

# Monetary and Fiscal Policy in England during the French Wars (1793-1821)

Pamfili Antipa\* and Christophe Chamley\*\*

June 23, 2016

EARLY DRAFT

We analyze the fiscal and monetary policies implemented in Britain to finance the French Wars (1793-1815). We also present new hand-collected balance sheet data that sheds light on how the Bank intervened in government debt markets.

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

JEL: N13, H63, E58, E62.

\* Banque de France

\*\* Boston University

“There is no neat way to distinguish monetary policy from debt management, the province of the Federal Reserve from that of the Treasury. Both agencies are engaged in debt management in the broadest sense, and both have powers to influence the whole spectrum of debt.” (James Tobin)

## 1 Introduction

The French wars (1793-1815) exerted more pressure on the fiscal and monetary policy of Britain than at any time after the Glorious Revolution. Britain’s victory over Napoleonic France ushered in a Period of undisputed naval and commercial supremacy for the century to come.

The policies the Bank of England (BoE) implemented interacted with fiscal policy choices and therefore affected prices and real activity. During the war years, the BoE’s balance sheet increased by 130 percent, primarily through the expansion of government bills. This policy was set with the expectation of an exit strategy. After the war, the government would redeem some of the short-term bills held by the Bank of England by converting them into long-term bonds, backed by future tax revenues.

Put differently, the expansion in the Bank’s balance sheet was backed by real assets. According to a Modigliani-Miller argument (Wallace, 1981; Chamley and Polemarchakis, 1984), the expansion of balance sheets in this context should not have a large impact on the price level. And yet, at its peak in 1813, the price level exceeded its pre-suspension level by roughly 40 percent.

The Bank’s intervention took place in an environment where the convertibility of the pound into gold had been suspended. The suspension of the gold standard was accompanied by important degrees of debt accumulation and inflation. Not only was the return to the pound’s pre-war gold content contingent on the outcome of the war, it would come at high deflationary costs. Therefore, there was considerable uncertainty regarding the eventual course of policy (Acworth, 1925; Fetter, 1965; Kindleberger, 1982). Resuming the gold standard was an uncertain prospect, as was the reversion of the fiscal and monetary expansion that had financed the French Wars. This uncertainty affected the behavior of prices (Antipa, 2015).

The issues we address are of historical importance since the monetary policies implemented during the French Wars served as a blueprint for financing World War One.

We contribute also to the analytical debate that is concerned with the conditions under which the variations of a central bank's balance sheet affect prices. Finally, our findings are relevant for the euro area where the euro plays a role that is analogous to the specie of former times and where the ECB is the principal actor of crisis management, in the absence of a supranational fiscal authority (Reis, 2014).

The remainder of this article is organized as follows. The next section lays out the historical background, in which the BoE's balance sheet policies took place. Section three presents evolutions in the BoE's balance sheet and insists on the Bank's intervention in the different segments of the government debt market. Section four lays out the connections between the short and long ends of the government debt market and discusses the interactions with other policy measures namely the Sinking Fund. A last section puts our findings into historical and analytical perspective and concludes briefly.

## 2 Background

From 1792 to 1815, England mobilized in the “French Wars” all its resources, in collaboration with allies on the continent, to thwart the French attempt at the domination of Europe. At the onset, it was not clear that Britain would establish herself as the sole world power for the century to follow. As Knight (2013) writes:

*“Most people (except very few scholars) do not realize how vulnerable Britain was at this time. It was a world war in all but name, with ferocious fighting right to the finish between two systems of government, each using every possible resource to overcome the other. A British victory was finally achieved but only through radical efficiencies in the nation economic and political life.”*

By the beginning of the French Wars, Britain was equipped with formidable tools of fiscal and financial policy whose development and training had been stimulated since 1688 by a century with four major wars. The excise generated the major part of the tax revenues and was run by an efficient administration (Brewer). Collusion beer? This secure source provided the foundation for the issuance of new loans. In the first half of the century, the market for financial assets underwent its “financial revolution” (Dickson) that was achieved when the entire public debt was refinanced at a lower interest rate (Chamley). The three wars after 1740 were financed according to “modern” principles of public finance (Barro \*\*). A surge of military expenditures was financed by new loans that were funded on earmarked taxes, mainly the excise. The debt to GDP ratio rose during a war and fell after the war, partly through a small budget surplus,

and mainly because of the growth of the economy.

Policy makers at the time had to make decision under uncertainty about future events. But the expectations about the possible future events defined a regime for policy. Within a policy regime, decisions are affected by the realizations of random events but a given regime implies a consistency constraint such that the regime itself does not change. The unfolding of events may however make a regime inappropriate for policy response. In that case, the regime, which imposes a consistency framework on policy, has to be replaced by a new one. During the French Wars, two changes of regime took place, in 1797 and in 1810. The transition after 1815 was of course a phase in itself that had been anticipated before, with some uncertainty. In this paper, we therefore follow the sequence of these regimes.

We first recall the conditions of the public finances before the French Wars. In the first phase, 1793-1797, the fiscal policy is the same as in the previous three wars of the 18th century: tax smoothing with debt financing and convertibility of the pound by the Bank of England. The unprecedented level of interest rates led to the second phase (1797-1810) with the suspension of the convertibility, a real bills policy of the Bank of England and, despite the war, a primary surplus of the budget. For the final push (1810-1815), fiscal policy went back to deficit financing and the Bank of England purchased government liabilities. The last phase after Waterloo, with a large primary surplus and shifts in the balance sheet of the Bank of England led to a the resumption of the convertibility in 1821.

### **3 Three regimes**

#### **3.1 Public finances before 1797**

Between the start of the war against revolutionary France (February 1793) and the suspension of the gold convertibility (February 1797), Britain's fiscal policy, under Pitt, followed the method of debt financing that had been honed in three previous wars.

In each of these wars, the surge of expenditures was financed by new debts that were mainly long-term bonds funded by ear-marked taxes, especially excise but also import duties, which were voted simultaneously for their services. Each war thus led to a new plateau of commodity taxes. The only tax for which the increase was cancelled after a war was the land tax (Brewer). In peace time, the ratio of debt to GDP decreased, partly because of a small budget surplus, with a sinking fund, and more importantly because of the growth of the economy (Figure \*\*\*). The pattern of taxation and deficit

fits the “tax smoothing” method of the modern literature,<sup>1</sup> but it can also be explained by expediency.<sup>2</sup>

The cost of each war increased \*\*\* American war (1776\*-1783), Britain reverted to the same types of debt instruments and in the War of the Austrian Succession. For a brief time, the rate of interest on the British debt briefly even reached the French level.

Pitt having taken the Premiership at age 24 soon after the Treaty of Paris (1783), reinstated immediately a Sinking Fund of about 1 million per year thus providing evidence of fiscal rigor. That Sinking Fund resembled at times a an accounting gimmick. This saving piggy bank was preserved later in the war in years of fiscal deficit. But such a device serves as a signal of the commitment to balance the budget. Even in our contemporary economies, separate accounts have been used to reinforce future commitments, such as the separate tax for social security in the US. The initiative of Pitt which was a natural thing to do in after the American War in a regime of overall fiscal surplus, contributed to reinforce the commitment of the government to eventual fiscal balance in the entirely regime where the convertibility of the pound was suspended and the resumption of the convertibility depended on the credibility of that fiscal balance.

During the decade after the Treaty of Paris in 1783, the rate of interest decreased gradually, as one would expect in peace time. What may be more interesting is the fall of the premium of the 4% annuity over the 3%. Recall that this premium is the present value of the payments of the additional coupon of the 4% over the 3%, namely one pound, as long as the 4% is not redeemed. Following previous experience in the 18th century, this redemption would take place either slowly through a budget surpluses (the Sinking Fund), or in one fell swoop as in 1749, for the entire stock of the 4% annuities. In either case, a reduction of the premium is a strong indication that the market expects interest rates to fall in the future and to fall back to the peace time level not higher than 3%.

At the beginning of 1784, the price of the 4% was nearly 4/3 of the 3%. A lowering of the long-term interest rate back to 3% was to far to be seen. In the Spring of 1791, the long-

---

<sup>1</sup>Barro, 1979, 1987, Chamley, 1985

<sup>2</sup> The deficit method was the same for the three wars, but the types of financial instruments were different. In the War of the Austrian Succession (1743-48), the main part of the new debt was in 4% redeemables (15.3 million out of 23.7). The reduction of the interest from 4 to 3% was indeed the crowning of the Financial Revolution (Dickson) and marked the maturity of Britain’s debt financing system. During the Seven Years War, Britain did not issue redeemable debt, perhaps because the context was less favorable for an interest reduction than in 1748 when annuities the stock of 4% greatly exceeded the debt issued from the war. All loans during that war were \*\*\* (see other paper). (Chamley, 2011).

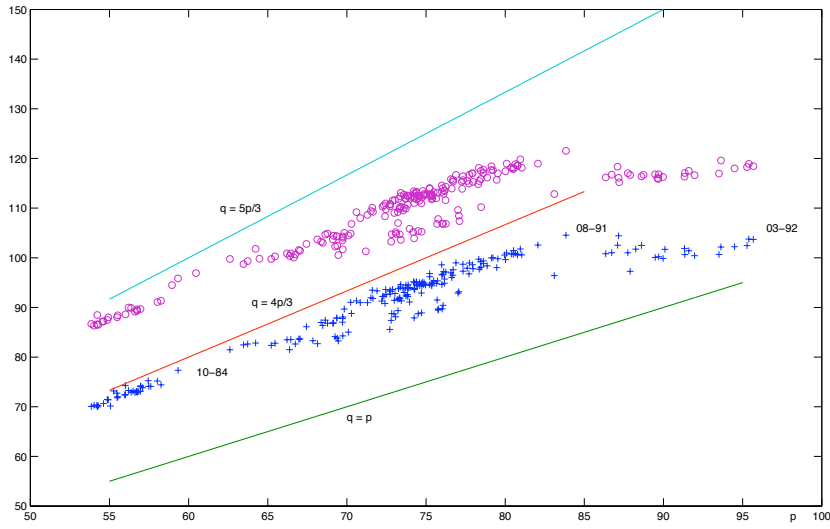


Figure 1: Prices of the consol (3%) and of the 4% annuities

Source: Gentleman Magazine.

term rate had decreased to 3.5% but the premium was still high (Figure 3.1). At the beginning of the summer, the 3% was priced at 85 and the 4% at 105. That difference of 20 means an expectation of redemption of more than 30 years in the future<sup>3</sup>. That premium fell precipitously during 1791. In March 1792, the 3% was priced at 97, the premium of the 4% had shrunk to 5, with an expected interval of time to redemption of about 5 years. The market expectations and conditions were very similar to those in 1747 before the previous interest reduction for all 4% annuities.<sup>4</sup> The events in France during the summer of 91 led the market believe that a new period of peace was coming.

Cooper p. 97 Keep the sinking fund, “doing so did preserve the commitment to abolishing the debt within a finite term of years.” note 23, a point made by Binney, *British Public Finance*, p. 116 and P.K. O’Brien, ‘Government revenue, 1793-1815: a Study of Fiiscal and Financial Policy in the Wars Against France’. (D. Phil. thesis, University of Oxford, 1967), p. 233. Other references p. 98.

<sup>3</sup>The present value of coupons of one pound for 30 years, discounted at 3%—the lower bound for the interest in this case—is 19.6.

<sup>4</sup>Chamley, 2011

### 3.2 1793-1797: standard tax smoothing and Gold convertibility

When the war resumed in 1793, Pitt and the policy makers obviously did not anticipate the next two decades. Although both military expenditures jumped much faster than at the starts of previous wars<sup>\*\*\*</sup>, the natural policy response was to rely on the standard debt financing with ear-marked commodity taxes and without increase of the land tax. However, the debt to GDP ratio was higher than at the starts of the previous wars. Already in the first year of the war in 1793, while the amount of borrowing was still relatively small, compared to previous wars, at 4.5 million, the price of the 3% consol, that had been at 95 in the Spring of 1792, fell to 72, lower than in any of the previous three wars. Cooper reports<sup>5</sup> “Pitt based his financial policy, and indeed, his entire conduct of the war on the assumption that the conflict would be over relatively soon.” At the end of 94, the consol was at 65. More importantly, the premium of the 4% annuity had risen to 15 (Figure 3.1). The market did not expect a short war.

#### Issuing bonds at 3% or 4%?

Most long-term bonds in Britain were redeemable at par. We can assume for exposition here that the peace time long-term interest rate was around 3 percent. A bond at 4 or 5 percent would be redeemed after a war when the interest rate decreased to its peace time level. This could be done by either of two methods. The first operated through a flow: the funds available in the sinking fund were used to repurchase at par bonds with high coupons through lotteries. The second method was a reduction of the interest on the entire stock of the bonds with a high coupon, as in 1749 to 3 percent<sup>6</sup> or later in 1888 to 2.5 percent.<sup>7</sup>

A 4 percent bond was equivalent to the combination of a 3 percent bond and an asset that delivered a coupon of 1 until the redemption of the bond. The price of that asset *increased* with the (long-term) interest rate: a higher interest rate meant a longer maturity to redemption and that effect dominated the lowering of the discounting for future payments. The next table presents various statistics on the prices of annuities at different rates.

Which financial instrument to use for the new debt was heatedly discussed. Grellier reports:

---

<sup>5</sup>Cooper (1982), p. 95-97. The discussion in Cooper (1982) is very interesting even if we may interpret some events differently.

<sup>6</sup>Chamley, 2011.

<sup>7</sup>Harley, 1976.

“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 per cents, it was judged expedient to conclude the bargain in that stock, on the above terms, which were between 4 and 5 percent under the market-price.<sup>8</sup>

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.”<sup>9</sup>

Pitt preferred the bonds with the high coupons but could not get his way. Later, he changed his mind<sup>10</sup> For the discussion, assume that the peace time “stable” interest rate is at 3% and that the consols are therefore like unredeemable debt. Under perfect foresight, to issue consols or redeemable bonds at 4% is of course equivalent. The 4% is just issued at a higher price. The only difference is that the consols shift the interest payments towards the future. For example, compare the financing of a war expenditure of 100 with either 3% or 4% annuities. Let  $B$  the amount of 3% annuities and  $p$  their price, and  $B'$ ,  $q$ , the amount and price of 4% annuities. Suppose the war lasts for one year during which the one year interest rate is  $r$ . After the war, the rate is permanent at 3%. These values are related by the following equations.

$$\begin{aligned} p &= \frac{3}{1+r} + \frac{100}{1+r} = \frac{103}{1+r}, & q &= \frac{104}{1+r}, \\ 100 &= & pB &= qB'. \end{aligned} \tag{1}$$

Let  $I$  and  $I'$  be the amount of interest paid during the year of the war. It follows immediately that

$$B = \frac{104}{103}B', \quad I = \frac{3}{4} \frac{B}{B'} = \frac{3}{4} \frac{104}{103}I'. \tag{2}$$

Suppose that the one year interest rate during the war is 4%. The price of 4% is constant during and after the war. The price of the 3% increases from 103/104 to 100. The price of the 4% is less variable than that of the 3%. Indeed for the interval of time \*\* \*\*,

---

<sup>8</sup>Grellier, 1810, p. 371.

<sup>9</sup>Grellier, 1810, p. 372.

<sup>10</sup> “The terms of this loan excited considerable discussion; and it appears evident from them, that Mr. Pitt, who had formerly strongly reprobated borrowing in the 3 per cents had now changed his opinion” Grellier (1810), p. 388:

the variance of the year to year changes of the 3% is higher than that of the 4%, as in shown in Table \*\*\*. The mechanism is simple: the lower coupon of the 3% annuity is supplemented by a capital gain to match the return of the 4% annuity.

#### Table variances of annuity prices

The second difference is in the profiles of the interest payments. With the 4%, the government pays a higher interest during the war and a lower interest thereafter. In the previous example, by issuing 3% annuities, the government reduce by roughly one quarter its interest bill (compared to the 4%). After the war, the increase of the interest is only 1%. That may be easy to bear when peace is restored. Hence, a government that is pressed for liquidity during the war may prefer to issue annuities with a lower coupon.

Both arguments are already found in Greville (1810 or 1812 \*\*\*) who states that Pitt preferred the 3 % annuities \*\*\* QUOTE and page\*\*\*

Silberling brings an interesting argument.<sup>11</sup> The stock jobbers derived profits from “continuations.” They would borrow from banks at no more than 5% (the usury rate) and could lend to investors who did not have to pay out the full price of a stock until some time in the future, in the hope that the price would rise (Michie, Chapter I, p. 25). The transaction prices could be adjusted such that they would be not limit on the lending rate.

The gains from the end of the war (assuming victory) are distributed differently when the loans are in consols at 3% or redeemable annuities at 4% of 5%. In the first case, the end of the war brings a capital gain and the beneficiaries are the bond holders. For the second case, we have to consider only the difference between holding redeemable annuities and consols. The end of the war eventually terminates the difference in coupons. The beneficiary is the tax payer.

There are other arguments that would be in favor of high coupons bonds and these may not appear in the literature of the time. The first is that a high coupon bond generates an incentive for a “good behavior” in policy (both on taxation and expenditures). Such a behavior generates a faster return to lower interest. But redeeming earlier the high coupon bonds, the government can reap the rewards of such a policy. The second argument is that the market seems to overreact to some news. For example, the premium of the 4% increased rapidly to a high level in the first year of the war. *A contrario*,

---

<sup>11</sup>Silberling (1924), p. 42728).

in 1747-48, the premium was high and did not anticipate the rapid fall of the interest rate. The government made a significant profit by issuing 4% annuities in 1746-48 and lowering the interest rate in 1750.

The loans during the first phase of the war are presented in Table 3. These loans were not the only war loans. One should add the Navy bills or their refinancing, usually with bonds at 5 percent, and the loans that were raised by the Emperor (of Austria), with the collaboration of the government. For example, a loan of 3 million pounds was issued in 1794. Since the allies' armies on the continent had to be financed by British finance, there was an argument for direct borrowing by the Emperor instead of the transfer of funds raised by British loans. These loans were to be reimbursed by taxes on the continent, but they added to the supply of bonds in the market and the Parliament provided a guarantee.<sup>12</sup>

As an example, the second loan of 1797 was raised in annuities with coupons of 3 and 4 percent and additional annuity of 14 years, as described in Table 3. The main structure of the loan was decided ahead of time. A subscriber received for 100 pounds a portfolio that included annuities at 3% with a total face value of 175 and a market value of 87.5, annuities at 4% with a face value of 20 and a market value of 12.8. The total market value was slightly above 100 but final adjustment had to make the package sufficiently attractive for the entire period of subscription. That adjustment depended on the most recent market condition and here it took the form of a long annuity that 0.325 pounds (6s6d) that was priced at 4.55.

### **The Bank of England in the first phase**

The Bank of England, the Bank for short, was not a central bank in the modern sense. It had been created in 1794 to represent the interest of business and in particular of bond holders (North and Weingast 1989). During the "Financial Revolution" (Dickson) in the first half of the 18th century, the Bank certainly acted more in the interest of

---

<sup>12</sup>In another example, the budget presented on February 23, 1795, introduced a loan of 18 million where each subscriber of £100 received an option to subscribe in addition, for a maximum of one third of £100, to Emperor's loans. The loans to the Emperor had therefore a cap of 6 million. Interestingly, the buyers of the British loan were entitled to a compensation if the loan to the Emperor was less than the cap, 6d by shortfall of £750,000 plus 6d if the Parliament had refused to "guarantee" the loan. (Grellier, 1810, p. 382). It turned out that the loan was guaranteed but only 4.6 million were raised. The subscribers received an additional compensation of 1s. per cent. (Grellier, 1810, p. 383-384).

A collateral in actions on the bank of Vienna was attached to the loan and the Parliament guarantee meant that some revenues were earmarked in case of default by the Emperor and the British government could sue the "receivers or treasurers of Imperial revenues." In addition, a monthly amount of £7,666:13:4 was to be paid by the Emperor for a Sinking Fund toward the repurchase of the loan at the market price.

Table 1: New loans issued by public subscriptions 1793-1798

1	2	3	4	5	6
Date	Amount Lmillion	Instruments	Rate (%)	Market (3 %)	for 100 £
1793	4.5	3%	4.167	72	100/.72 in 3% annuities
1794	11	3%, 4%, 66 years annuity	4.54	??	3%: 100, 4%: 25 66 years annuity of 11s, 5d
1795	18	3%, 4%, 65 1/4 years annuity	4.78	??	3%: 100; 4% 33, 6s 8d 65 1/4 years annuity 8s 6d
1796	18	3% cons., 3% red. 65 1/4 years annuity	4.74	??	3% cons.: 120, 3% red. 25; 65 1/4 y. 6s 6d
	7.5	3% cons.: 120, 3% red. 25 64 1/4 years annuity	4.62	??	3% cons.: 120, 3% red. 25 annuity 63 3/4 y. 5s 6d
1797	18	5%, 3%	5.7	47 7/8 (May 4)	5% 112:10 or 3% 100/.75
	14.5	3% and 4%	6.85		3% 125, 3% red. 50, 4% 20 62 1/4 years annuity o 6s 6d
1798	17	3% cons., 3% red.	6.24	??	3% cons. 125; 3% red. 50
SUM	108.5				

Source : United Kingdom, Parliamentary Papers (BPP, 1898), Grellier (1810), (1812).

For additional details, see the text and the appendix.

the bond holders than of the tax payers when it opposed or resisted the attempts of the government to reduce the interests (Chamley, 2011).

The pressure that was applied by the French wars accelerated the evolution of the Bank toward its *de facto* role as a central bank.<sup>13</sup> (Recall that the Bank was nationalized only after World War II). During the first phase of the war, the Bank maintained the Gold convertibility of its notes, as in the previous wars and, taking a bank's point of view, it was anxious to keep that convertibility. It did not favor loans to the Emperor and it was anxious to set some limit to its short-term funding of the government.<sup>14</sup> The strong reservations of the BoE turned into opposition<sup>15</sup> in 1796.

<sup>13</sup> See Cannan (1919).

<sup>14</sup> "The court of directors, on the 16th of April, 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 £1,200,000 to be paid to the Bank on that account immediately. (Grellier, 1810, p. 381). See also p. 389, p. 390.

<sup>15</sup> Grellier, 1810, p. 391.

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

Source : Grellier (1810), p. 412.

For additional details, see the text and the appendix.

The tension between the BoE and the Government perhaps increased in the winter of 1797.<sup>16</sup> In February, a run started on some country banks.<sup>17</sup> On Saturday, February 25, the 3% was down to 50 1/4. The next day a crisis meeting took place with the governors and Pitt.<sup>18</sup> The Bank claimed that it had lost nearly a million in specie during the past week and that it had only 1,272,000 pounds in cash and bullion. For the first time in the history of the Bank, the suspension of the convertibility was decided and announced the next day as a temporary measure.<sup>19</sup>

The policy had an immediate effect. The 3% rose jumped from 50 1/2 to 52 1/2, and, more importantly, reserves increased. The events in February 1797 can be characterized as a standard bank run that was stopped by the suspension of the convertibility. “About the beginning of May the fear of issuing specie, which the stoppage of the Bank had occasioned, began to subside” (Grellier, 1810, p. 413). The Bank following its own interest, wanted to resume the convertibility, but this return was opposed by Pitt (Grellier, 1810, p. 414). This is understandable. The tensions of the previous year had shown that, in the credit conditions of the time, the convertibility had created additional difficulties for the financing of the war. Furthermore, another crisis would have entailed another suspension, and so on. From the point of view of modern macroeconomics, Pitt was right in setting a new regime with stable rules.

The regime of temporary suspension of the convertibility lasted until 1821 and the

---

<sup>16</sup>Grellier (1810), p. 405.

<sup>17</sup>Grellier (1810), p. 406.

<sup>18</sup>Grellier (1810), p. 407.

<sup>19</sup>Grellier (1810), p. 408. Earlier suspensions such as in 1696/97 during the Great Recoinage and as in 1745 resulting from the Jacobite rising had been short-lived.

suspension was extended by a number of decrees. These extensions for limited periods or particular contingencies reinforced the commitment to the eventual resumption of the convertibility. Once the constraints imposed by the gold standard were done away with, it became possible to accommodate the external drain of specie caused by Britain's expenditures on the Continent while absorbing increasing public debt issues (Bordo and White; 1991).

### 3.3 1797-1810: suspension of the convertibility and tax push

After the suspension of the convertibility that had been triggered by the bank runs of February 1797, the fiscal policy continued to rely mainly on deficit financing for the next two years.

**Fiscal policy: primary surplus**

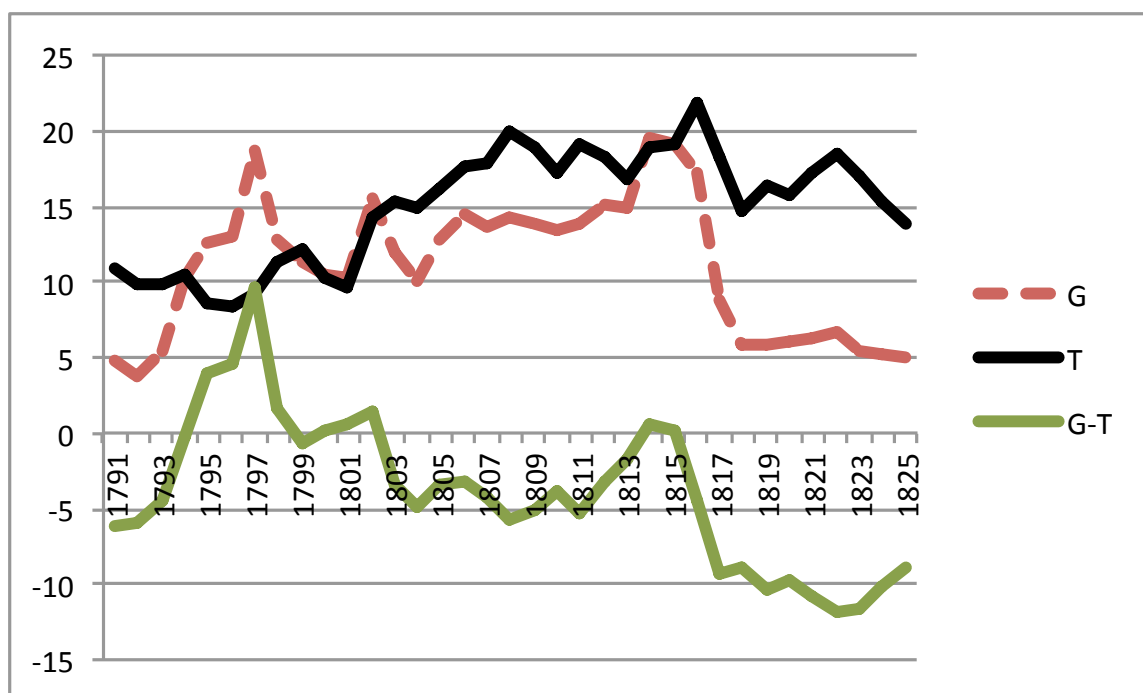


Figure 2: Government expenditures on goods and services (G) and revenues (T)  
Source: Mitchell, 1988.

Triple the assessed taxes, expected 7M

The increase of the land tax provided a signal that the government was prepared to muster the resources that were necessary to pay the debt. It had a positive impact on

the price of the government annuities (Grellier 1810, p. 417).

Composition of the National Debt, January 5, 1800 (Grellier, p. 420).

Table 3: The British debt in 1800

Type	Amount (million)
Bank of England	12
South-Sea Company	24
3%	334
4%	45
5%	48
3% Imperial	7.5
Unfunded	20
Total	491

Source : Grellier (1810).

England had started the French Wars in 1792 with an already high debt-to-GDP ratio of 122%, a legacy of the wars since the Glorious Revolution. By the end of the war in 1815, the debt-to-GDP ratio had reached 226%; it eventually stabilized at 260% in 1821 (figure 3). Following the usual practice, expenditures during the first years of the war were paid for by issuing long-term government debt (Barro, 1987). Subsequently, the national debt doubled during the first six years of unsuccessful warfare against Revolutionary France, causing doubts regarding the stability of public finances: between February 1793, the beginning of the French Revolutionary Wars, and February 1799, the price of Britain's benchmark bond fell by 26 percent, to levels that had not been reached till the 1720s (figure 4).<sup>20</sup>

In these circumstances, William Pitt the Younger introduced Britain's first income tax in 1799.<sup>21</sup> While opposition was strong to the new tax, it proved very productive. In the

---

<sup>20</sup>The usury laws an interest rate ceiling of five percenta restriction that could be circumvented through various means. Public securities were officially exempted from the five-percent-ceiling.

<sup>21</sup>See Daunton (2001), p. 44-46.

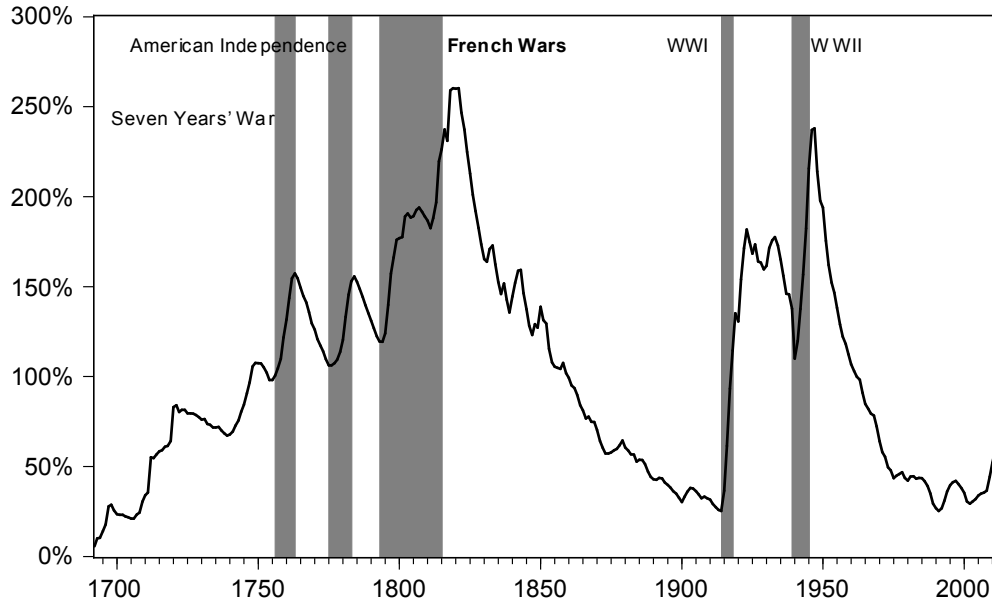


Figure 3: Debt-to-GDP ratio, 1698-2011  
 Sources: Mitchel, 1988; Officer and Williamson, 2013.

peak years of the war (1808-1815), the tax raised about the same amount as customs, 18% of total revenues. More broadly, in the second part of the French Wars, Britain abandoned the tax smoothing policy that it had followed for the previous century. Other than the introduction of the income tax, rates were increased on a number of already existing taxes. In total, 60% of the extra revenues raised to finance the war were paid for by taxes (OBrien, 1988).

In particular, Britain had a primary surplus of 2.9% of GDP on average during the years 1803-1813. Only the final surge in 1814-1815 was financed by borrowing (figure 2). Of course, the primary surplus was not sufficient to service the debt that had been left from the previous century, including the first part of the French Wars. Hence, the government was forced to continue to borrow in each year of the war.

The efforts in terms of taxation increased the credibility of public finances. The streamlining of the kingdom's administration further enhanced the public sentiment that everybody in the Nation was contributing to the war effort (Knight, 2013). Despite a substantial increase in the government's tasks, charges for the civil government remained broadly stable over the war years. These evolutions affected the yield on consols. The

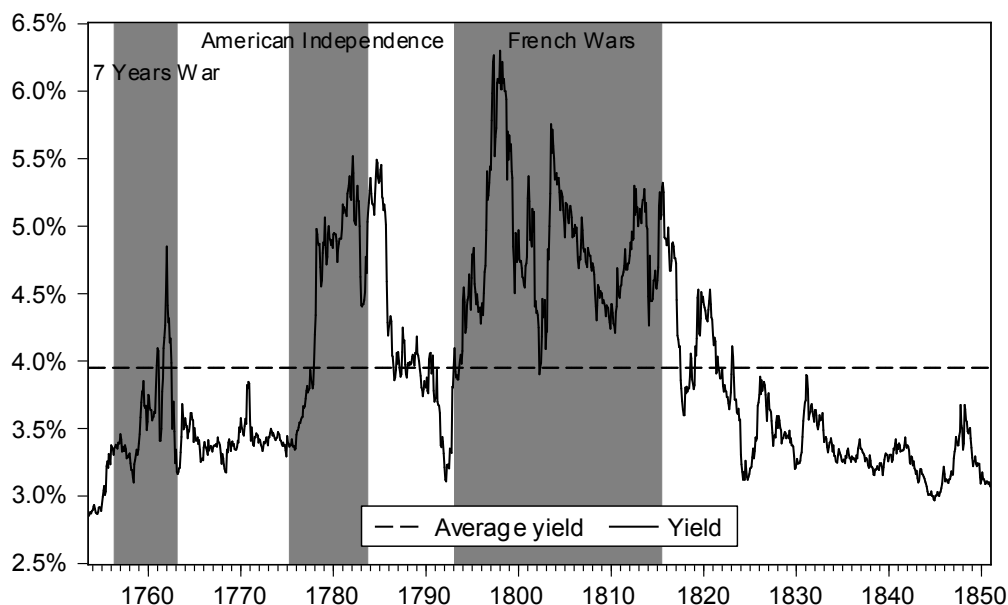


Figure 4: Yields on public long-term debt, 1750-1850  
Sources: Neal, 1990.

correlation between the latter and the primary deficit was  $-0.74$ , implying that market participants required lower yields whenever the surplus increased.

### Monetary policy: real-bills

The suspension of the gold standard had created a payment system that was based on the BoE's notes, the supply of which was controlled by the Bank and the Treasury. Throughout the period, the Bank's balance sheet increased substantially but the composition of the balance sheet may have mattered even more than its growth.

The suspension of the convertibility removed a constraint of the Bank on the discounting of securities and on the expansion of its notes. The evolution of the securities in the assets of the Bank is represented in Figure 5. Private securities were more than tripled, but the lending to the government did not expand in relation to GDP and was lower than in the first half of the 1790s (Figure 6).

For the makers of fiscal and monetary policy, the suspension of the convertibility enabled the Bank to lower the interest rate for private credit and therefore also for public credit.

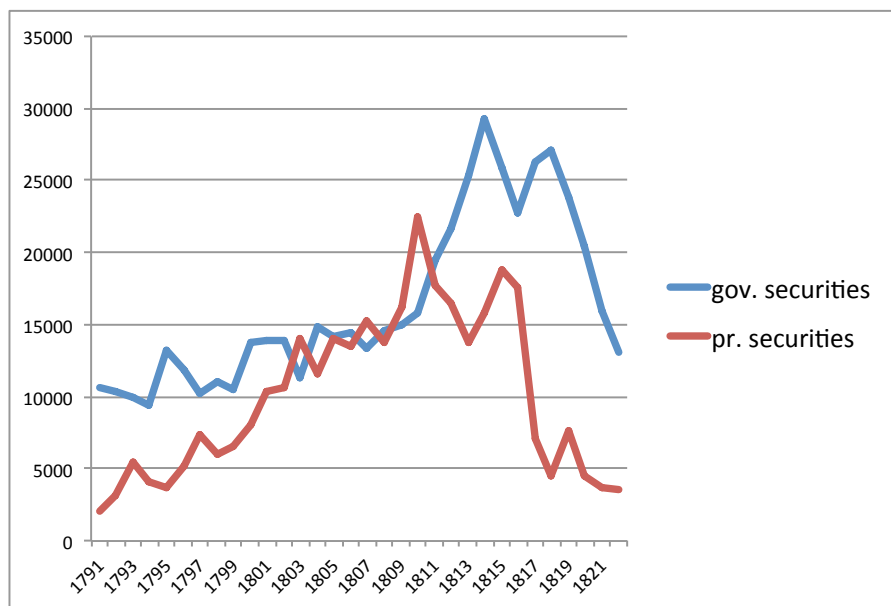


Figure 5: Discounts by the Bank of England (1791-1822)

During the period 1797-1810, the policy of the Bank is defined by the real-bills doctrine. The Bank could discount bills that financed goods in process. The notes that were issued by the Bank were backed by real assets and not by paper. When the demand for credit decrease—and the goods in process be sold—the notes and the discounts would be reduced *pari passu*. The process would not be viewed as inflationary.

There is a relation between the monetary regime in England 1797-1810 and 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.<sup>22</sup> During that phase, the assignats were issued first in large denomination, then in small notes that could be used as currency, with no significant impact on the price level. Inflation started only after the pressure of war financing while regular tax revenues collapsed—what is a revolution for if we still have to pay taxes?—led a printings of assignats well in excess of their real counterpart. Inflation was first contained by the price controls that were enforced by the Terror. It jumped to a high level after the fall of Robespierre, but as shown by Sargent and Velde, printing assignats could more than compensate for the fall of regular revenues in the continuing war.

The experience of the assignats remained on the mind of policy makers and economists

<sup>22</sup>See the illuminating exposition by Sargent and Velde (1995).

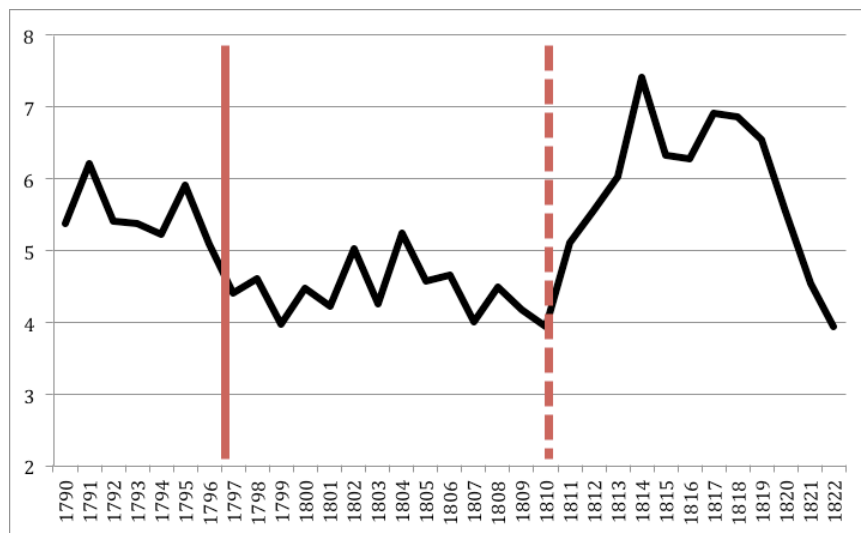


Figure 6: Public securities in the Bank of England (percentage of GDP)

in England. However, the policy context was very different. Taxes had not collapsed but they were increase to generate a primary surplus, and the Banks' notes were not the result of direct lending to the government.

Issues of regime of real-bills, although two centuries old, seem to call for more analysis.<sup>23</sup> They are certainly relevant today in the context of quantitative easing. One should stress that the method for expanding the money supply, *i.e.*, the asset side of the balance sheet of a central bank, may be more important than the expansion itself.<sup>24</sup>

Prices did increase during the real-bills phase but much less in proportion, than the quantity of notes of the Bank. The evolution of prices will be discussed below. At the time the increase of prices led to many discussions by policy makers and economists. The Bullion Committee, chaired by Sir Robert Peel (age 22) published the Bullion Report in 1810 to discuss the issues related to the resumption of the gold standard.

### 3.4 1812-1815: the “surge”

After the defeat of Napoleon in Russia and the resumption of the war by Prussia and the coalition led to a new policy regime in Britain. The surge of military expenditures was financed without further tax increase by borrowing (Figure 2). The primary budget

<sup>23</sup>See also Sargent and Wallace (1982).

<sup>24</sup>In an extreme case where money is held only for portfolio, a case that is obviously not directly applicable here, but is useful as a benchmark case, discounts of government assets by the central bank have no impact on the real allocation of resources (Chamley and Polemarchakis, 1984).

into balance was brought into balance but not in deficit.

On the monetary policy, for the first time in the French wars the Bank increased its lending by a large amount. This lending was offset by a significant decrease of private securities. Hence, from 1810 to 1813, the circulation of notes of the Bank hardly changed (23M in 1810-1812, 24M in 1813). More details needed on these operations. Apparently, a negative correlation between public and private securities.

The increase of lending to the government by the Bank toward the end of the French wars was only a small part of the increase of the debt, not more than 10M between 1810 and 1815. After the defeat of Napoleon in Russia, and even more so in Leipzig, the end could be seen. Perhaps, policy makers may have seen that the level of taxation was sufficient to guarantee of the security of the new loans to the government in the last phase of the wars.

### 3.5 1815-1821: “exit” and resumption of the convertibility

Although the income tax, which had been a war tax, was abolished in 1816, the level of taxation remained high after Waterloo. As government expenditures collapsed from 20 to 5 percent of GDP, the primary surplus jumped to 10 percent and provided an additional signal that the debt would be paid (Figure 2). In addition, important conversion of short into long-term and of high into low-interest rate debt were undertaken in 1818, 1819, 1822 and 1824. All these operations lowered the amount of outstanding debt further.

The suspension and for that matter not abrogation of the gold standard carried the implicit promise of a return to a specie-based monetary system. Moreover, if the pre-war gold content of the pound and therefore pre-war price level was to be reached again, war-time inflation had to be made undone. As the latter was the counterpart of public debt accumulation, the monetary and fiscal expansion that had contributed to finance the wars had to be reversed.

The Bank’s directors insisted that an effective resumption was only possible if the government reimbursed a substantial amount of debt to the Bank. As the Bank could hardly refuse the Treasury’s demands for funding, the notes that the Bank issued against the security of Exchequer bills placed an important share of the Bank’s issue beyond its own control.<sup>25</sup>

---

<sup>25</sup>Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments of 1819.

1797				1797			
	Assets	Liabilities			Assets	Liabilities	
Gold	2588	10394	circ	Gold	12.85	51.62	circ
Gov sec	10240	6328	dep	Gov sec	50.85	31.42	dep
Priv sec	7309	16722	sum	Priv sec	36.30	83.04	
		3415	cap			16.96	
Total	20137				100		

1821 (scaled by 1.44)				1821			
	Assets	Liabilities			Assets	Liabilities	
Gold	8022	15340	circ	Gold	37.04	70.83	circ
Gov sec	11029	3973	dep	Gov sec	50.92	18.34	dep
Priv sec	2607	19313		Priv sec	12.04	89.17	
		2345				10.83	
	21658				100.00		

Table 4: The balance sheet of the Bank of England

Percentages are on the right. In the lower left, the numbers are divided by 1.44 which is the growth multiplier of real GDP between 1797 and 1821.

---

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.

## 4 The political economy in the exit strategy

Given the political and economic costs of reversing the war stimulus, the resumption of the gold standard at the pre-war parity was surrounded by an important degree of uncertainty (Acworth, 1925; Kindleberger, 2000). Many discussion took place on whether the convertibility should be resumed at the same rate as in 1797<sup>26</sup> \*\*\* more on this\*\*\* A restoration of the same parity would require deflation back to about the same price level as before the war.

---

<sup>26</sup> Tooke (1824) and the Bank of England took position vis-à-vis Ricardo (1817) and the Bullionists by articulating the Real Bills doctrine. The Bank's note issue was not inflationary since it was undertaken against sound commercial bills; the exchanges with the continent and bad harvests were causing the devaluation of the pound. More recently, Lewis (1978) and Rostow (1948 and 1978) have reiterated this position, while Bordo and Schwarz (1981) emphasized the importance of monetary factors for price level determination.

Prices did increase between 1797 and 1810 but much less, in percentage terms, than the notes in circulation and much of it may have not been caused by the expansion of notes. Figure 7 present the evolution of different indices. Today, policy makers tend to neglect year to year variations of commodity prices for the estimation of the inflationary trend. In that early stage of the industrial revolution, the main share of production was in agriculture. The spikes of the agricultural prices were caused by poor crops, especially in 1800-1801. These variations have an impact on the prices in other sectors of the economy. Prices increase could also be triggered by war shortages. The issue will be discussed below.

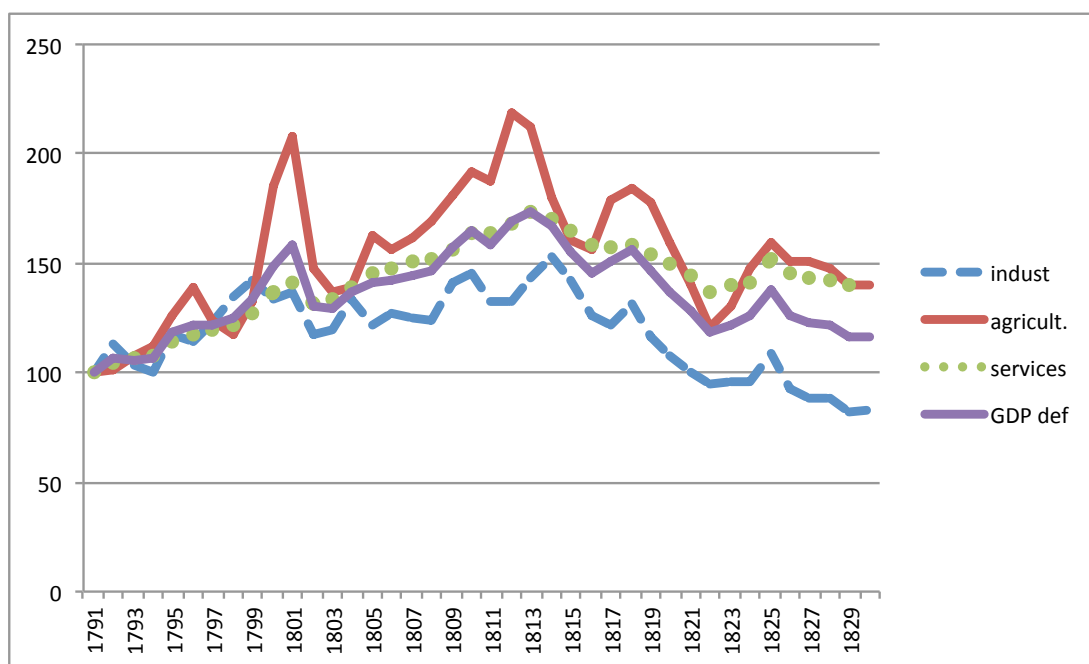


Figure 7: Price indices

The period of the suspension was characterized by large fluctuations of war expenditures and therefore of aggregate demand. In order to consider the relation between these fluctuations and inflation, independently of the variations of the quantity of money, the points in Figure 8 represent the values of the output gap and inflation. The price index is taken as the wage index which may be closest to the underlying rate of inflation. (One should keep in mind that in that time wages were a smaller part of income than today).<sup>27</sup> The output gap is taken as the difference, in percentage, between the level of

<sup>27</sup>While wartime conditions and the Continental blockade imposed by the French (1806-1813) caused a rise in freight and insurance premia, these evolutions were not sizable enough to explain the observed price swings. In fact, blockades against the British could not be maintained tightly enough and smuggling was highly profitable and, thus, rampant. British traders were flexible and succeeded in

real GDP and its trend. The latter is computed by applying a 1.7 percent real growth rate to GDP.

The figure presents an inverse relation. Some of the “outliers” can be explained. The deflation of 1802 is related to the sharp fall of the agricultural prices. The point for the year 1815 should be much to the right: it corresponds to yearly data, but after June 18, all military expenditures collapsed. It is possible that the deflation in 1820 and 1821 was amplified by the announcement in 1818 that the convertibility would be resumed at the same rate as before 1797.

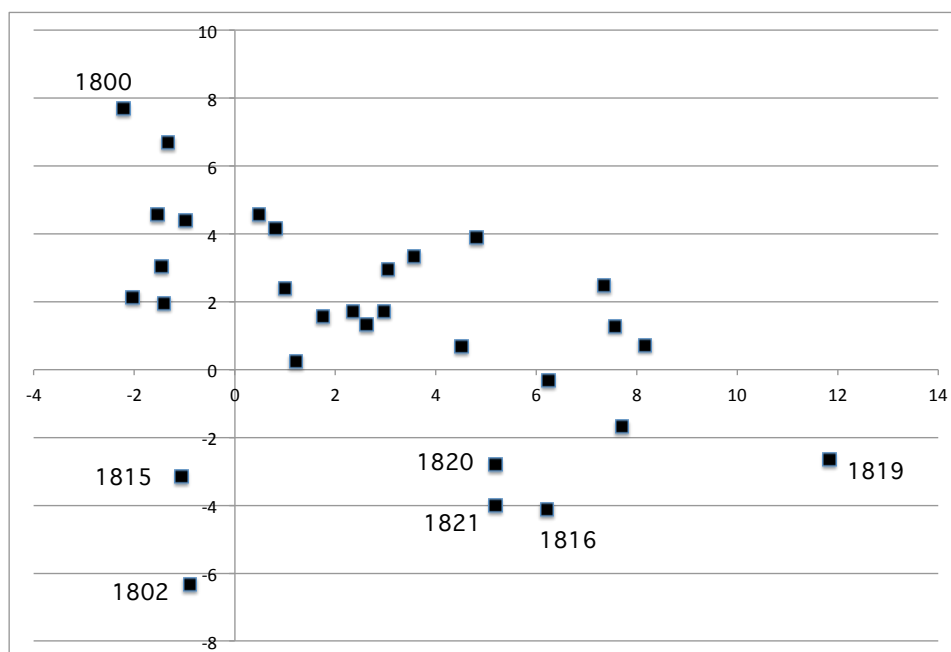


Figure 8: Output gap (horizontal) and wage inflation (vertical): 1792-1820 temporary figure

The 1816-1817 after-war depression was accompanied and magnified by the large post-war demobilization and agricultural winter unemployment (Acworth, 1925). The estimated rate of unemployment ranged from 17% in the post-war depression of 1816 to 1.5% percent in boom years around 1825, for an average of 5% for the period from 1770 to 1815 (Feinstein, 1998). From the overall data, one would expect a decrease of the wages after the war when the output gap was high. But we can also note from the figure that the decrease of the wages was even stronger than what could be expected from the opening new markets when old ones closed (Crouzet, 1990). The Navy’s supremacy and British colonial conquests further helped the matter.

output gap.

Although numerous, public manifestations of economic and social discontent were rendered illegal by a number of legislative actions that restrained civil rights heavily. Trade unions and collective bargaining were banned from the public space. Other safeguards of individual freedom against arbitrary state action were curbed.<sup>28</sup> Following the ‘Peterloo Massacre’s, a demonstration in favor of universal suffrage in the August of 1819 that cost the life 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. Crafts (1998), therefore, characterizes the period between the French Revolution and the late 1820 as one of severe repression.

Moreover, the electoral system of the time entailed an under-representation of the citizens most affected. The right to vote in Parliamentary elections or to become a member of parliament was largely linked to property rights. This generally meant only the affluent qualified; registered voters over the period under consideration amounted to 1.5% of the total population.

Denominations of public debt certificates<sup>29</sup> 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). Since deflation increased the real value of debt to the advantage of creditors, support for reimbursement of public debt at the old par was strong amongst registered voters and members of parliament.

At the time, there were some doubts in the market about the resumption of the convertibility. These expectations can be measured by two prices, the exchange rate of the pound in the Hamburg market and the inverse of the agio in London, which here can be taken as the price of the pound in gold. These prices are presented in Figure 9. For the years when the pound is discounted in London while not sustained by the convertibility in the Bank of England, there is a remarkable concordance between the two prices. In 1814 for example, an investor who bought pounds against gold to be resold a few years

---

<sup>28</sup>The 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 detention 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).

<sup>29</sup>Consols and Exchequer bills were not issued for sums under £100 and £1000, respectively. In 1819, yearly average salaries ranged from 39 for farm laborers to 219 for highly paid government officials, Lindert and Williamson, 1983

later would make a handsome profit.<sup>30</sup>

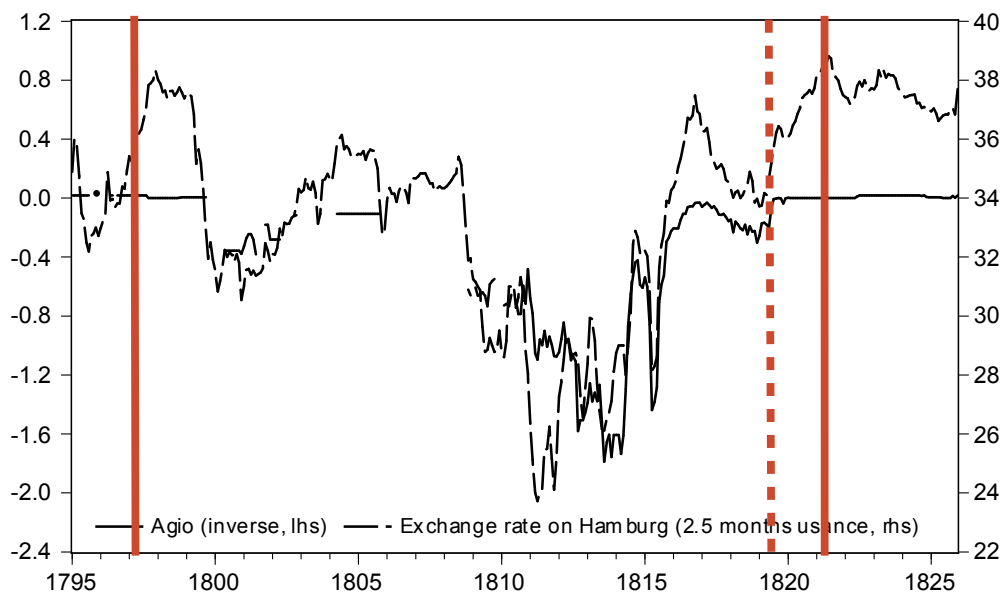


Figure 9: Market prices

Agio (plain): price of gold on London as a fraction of the pre-suspension value  
Exchange rate on Hamburg (dotted): Schilling per Pound Sterling,

The dashed line coincides with the announcement that the gold standard would be resumed, undertaken in May 1819.

Sources: Boyer-Xambeu et al., 1994.

This interpretation of events is in line with the fact that the beginning of the pound's depreciation coincided with the intensification of hostilities, i.e. when contemporaries discovered the opening of a new war front that would prolong military efforts and, thus, fiscal strain. In addition, the internal and external values of the pound recovered with the announcement of the gold standard's resumption in May 1819 (dashed line) and not with its actual implementation or the BoE's reimbursement of Treasury debts.

<sup>30</sup>Antipa (2015) showed that fiscal prospects determined the pound's internal value, given by its exchange rate into gold. The nature and timing of certain jumps in the pound's exchange rate into gold allowed ruling out the hypothesis that inflationary tensions were caused by monetary expansion. When, for instance Napoleon reascended the throne in March 1815 after having escaped his exile on Elba the pound's exchange rate fell by 50%. As no war-related spending had yet occurred, it was the expectation of future public spending a fiscal news shock that affected the internal value of the pound.

TO BE CONTINUED

## 5 Conclusion

The mistakenly perceived ease with which the resumption was undertaken in 1821, however, shaped British monetary orthodoxy and the global financial system for the century to follow (Fetter, 1965). It also ushered in the gold standards second resumption after WWI, an event that prolonged and aggravated the Great Depression (Kindleberger, 1984; Bernanke, 1995; Eichengreen and Temin, 2000).

What had changed between the first and second resumption of the gold standard were not the social and economic costs that accompanied deflation. Rather, the changes in political accountability increased the political costs of undoing inflationary war finance (Polanyi, 1944; Eichengreen, 1995). This lesson is also relevant for the current policy choice between maintaining a fixed exchange rate and restructuring an outstanding debt overhang, as under discussion in certain member countries of the euro area.

## APPENDIX

### **The Bank of England's role in the financing of the War**

The BoE's role in the management of funded debt was of a somewhat different nature than usually assumed. As the registrar of the Treasury, the BoE was in charge of managing the subscriptions to debt issues, of transferring stocks between old and new holders, and of paying due dividends. For these services the BoE was remunerated by the Treasury.

The BoE was less important as a holder of national debt. In the first decades of the 18<sup>th</sup> century, the chartered companies, in administering their capital stock, managed nearly the whole national debt.<sup>31</sup> When the French Wars commenced in 1793, the BoE held a little over 5% of outstanding funded debt. By the end of the wars, the rapid increase in debt meant that the BoE's holdings represented less than 2% of it.

### **Short-term Debt and the Money Market**

The BoE's interventions were crucial for the circulation of short maturity government debt and more broadly for the functioning of the money market. Unfunded or floating debt was usually issued in anticipation of tax incomes. State departments would issue bills to obtain goods and services on credit and would redeem them once taxes arrived at the Exchequer. Unfunded debt took, hence, the form of Navy, Transport, Victualing and Exchequer bills, the latter accounting for the large majority of unfunded debt.

Already since 1697, the BoE undertook to manage the circulation of Exchequer bills, a service for which it was remunerated for. At the beginning of each year, the BoE would advance funds against bills on the security of the malt and land taxes. The Exchequer would gradually reimburse the BoE upon reception of tax revenues. The circulation of the bills also entailed that the BoE guaranteed their convertibility into gold. Therefore, investors effectively purchased a share of what the government owed the BoE when acquiring Exchequer bills, a feature that guaranteed a certain security and, hence, price to the bills (Philippovich, 1911).

Moreover, as soon as Britain went to war in 1793, the already usual practice of advancing funds for Exchequer bills without Parliamentary authorization or funding was officially legalized (a practice not in compliance with the Bank's Foundation Act). These bills had the great advantage of not needing Parliamentary approval and were largely issued

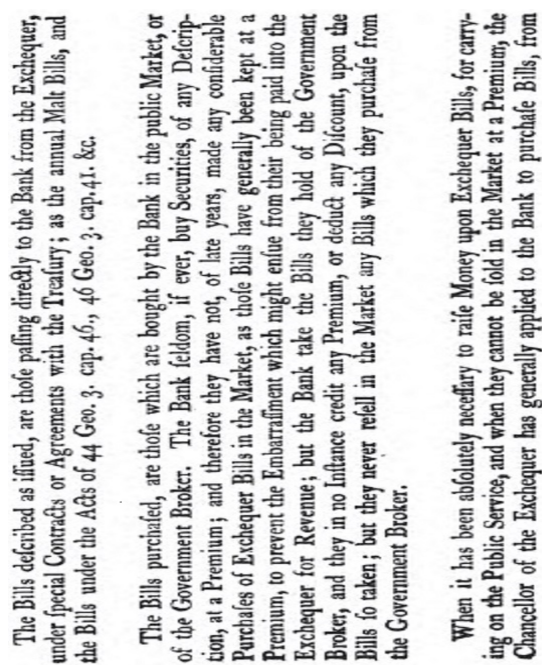
---

<sup>31</sup>The other two chartered companies were the East India Company and the South Sea Company.

to finance unforeseen expenditures. This possibility became particularly important towards the end of the war when unexpected outlays became abundant.

Bills financed by the BoE were used to pay the dividends on long term debt, to sustain the British and Irish Sinking funds, and of course to cover excess charges. The report regarding the resumption of the gold standard issued in 1819 contained a transcript of communications between the BoE and the Exchequer. Every time the Chancellor of the Exchequer applied for means at the Bank, he would also state the reasons for his funding needs.

Finally, the BoE would purchase bills directly in the market in order to sustain their prices. Exchequer bills were accepted in the payment of taxes. In order to keep them in circulation, it was essential that they be kept at a premium. Holders had an incentive to sell them on the secondary market rather than to use them for the payment of taxes. Figure 10 shows an excerpt from the Resumption report that recapitulates the interventions of the BoE in the market for Exchequer bills.



The Bills described as issued, are those passing directly to the Bank from the Exchequer, under special Contracts or Agreements with the Treasury; as the annual Malt Bills, and the Bills under the Acts of 44 Geo. 3. cap. 45, 46 Geo. 3. cap. 41. &c.

The Bills purchased, are those which are bought by the Bank in the public Market, or of the Government Broker. The Bank seldom, if ever, buy Securities, of any Description, at a Premium; and therefore they have not, of late years, made any considerable Purchases of Exchequer Bills in the Market, as those Bills have generally been kept at a Premium, to prevent the Embarrassment which might ensue from their being paid into the Exchequer for Revenue; but the Bank take the Bills they hold of the Government Broker, and they in no Instance credit any Premium, or deduct any Discount, upon the Bills so taken; but they never resell in the Market any Bills which they purchase from the Government Broker.

When it has been absolutely necessary to raise Money upon Exchequer Bills, for carrying on the Public Service, and when they cannot be sold in the Market at a Premium, the Chancellor of the Exchequer has generally applied to the Bank to purchase Bills, from

Figure 10: The Bank's Proceedings in the Markets for Exchequer Bills

*Sources: Second Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments, 1819*

It appears clearly that the BoE intervened actively on the market for Exchequer bills with the intention to influence prices. In addition, as the funds advanced against Ex-

chequer bills were used for a plethora of objectives, the BoEs funding of them can be understood as the definitive policy measure that kept British public finances sustainable. For this system to perform efficiently, the value of the Bank's notes had to be safeguarded. Legal restrictions imposed their acceptance for any sort of debt at face value.<sup>32</sup> While it was carefully avoided to call BoE notes legal tender, this had *de facto* become their status.

## The data

In order to flesh out and quantify the above, we present new and hand-collected balance sheet data. Beginning in 1810, the Bank started recording its interventions in the primary and secondary market for Exchequer bills at a weekly frequency. It seems likely that these data were collected because the Bank's interventions became very sizable. We supplement the data on the volumes of interventions with another hand-collected data set of daily prices for Exchequer bills. For the period before 1810, we rely on annual balance sheet data prepared for the Report from the Committee of Secrecy on the Bank of England Charter, published in 1832.

The data contained in the report was produced by the then chief accountant of the BoE William Smee and formed the basis for Clapham (1944) and Mitchell (1988). We exploited the original data, as it contained more details than the later publications. As the data was of strategic importance for the BoE's charter renewal, we cross-checked it with more recently produced balance sheet data.<sup>33</sup>

## From the Short to the Long End of the Market

The management of unfunded debt encompassed also an operation called funding. The latter procedure entailed converting bills into bonds and, therefore, increased funded debt by the amount it decreased the unfunded one. As such, this operation involved no transfer of cash from the public to the Government. Outstanding bills were converted into bonds of an equivalent market value, hence the importance of keeping them at a premium. The BoE stood ready to cash the bills of those holders not willing to convert.

Funding created long-term debt. However, while parliamentary authorization was necessary before issuing standard long-term debt (mostly in the form of consols), parliament only intervened to *ex post* sanction the creation of long-term debt through funding operations. In particular, once the bills were converted into four or five percent de-

---

<sup>32</sup>Lord Stanhope's Act or 51 Geo. III, c. 127.

<sup>33</sup>Figures in both sources are highly comparable; correlations between equivalent series in the two data sets are very high and range between 0.73 and 0.99.

nominations of bonds during war-time, they also became convertible into three percent consols when peace was concluded (Chamley, 2011). Conversions, therefore, potentially reduced the Government's interest bill over the longer term and were never opposed.

Funding operations were engineered to cancel short-term debt whenever prices depreciated because of over-abundant issues (Grellier, 1812). Operations were undertaken beginning 1795 but remained rare and sporadic for the first years of the wars. When the war intensified after 1809, funding operations became the rule, accounting sometimes for as much as 40 percent of yearly long-term debt created. This was the case in 1797, 1810 and 1811. In 1819, long-term debt creation originated solely in the conversion of short into long-term debt. On average, converting bills into bonds accounted for 22% 32% of funding during the war and the suspension of the gold standard, respectively.<sup>42</sup>

Once long-term debt was created, another institution was charged to redeem it, influencing market prices by its intervention. The Sinking Fund originally created in 1786 to deal with the debt inherited from the American War of Independence was supposed to reduce the outstanding amount of public debt by buying bonds from the secondary market. Initially the fund was fed by surpluses, but as the war took its toll on public revenues, part of the debt created was used to aliment the fund. Every new loan should be accompanied by an increase in taxation sufficient to pay the interest and 1% of the principal of the loan.

To contemporaries the fund made sure that the burden of sovereign debt was to be diminished. Moreover, the fund's regular purchases undertaken by the Commissioners for the Reduction of the National Debt guaranteed that [...] "any person having to sell stock, was sure of a purchaser in the broker of the Commissioners, when he could find no other".<sup>43</sup> The commissioners' interventions in the long-term debt market, thus, kept the prices of the funds up.

In the same vein, the Bank's interventions in the market for Exchequer bills were supporting the price of the latter. Keeping up the selling prices guaranteed that successive debt issues could be undertaken at relatively high prices and, hence, low interest rates. Selling prices close to par also implied that the Treasury obtained large amounts of cash from the public relative to the nominal amounts of debt created.

Another parallel between the Bank and the fund were the sheer size of interventions in

---

<sup>42</sup>Report by the Secretary and Comptroller General of the Proceedings of the Commissioners for the Reduction of the National Debt, 1891.

<sup>43</sup>Hansard HC Deb, 13 May 1819, vol. 40, cc347-60.

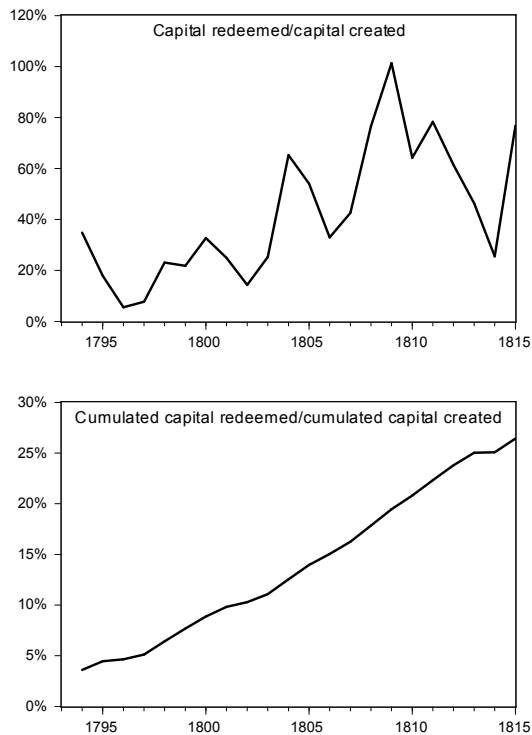


Figure 11: The Sinking Fund, 1793-1815

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

their respective markets. Figure 11 presents the ratio between the annual flows of long-term debt created and redeemed by the sinking fund for the war years (upper panel). The sinking fund redeemed every year, on average, the equivalent of 42% of long-term debt created. Regularly taking an amount of such importance off the market affected available quantities and, hence, prices.

In addition, by the end of the war, the Sinking fund had redeemed the equivalent of 26% of debt created. This amount somewhat underestimated the importance of the sinking fund for the evolutions in outstanding debt during the French Wars. The stock of accumulated outstanding debt included £240 millions of capital that were created before the French Wars.

## References

- [1] Acworth, Angus W (1925) 'Financial Reconstruction in England 1815-1822', P.S. King and Son LTD, London
- [2] Antipa, Pamfili (2014) 'How Fiscal Policy Affects the Price Level: Britain's First Experience with Paper Money' Banque de France Working Paper n 525.
- [3] Ashton, Thomas S. (1959) 'On the Determination of the Public Debt', *Journal of Political Economy*, 87, pp. 940-971.
- [4] Barro, Robert J. (1979). "On the Determination of the Public Debt," *The Journal of Political Economy*, Vol. 87, No. 5, Part 1., pp. 940-971.
- [5] Barro, Robert J. (1987) 'Government Spending, Interest Rates, Prices, and Budget Deficits in the United Kingdom, 1701-1918', *Journal of Monetary Economics* 20, pp. 221-247.
- [6] Bernanke, Ben (1995) 'The Macroeconomics of the Great Depression: A Comparative Approach', *Journal of Money, Credit and Banking*, Vol. 27(1), pp.1-28
- [7] Bordo, Michael D. and Eugene N. White (1991) 'A Tale of Two Currencies: British and French Finance During the Napoleonic Wars', *The Journal of Economic History* 51(2), pp. 303-316.
- [8] Brewer, John (1988) 'The Sinews of Power', Century Hutchinson, London
- [9] Broadberry, S., B. Campbell, A. Klein, M. Overton, and B. Leeuwen (2012) 'British Economic Growth, 1270-1870: An Output-based Approach', mimeo.
- [10] Broz, Lawrence, L. and Richard S. Grossman (2004) 'Paying for Privilege: the Political Economy of Bank of England Charters, 1694-1844' *Explorations in Economic History*, 41, pp. 48-72.
- [11] Calomiris, Charles, W. and Stephen H. Haber (2014) 'Fragile by Design', Princeton University Press.
- [12] Cannan, Edwin (1919) 'The Paper Pound of 1797-1821', *The Bullion Report* 8th June 1810, New York, Kelley Reprints, 1969.
- [13] Capie, Forrest and Alan Webber (1985) 'A Monetary History of the United Kingdom: 1870-1982', Routledge, London.
- [14] Chamley, Christophe (1985). 'Efficient Taxation in a Stylized Model of Intertemporal General Equilibrium', *International Economic Review*, vol. 26, No2, 451-68.

- [15] Chamley, Christophe (2011) 'Interest Reductions in the Politico-Financial Nexus of Eighteenth-Century England', *The Journal of Economic History*, 71(3), pp. 555-589.
- [16] Chamley, Christophe and Herakles M. Polemarchakis (1984). 'General Equilibrium Assets and the Neutrality of Money', *Review of Economics Studies*, 51, pp. 129-138.
- [17] Clapham, John (1944), 'The Bank of England', Cambridge University Press, Cambridge.
- [18] Clark, Gregory (2004) 'The Price History of English Agriculture, 1209-1914', *Research in Economic History* 22, pp. 41-124.
- [19] Clark, Gregory (2005) 'The Condition of the Working-Class in England, 1209-2004', *Journal of Political Economy* 113(6), pp. 1307-1340.
- [20] Clark, Gregory (2006) 'The Long March of History: Farm Wages, Population and Economic Growth, England 1209-1869', *Economic History Review* 60 (1), pp. 97-135.
- [21] Clark, Gregory (2014) 'What Were the British Earnings and Prices Then? (New Series)' MeasuringWorth, 2014
- [22] Cooper, Richard (1982) 'William Pitt, Taxation, and the Needs of War, ' *Journal of British Studies*, Vol. 22, No. 1 (Autumn, 1982), pp. 94-103.
- [23] Crafts, Nicolas (1997) 'Some Dimensions of the 'Quality of Life' during the British Industrial Revolution', *Economic History Review*, Vol. 50 (4), pp. 617-39
- [24] Crouzet, François (1964) 'Wars, Blockade, and Economic Change in Europe, 1792-1815', *The Journal of Economic History*, 24(4), pp. 567-588.
- [25] Del Negro, Marco and Christopher Sims (2014) 'When Does a Central Banks Balance Sheet Require Fiscal Support?', mimeo.
- Daunton, Martin (2001). *Trusting Leviathan: the Politics of Taxation in Britain*, Cambridge University Press.
- [26] Dickson, Peter, G. (1967) 'The Financial Revolution in England', Macmillan, London.
- [27] Duffy, Ian P.H. (1981) 'The Discount Policy of the Bank of England during the Suspension of Cash Payments, 1797-1821', *The Economic History Review*, 35(1), pp.67-82.
- [28] Eichengreen, Barry (1995) 'Golden Fetters', Oxford University Press, New York.

- [29] Eichengreen, Barry and Peter Temin (2000) 'The Gold Standard and the Great Depression', *Contemporary European History* Vol. 9, pp. 183-207.
- [30] Ekelund, Robert, B and Mark Thornton (1992) 'The Union Blockade and Demoralization of the South: Relative Prices in the Confederacy', *Social Science Quarterly*, 73(4), pp. 890-902.
- [31] Esteban, Javier Cuenca (2003). "The British balance of payments, 1772-1820: India transfers and war finance," *The economic History Review*, **54**, 1, 58-86.
- [32] Feinstein, Charles H. (1972) 'National Income, Expenditure and Output of the United Kingdom, 1855-1965', Cambridge University Press, Cambridge.
- [33] Feinstein, Charles H. (1998) 'Pessimism Perpetuated: Real Wages and the Standard of Living in Britain during and after the Industrial Revolution', *The Journal of Economic History*, Vol. 58(3), pp. 625-658.
- [34] Ferguson, Neal, Andreas Schaab, and Moritz Schularick (2014) 'Central Bank Balance Sheets: Expansion and Reduction since 1900', mimeo (ECB Forum on central banking, Sintra, May 2014).
- [35] Fetter, Frank W. (1959). "The Politics of the Bullion Report," *Economica*, **102**, 99-120.
- [36] Fetter, Frank W. (1965) . *Development of British Monetary Orthodoxy 1797-1875*, Harvard University Press.
- [37] Frankel, Jeffrey, A. (1982) 'The 1807-1809 Embargo against Great Britain', *The Journal of Economic History*, 42(2), pp. 291-308.
- [38] *The Gentleman's Magazine*, various issues since 1737.
- [39] Grellier, J. J. (1812). *The Terms of All the Loans Which Have Been Raised for the Public Service*, 3rd ed., London.
- [40] Grellier, J. J. (1810). *A History of the National Debt*, London.
- [41] Harley, Charles K. (1976). 'Goschen's Conversion of the National Debt and the Yield on Consols,' *Economic History Review* 29, no. 1, p. 101-106.
- [42] Hodrick, Robert and Edward Prescott (1997) 'Postwar U.S. Business Cycles: An Empirical Investigation', *Journal of Money, Credit and Banking*, 29, pp. 1-16.
- [43] Johnston, Neil (2013) 'The History of Parliamentary Franchise', Commons Library Research Paper 13/14.

- [44] Kindleberger, Charles P. (1984) 'A financial history of Western Europe', Routledge, London.
- [45] Kindleberger, Charles P. (2000) 'British Financial Reconstruction, 1815-1822 and 1918-1925', in *Comparative Political Economy*, The MIT Press, Cambridge, Massachusetts.
- [46] Lucas, Robert (1980) 'Two Illustrations of the Quantity Theory of Money', *American Economic Review* 70, pp. 1005-14.
- [47] Mankiw, N. Gregory (1987) 'The Optimal Collection of Seigniorage-Theory and Evidence', *Journal of Monetary Economics*, 20, pp. 327-41.
- [48] Michie, Ranald C. (2001). *The London Stock Exchange: A History*, Oxford University Press.
- [49] Mitchell, Brian R. (1988) 'British Historical Statistics' Cambridge University Press, Cambridge.
- [50] Neal, Larry (1991) 'A Tale of Two Revolutions, International Capital Flows, 1789-1819', *Bulletin of Economic Research*, 43(1), pp. 307-37.
- [51] Neal, Larry (1998) 'The Financial Crisis of 1825 and the Restructuring of the British Financial System', *Federal Reserve Bank of Saint Louis Review*.
- [52] North, Douglas C. and Barry R. Weingast (1989), 'Constitutions and Commitment: the Evolution of Institutions Governing Public Choice in Seventeenth Century England', *Journal of Economic History*, 49(4), pp. 803-832.
- [53] O'Brien, Patrick K. (1988) 'The Political Economy of British Taxation, 1660-1815, *The Economic History Review*, 41(1), pp. 1-32.
- [54] O'Brien, Patrick K. (2006) 'Mercantilist Institutions for the Pursuit of Power with Profit. The Management of Britain's National Debt, 1756-1815', London School of Economics and Political Science Working Paper No. 96/06.
- [55] O'Donoghue, Jim, Louise Goulding and Grahame Allen (2004) 'Consumer Price Inflation since 1750', Office for National Statistics.
- [56] Officer, Lawrence H. and Samuel H. Williamson (2013) 'Measuring Worth'.
- [57] Polanyi, Karl (1944) 'The Great Transformation', Farrar and Rinehart, New York.
- [58] Quinn, Stephen and William Roberds (2014) 'Death of a Reserve Currency', Atlanta Fed Working Paper 2014-17.

- [59] Reis, Ricardo (2013) ‘The Mystique Surrounding the Central Banks Balance Sheet, Applied to the European Crisis’, *American Economic Review: Papers and Proceedings*, 103(3).
- [60] Roberds, William and François R. Velde (2014) ‘Early Public Banks’, Federal Reserve Bank of Chicago Working Paper 2014-03.
- [61] Sargent, Thomas, J. and Bruce D. Smith (1987) ‘Irrelevance of Open Market Operations in Some Economies with Government Currency Being Dominated in Rate of Return’, *American Economic Review* Vol. 77(1), pp. 78-92.
- [62] Sargent, Thomas, J. and François R. Velde (1995). “Macroeconomic Features of the French Revolution,” *Journal of Political Economy*, **103**, 3, 474-518.
- [63] Sargent, Thomas, J. and Paolo Surico (2011) ‘Two Illustrations of the Quantity Theory of Money: Breakdowns and Revivals’, *American Economic Review* Vol. 101(1), pp. 109-128.
- [64] Sargent, Thomas, J. and Neil Wallace (1982). “The Real-Bills Doctrine versus the Quantity Theory: A Reconsideration,” *Journal of Political Economy*, **90**, no 6, 1212-1236.
- [65] Sherwig, John M., (1969) *Guineas and gunpowder; British foreign aid in the wars with France, 1793-1815*, Cambridge, Harvard University Press .
- [66] Silberling, Norman J. (1924). ‘Financial and Monetary Policy of Great Britain During the Napoleonic Wars,’ *The Quarterly Journal of Economics*, Vol. 38, No3, 397-439.
- [67] Stasavage, David (2007) ‘Partisan Politics and Public Debt: The Importance of the ‘Whig Supremacy’ for Britains financial revolution’, *European Review of Economic History*, 11, pp. 123-153.
- [68] Sussman, Nathan and Yishay Yafeh (2006), ‘Institutional Reforms, Financial Development and Sovereign Debt: Britain 1690-1790’, *Journal of Economic History*, 66(4), pp. 906-935.
- [69] Tooke, Thomas (1824) ‘Thoughts and Details on the High and Low Prices of the Last Thirty Years’, 2nd edition, John Murray, London.
- [70] Wallace, Neal (1981) ‘A Modigliani-Miller Theorem or Open-Market Operations’, *The American Economic Review*, 71, 267-274.
- [71] Williamson, Jeffrey G. (1984) ‘Why Was British Growth So Slow During the Industrial Revolution?’, *The Journal of Economic History*, 44(3), pp. 687-712.