the gold suspension was that the Bank of England would improve the liquidity of the credit market during the war but it would not provide war finance by issue notes. The Bank’s directors insisted that a resumption was possible only if the government reimbursed a substantial amount of debt to

the Bank.⁴⁹ The loans from the BoE were to be considered as real asset and not seignorage: they were claims on future tax revenues from the government, and the formal link to these revenues was established by the conversion into long-term bonds that were funded on specific taxes.

For the Bank, the exit strategy, to use a modern term, was the restoration of a balance sheet that was similar to the one before the suspension. When the gold standard was fully restored on 1 May 1821, the Bank's balance sheet was back to its pre-suspension level (Table 7). The Bank's bullion reserve had rarely been higher. In order, to rebuild its stock in view of resuming convertibility, the Bank had been buying gold at a loss (Clapham 1944). Private securities, coming from the Bank's discounting business, were reduced as well. Eventually, the Bank was repaid £10 million, or 55 percent of government short-term debt held on its balance sheet (59 Geo. III, c. 76). Important conversions of short into long-term and of high into low-interest rate debt were undertaken in 1818, 1819, 1822 and 1824. These operations were necessary if the debt was to be reimbursed.

After 1815, the agio and the exchange market reacted quickly with the higher probability of a return to the 1797 parity. However, they did not resume a level at parity before 1819 when a consensus was established and the resumption of the parity was reaffirmed by the Parliament.⁵⁰ Before that, the debates prefigured those after World War I, in which Keynes took a famous position. On one side, 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). Contemporaries indeed considered the possibility of never resuming cash payments, as uttered by Bank proprietors when the

⁴⁹ Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments of 1819.

⁵⁰The definite resumption of specie payments (59 Geo. III, c. 76) was enacted 2 July 1819. It stipulated that the Bank was to gradually resume payments, by exchanging its notes against ever higher amounts of specie between 1 February 1820 and 1 May 1823. Discretion was left to the Bank to accelerate resumption, granted that any increase in the pound's gold content was irreversible. The plan for resumption was credible in the eyes of contemporaries. Upon the first announcements in May 1819, Bank stock and gold prices reacted immediately, suffering sizable declines in value; the pound's exchange rate on Paris appreciated (Antipa 2016).

suspension of convertibility was reiterated for the first time after hostilities had ceased in the spring of 1816 (*London Times* 13 April 1816).

The abolition of war-related malt taxes along with the repeal of the income tax in 1816 entailed that the government continued to borrow short-term even after the end of the war.

TABLE 7

Balance sheets of the Bank of England

There were, however, doubts in the market regarding the resumption of the convertibility. These expectations can be measured by two prices, the external exchange rate of the pound and its internal exchange rate into gold, the *agio*. The external exchange rate was based on the price for bills of exchange. The latter were payment instruments that circumvented bullion shipments by taking advantage of offsetting balances that international merchants accumulated with each other (Neal 1990, p. 5f).

These important commercial and financial networks and instruments were essential for British war finance. The Exchequer purchased bills of exchange from London merchants, drawn on their foreign correspondents. British military officials used these bills abroad to hire troops and purchase supplies. Continental merchant readily accepted the bills, as they could in turn be used to pay for British imports. Napoleon sought to undermine British war finance and the acceptance of bills of exchange by making it difficult to import British goods (Neal 1990, pp. 201ff).

The price of bills of exchange therefore reflected political and military events that, among other things, affected British export markets on the Continent. The price of bills also incorporated contemporaries' expectations, as we consider the 2.5 months usance rate on Hamburg—the only series available for the entire period of the French Wars. As shown in Figure ??, the exchange rate fluctuated around 34 schillings (Flemish banco) per pound until the end of 1808. The poor harvests in 1800/01 did, for example, not affect the exchange rate durably. Afterwards, the pound devalued progressively in line with important expenditures in the Peninsular War and the continued war-related expenditures and subsidies to Britain's allies elsewhere on the Continent (Silberling 1924).

B. Adding monetary to fiscal contraction: political economy and economic costs

Start this section by pointing out what measures implemented meant in modern terms. Fiscal retrenchment in times of depression, plus monetary contraction.

Then continue this section with description of political system. Than redistribution and deflation, but economic costs would not translate into political ones. In system where election were no threat and there was collusion between voters and MPs the way to cope with tensions was repression.

The professed objective of the exit strategy was the return to the “old normal”, also in times of (re)distributive issues. Before and after tax. It also implied a return to the pre-war wealth distribution along two dimensions. The income tax—exclusively discharged by the affluent—was abolished in 1816. The excise—paid by the not so well-off for domestically produced goods and services—was kept constant. Overall, taxation thus remained high after Waterloo and became again more regressive (Daunton 2001, pp. 47-57). ADD Lord King on distribution (old against new elites; borrowers against lenders). CORN LAWS and deflation (Boyd Hilton). Gold standard

Pitt had pledged in 1799 that the new income tax would be a war tax and indeed, it was abolished in 1816. Other taxes (mainly the excise) were kept at the same level. The abolition of war-related malt taxes along with the repeal of the income tax in 1816 entailed that the government continued to borrow short-term even after the end of the war.

The post-war recession certainly contributed to the deflation after 1815. Numerous public manifestations of economic and social discontent were rendered illegal by a number of legislative actions. Trade unions and collective bargaining were banned from the public space. Other safeguards of individual freedom against arbitrary state action were curbed.⁵¹ Following the “Peterloo Massacre”—a demonstration for universal suffrage in August 1819 that cost the life

⁵¹The Combination Acts of 1799 and 1800 made trade unions and collective bargaining illegal and were commonly attributed to the fear that the French revolutionary ideas would spread among the working class. *Habeas Corpus* the principle that requires that a person under arrest be brought into court in order to safeguard prisoners against unlawful detentions was suspended several times over the period. In 1793 (34 Geo. III, c. 54), in 1798 (38 Geo. III, c. 36), 1799 (39 Geo. III, c. 15 and 39 Geo. III, c. 44), and in 1817 (57 Geo. III, c. 3).

of 15 people—the British government acted to prevent any future disturbances by introducing the so-called Six Acts. The acts were aimed at censoring radical newspapers, preventing large meetings, and reducing what the government saw as the possibility of armed insurrection. The franchise had not yet been extended and the electoral system provided no representation of the citizens of low income who were most affected. The right to vote in Parliamentary elections or to become a member of parliament was linked to property rights. Only the affluent qualified and registered voters over the period under consideration amounted to 1.5 percent of the total population.

Denominations of public debt certificates were large enough to guarantee a large intersection between creditors of public debt on the one hand, and members of parliament and registered voters on the other hand (Johnston 2013).⁵² Since deflation increased the real value of debt to the advantage of creditors, support for reimbursement of the public debt at the old par was strong amongst registered voters and members of parliament.

V. Conclusion

TBC

⁵²Consols 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 (Lindert and Williamson 1983)

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APPENDIX

On the government accounts

From the Chisholm Report, we construct Table ** in the Appendix. In order to identify the items in the data, the letters of the column are attached to the data of the Report for the year 1820.

We make the convention that the surplus, Σ , is the gross income (P) minus the total expenditures (H), which itself is the sum of civil expenditures (J), military expenditures (K) and interest (I):

$$\Sigma = P - (I + J + K).$$

One verifies in the report that

$$R + P + S + Q = I + J + K + L + M + N,$$

and that the surplus is

$$\Sigma = M - R + N - S + L - Q.$$

The allocation in the data of the deficit, $-\Sigma$ between long-term debt and short-term debt is subject to some uncertainty because of the operations of the Sinking Fund by which the government lend to itself and borrowed from itself. In the Chisholm report, we take the revenues from issuing long-term debt to be the difference $(a - b) - c$. Note that the item b is short-term but is funded. The revenues from issuing long-term debt are different from the increase of the long-term debt which is the face value of the annuities.

For short-term liabilities, funded and non funded exchequer bills, balances at the beginning of the year, etc..., the market value of the new issues was not much different from the face value (see ***). Therefore, an approximate value of the increase of the short-term debt is equal to the difference between the deficit $-\Sigma$ and the revenues from issuing long-term debt, $(a - b) - c$.

Appendix B

“The Committee think it right to premise, that in this Investigation they have taken as their Guide the decided Opinion of Parliament, as declared by many repeated Enactments, that the Removal of the Restriction upon Cash Payments by the Bank, or in other Words, the Restoration of the Currency to a state of Regulation by its ancient Metallic Standard, is an Object which ought to be accomplished at as early a Period as shall be found safe and practicable: The first Act, confirming and continuing the Restriction contained in the Minute of Council of the 26th of February 1797, was passed on the 3d of May 1797, and was to be in force ’till the 24th of June 1797: The Restriction was further continued by an Act passed on the 22d June 1797, until One Month after the Commencement of the then next Session of Parliament: By another Act, passed on the 30th of November in the same Year, the Restriction was further continued until One Month after the Conclusion of the War by a Definitive Treaty of Peace: on the 3d of January 1798, the Directors of the Bank, in pursuance of a Power reserved to them by the Acts of Parliament referred to, gave Notice that on the 14th instant they would pay in Cash all Fractional Sums under Five Pounds: and on the 1st of February 1800 would pay Cash for all Notes of One and Two Pounds, dated prior to the 1st of July 1798, or exchange them for new Notes of the same Value, at the Option of the Holders: By another Act, passed on the 30th of April 1802, the Restriction was continued until the 1st of March 1803: on the 28th of February 1803 it was further continued until the Expiration of Six Weeks after the Commencement the next Session of Parliament: On the 13th of December 1803, the Country being then again at War, it was further continued until Six Months after the Ratification of a Definitive Treaty of Peace: In the Year 1812 an Act was passed for preventing any Note of Bill of the Bank of England or Ireland from being received for a smaller Sum than the Sum therein specified, and for staying Proceedings u[o Distress by tender of such Notes: and in 1814 this Act was further continued during the Continuance of any Act imposing Restriction upon the Bank with respect to Payments in Cash: BY an Act passed on the 18th of July 1814, the Restriction upon the Bank was continued until the 25th of March 1815; and it was further continued by an Act passed on the 23d of March 1815 to the 5th Day of July 1816: On the 21st of March 1816 an Act was passed, by which, after reciting in the Preamble ‘that it was highly desirable that the Bank should, as soon as possible, return to the Payment of its Notes in Cash; and that it was expedient, that the Provisions of the former Acts should be further continued, in order to afford Time to

the Directors of the Bank to make such Preparations as to their Discretion and Experience might appear most expedient for enabling them to resume Payments in Cash, without public Inconvenience, and at the earliest Period: and that a Time should be fixed at which the said Restriction should cease;’ it was enacted, That the said Restriction should continue un til the 5th of July 1818: On the 28th of May 1818 another Act was passed, by which, after reciting in the Preamble, ‘that it was highly desirable that the Bank of England should, return as soon as possible, to the Payment of its Notes in Cash, and that unforeseen Circumstances which had occurred since the passing of the last of the preceding Acts, had rendered it expedient that the Restriction should be further continued, and that another Period should be fixed of the Termination thereof;’ the Restriction is further continued until the 5th of July 1819: Of these unforeseen Circumstances, the most important was the Apprehension of the Effect of further Foreign Loans (Particularly those of France) upon the Exchanges and the Price of Gold: Subsequent to the first Restriction upon the Bank of England, similar Restrictions were imposed and continued by different Acts upon the Bank of Ireland, and their Termination was fixed at Three Months after the Expiration of the Restriction of the Restriction upon the Bank of England: During these successive Prolongations, the Bank appears at different Periods to have made great Exertions to procure such a Mass of Treasure as might enable it to replace itself upon its ancient Footing, whenever it should seem good to Parliament to remove the Restrictions: in 1798 the Treasure was increased to an Amount which bore, in the early Part of 1799, a very large Proportion to that of the outstanding Notes: During the Years immediately subsequent, this Treasure experienced a considerable Reduction; but from the Middle of 1804 to the Middle of 1808, the favorable State of the Exchanges enabled the Bank to make large Purchases of Gold: In order to encourage the Importation of Gold, the Directors determined to give £4 per oz., and the Treasure was so much augmented as to have exceeded in 1808 the highest Amount which it had reached in 1799: From that Period it successively declined: The Restriction was prolonged in 1814 only to the 25th of March 1815, and in 1815 only to the 5th of July 1816; but the extraordinary high Price of Gold, and the extreme Depression of the Exchanges, which, from whatever Causes, prevailed during great Part of these Periods, combined with the large Advances to Government which the Exigencies of the Public Service required, to prevent any material Progress being made towards a Restoration of the Treasure of the Bank to its former Amount: Notwithstanding these discouraging Circumstances, the Bank more. than. doubled its Treasure during the last Eight Months of 1815; and the Fall in the Price of Gold, and the favorable Turn of the Exchanges, enabled the Directors to raise

it, by January 1817, to more than Quadruple what it had been in the beginning of 1815: At this Period the Directors felt so confident of being able to comply with the Injunctions of Parliament, even before the Period at which the Restriction was to expire, that they issued a Notice for the Payment in Cash of all the One Pound and Two Pound Notes bearing Date prior to January 1816: Finding little of no Demand for Cash in consequence of this Notice, and their Treasure having continued during the Course of the Year to increase to an Amount far exceeding what it had ever reached, and, with few Exceptions, being a larger Proportion to the Extent of their Issues than it had ever borne before, the Directors issued a Second Notice in September 1817, for the Payment in Cash of all Notes bearing Date before the 1st of January in that Year: This Measure has been stated to the Committee to have been undertaken, in the Hope, that if it proved successful, that is, if the Gold so tendered were not demanded, or if, when demanded, it remained in the Country, the complete Resumption of Cash Payments would take place gradually and as it were insensibly, even prior to the Period then fixed by Parliament, viz. the 5th of July 1818: In the Month of April 1817 the Effect of the great Foreign Loans made in that Year began to be considerably felt: Between April and October 1817 the Exchanges took an unfavourable Turn, and the Price of Gold, which had from July 1816 to March 1817 fluctuated between £3 d18s. 6d. and £3 19s. 6d., rose between April and December 1817, from £3 d18s. 6d. to £4 0s. 6d.; since which Date it does not appear by the quoted Prices to have been ever again reduced below £4: The new Gold Coinage also began to be issued in July 1817: The Treasure of the Bank was raised to its highest Amount in the Month of October 1817: There appears to have been no considerable Demand for Gold previously to the Month of October: The First Issue of Sovereigns in large Quantities was in that Month: There was a Diminution in the Demand for them in the Three succeeding Months; but in the Month of February 1818 the Issue of Gold increased 'till August in the same Year; and the Demand, during this Period, is stated to have arisen decidedly for the Purpose of Exportation: It appears from the Evidence of Mr. Harman, that during the whole of the Year 1817, that the Bank did not think it necessary to make any Reduction of its Issues, either in consequence of the Effect of the Foreign Loans upon the Exchanges, or of its Payments in Gold, made in Conformity to the Notices above referred to.”⁵³

⁵³Journal of the Lords, May 7, 1819, 342-343.

Appendix C: Measuring the Money Supply

Our measure of the money supply consists of three components, the Bank of England's note issue, deposits with the Bank of England, and coins in circulation. The first two components are readily available. We construct the stock of coins in circulation in the following manner.

Our point of departure is the coin stock estimated for the year 1797—the year of the gold standard's suspension—as contained in the report preparing the resumption of the gold standard (Lord's report, p.346). Using a standard decay formula, we then calculate the coins' absorption rate based on data contained in Jevons (1868). The so-obtained absorption rate of 5.7 percent per year is also in line with Velde (2013).⁵⁴ Mint output is taken from the standard source for this data set, Challis (1996, appendix 1, pp. 673-98), which relies on official mint data. Given the precipitous fall in mint output, the above obtains a declining overall schedule for the coin stock, displayed in Figure 6.

⁵⁴Jevons (1868) collected data for the period spanning the years 1817 to 1867. For this period, exports of coins were allowed, contrary to period we consider, i.e. the years 1797 to 1821. This would imply a higher absorption rate for the later period. However, this bias is offset by the fact that hoarding of coins was substantially more prevalent during the suspension period. We are therefore confident that we can apply our measure of the absorption rate to the suspension period.

Appendix D: Debt Issues during the French Wars

Table 7: Loans Issued by Public Subscriptions, 1793-1821

	Date	Funded debt			Unfunded debt		
		£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
Regime 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
	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	27.0	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.

FIGURES

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

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

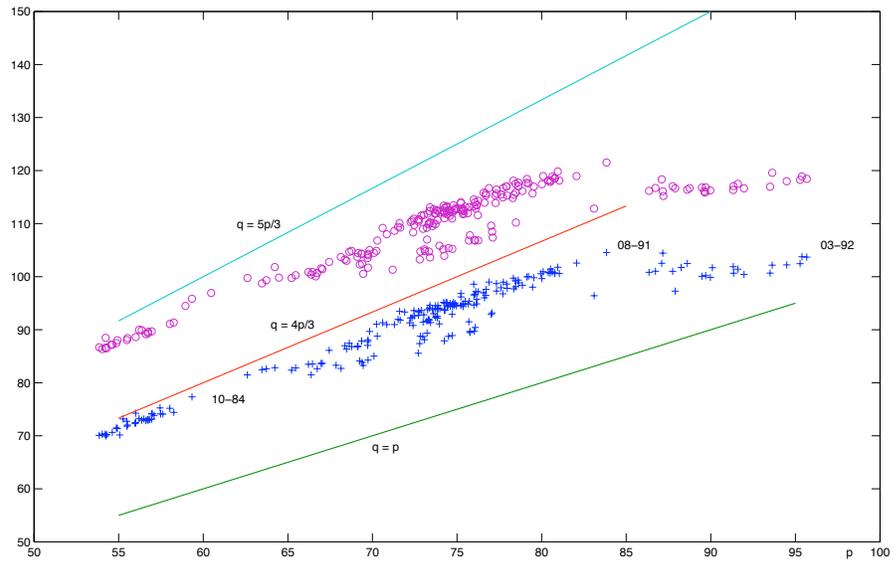


Figure 2: Prices of the bonds at 3 and 4 percent (1784-1794)
Sources: Bimonthly averages from daily prices in the Gentleman's Magazine.

Figure 3: Prices of 3 percent consols, 1755-1830

Sources: Neal 1990, Gentleman's Magazine.

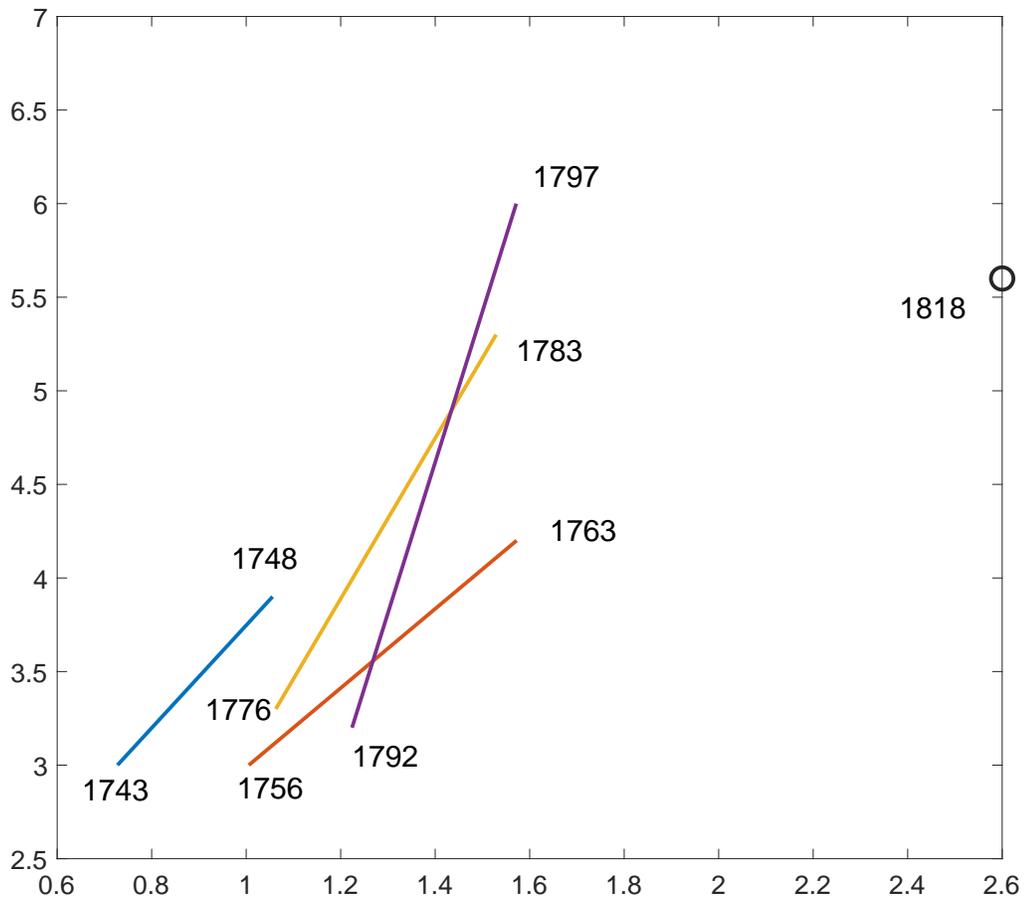


Figure 4: Debt levels and long-term interest rates in four wars

Sources: Gentleman's Magazine and authors' calculations.

Figure 5: 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

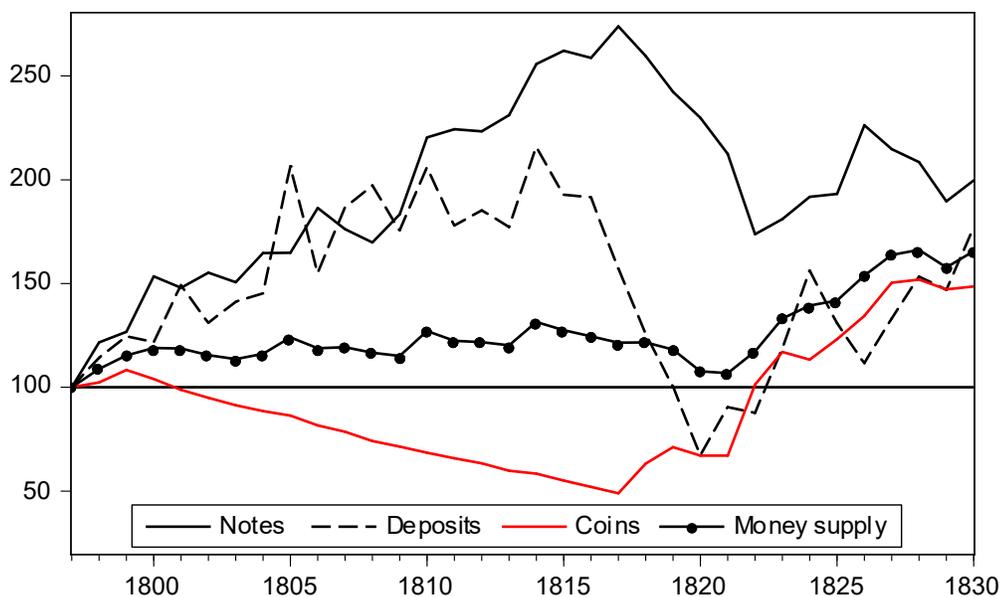


Figure 6: The Money Supply and its Components

All indices were set to 100 in 1797, the year of the gold standard's suspension. Sources: Challis 1994, Jevons 1868, Mitchell 1988, and authors' calculations.

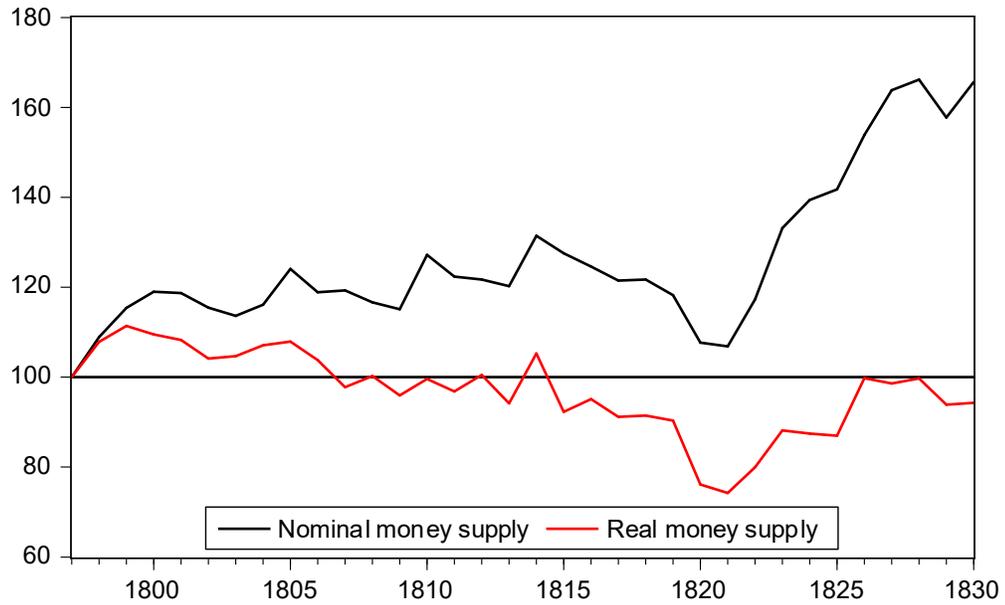


Figure 7: The Money Supply and the Growth of the Economy
The nominal money supply is deflated by the annual growth rate of real GDP.
Sources: Broadberry et al. 2012 and authors' calculations.

Figure 8: Public and Private Assets held by the Bank of England (1790-1825)
Nominal amounts of asset holdings are deflated by the annual growth rate of real GDP.
Sources: Broadberry et al. 2012, Mitchell 1988.

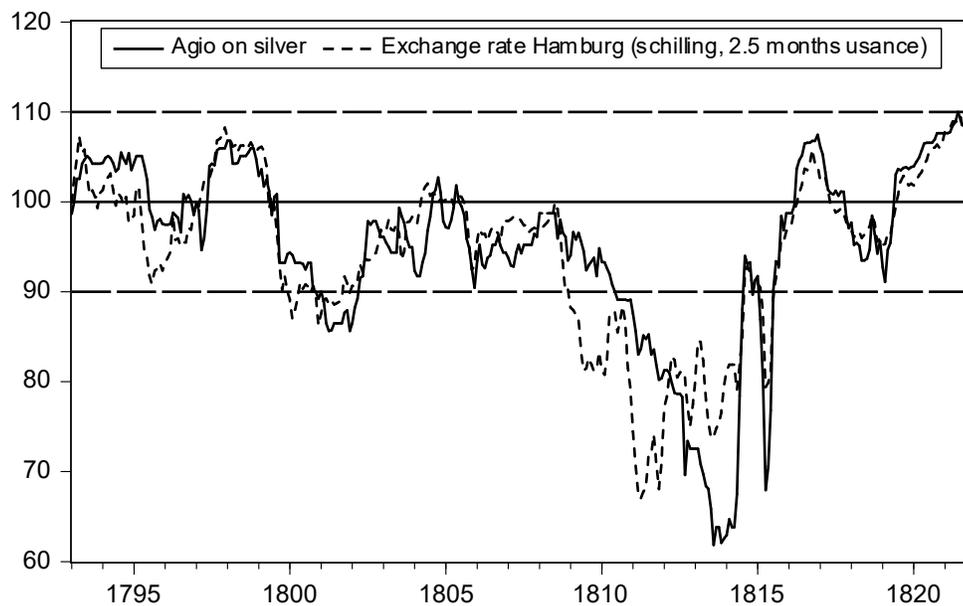


Figure 9: Inflationary Tensions—Premium on Silver and Exchange Rate on Hamburg
The agio on silver is calculated as the percentage deviation from the mint price of silver. Both indices are set to 100 in January 1797, the last month before the suspension of the gold standard.

Sources: Boyer-Xambeu et al. 1994, Castaing's Course of the Exchange, and authors' calculation.

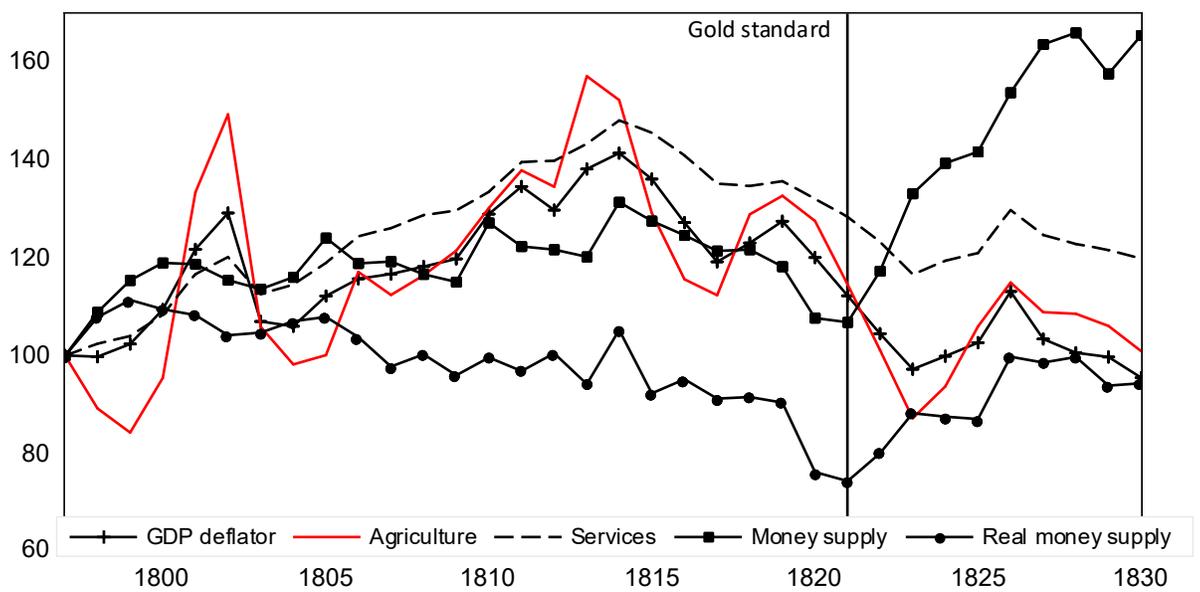


Figure 10: Price indices and the money supply, 1797=100, 1797-1830

The money supply was deflated by the real GDP growth rate.

Sources: Broadberry et al. 2012, Mitchell 1988, authors' calculations.

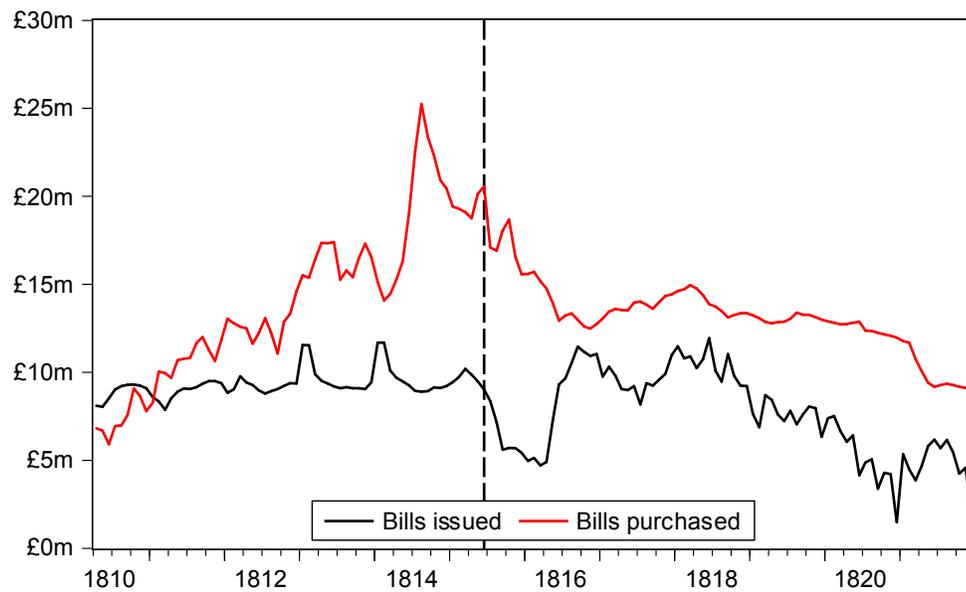


Figure 11: The Bank’s interventions in the public debt market, April 1810 to December 1820
The dashed line in Figure marks the end of the French Wars after the battle of Waterloo in June 1815. Series were seasonally adjusted using X12.
Sources: Bank of England Archives, authors calculations.

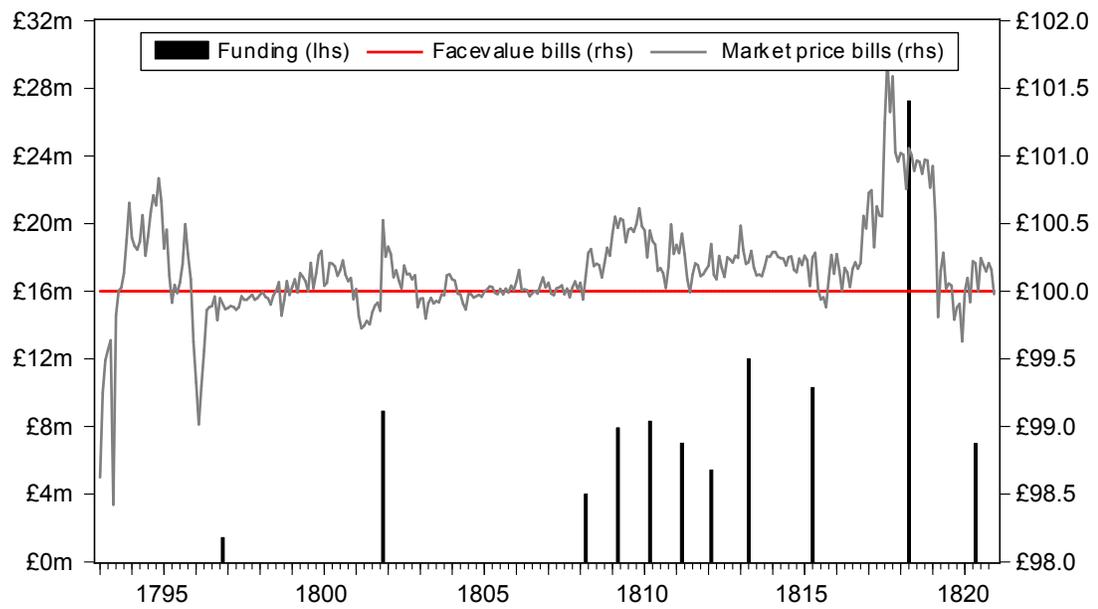


Figure 12: Price of Exchequer Bills in the London Money Market and Funding Operations, 1793-1815

Sources: Gentleman's Magazine, authors' calculations.