

# How Fiscal Policy Affects the Price Level: Britain's First Experience with Paper Money\*

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## Abstract

Between 1797 and 1821, Britain suspended the gold standard in order to finance the Napoleonic Wars. This measure was accompanied by large scale debt accumulation and inflation: After Napoleon's final defeat at Waterloo in 1815, the debt to GDP ratio climbed to 226%; the price level exceeded its 1797 level by 22.3%. Under these circumstances and given institutional settings that allowed excluding the possibility of strategic default, I will show that expectations of how debt would be stabilized in the future shaped the observed evolution of the price level. My contribution, thus, establishes the importance of fiscal factors for the determination of the price level.

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# 1 Introduction

In terms of a sovereign's reputation and market access some types of default are worse than others. Default may be excusable when it occurs in bad states of the world, which are unforeseeable and beyond the sovereign's immediate influence (Grossman and Van Huyck, 1988). Unjustifiable repudiation and strategic default, on the contrary, may hamper the sovereign's prospects to borrow or allow it only at prohibitive costs. In a setting in which unjustifiable repudiation can be excluded, default occurs in equilibrium and agents price its probability based on fiscal prospects. This establishes a link between agent's expectations in terms of fiscal sustainability and certain asset prices.

This paper documents a historical case in which institutional settings, among which the Bank of England's restrictions on the uses and abuses of public debt allowed excluding the possibility of strategic default (Acworth, 1925; O'Brien, 2010; Neal, 1990). I will show in the following that under these particular institutional circumstances, expectations of how debt would be stabilized in the future shaped the observed evolution of the price level.

Between 1797 and 1821, the so-called Restriction Period, Britain suspended the convertibility of Bank of England notes into gold in order to finance the Napoleonic Wars. This exceptional measure was accompanied by important degrees of debt accumulation and inflation. By the time discussions regarding the gold standard's resumption started after Napoleon's final defeat at Waterloo in 1815, the debt to GDP ratio had climbed to 226%; the price level exceeded its 1797 level by 22.3%. (Officer, and Williamson, 2013; Gayer, Rostow, and Schwartz, 1953).<sup>1</sup>

Under these circumstances, getting back to the pound's prewar parity would come at high deflationary costs. In particular, wartime inflation had to be made undone by peacetime deflation in order to peg the paper pound to its pre-war gold content. The debate surrounding the resumption of cash payments was very lively and another option, namely getting back to the gold standard at a devalued pound, was by no means

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<sup>1</sup>Both metrics would reach 260% and 20.6% respectively when resumption was finally decided in 1819.

excluded *a priori* (Acworth, 1925; Fetter, 1965; Kindleberger, 1982). Not only would devaluation have spared the war-ridden economy from deflation and its detrimental effects on activity. By decreasing the purchasing power of the pound, it would also have alleviated the burden of outstanding debt.<sup>2</sup>

Policy makers had two options, both of them characterized by a trade-off between the nominal value of the pound and the real amount of outstanding government debt. One choice entailed getting back to the pound's pre-war parity and price level but would come at the cost of deflation and an increased debt burden. The other option implied devaluing the pound; while alleviating the debt burden, this would also have been inflationary.

Contemporaries knew of these alternatives and attached probabilities to each of them as the Napoleonic Wars and debt accumulation dragged on. In particular, to get an idea regarding future inflation – i.e. regarding the policy choice between valuation induced de- or inflation – agents would assess what fiscal sustainability came across as in the future. If, for instance, the fiscal outlook looked grim, because hostilities intensified and public spending increased, debt relief by devaluation and, hence, inflation would become more likely.

The type of information that mattered at the time for fiscal sustainability and anticipated inflation was related to war finance. Roughly two thirds of Britain's budget were dedicated to war fare; the same was true for most other European countries during that period (O'Brien, 1988; Hoffman, 2012). Moreover, war was a costly endeavor that could, in the worst of cases, render otherwise solid public finances unsustainable. In every case it induced a great deal of uncertainty regarding the prospects for government finances.

For instance, severe territorial losses and their impact on an economy's tax base or imminent reparation payments (Oosterlinck, 2012) could become prohibitive. A war could, hence, push an economy to a point, its fiscal limit, were the government would not be

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<sup>2</sup>A third option to cope with the war's legacy would have been to default on some of the outstanding debt. As did contemporaries, so do I exclude outright default from the politically feasible. Section 6 and a companion paper of mine (Antipa, 2014) provide narrative and quantitative evidence for this claim.

able to finance its expenditures any more. Once an economy's fiscal limit was reached, default or devaluation induced inflation would become inevitable.

In addition, rather than being a specific point, such as a particular debt-to-GDP ratio for instance, an economy's fiscal limit could be thought of as a distribution affected by various factors. The latter included contingencies that were beyond a government's full control and that it could, thus, not commit to (Bi, 2012; Trabandt and Uhlig, 2011). Moreover, as the outcome of a war was often beyond a government's will, it was difficult to convince people that public finances would remain sustainable under all circumstances.<sup>3</sup>

The above did not necessarily entail that governments were not credible in their policy commitments. On the contrary, the soundness of British institutions at the time was broadly established (Bordo and Kydland, 1995; Bordo and White, 1991). Yet, given the economic, political, and institutional uncertainties induced by war, agents would nonetheless try to incorporate all available information that could help anticipate the future state of public finances, and, hence, the aggregate price level. This was a rational strategy irrespective of the government's initial commitment to sound fiscal and monetary policies.

I demonstrate the relation between evolutions in public debt on those of asset prices by identifying structural breaks in the latter. These break dates reflect the historical events that shaped market sentiments. I find that significant changes in prices coincide with events that command a reassessment of Britain's expected military fate. In particular, unfavorable news - concerning a battle lost by the British, for example - has an inflationary impact, as it potentially makes a British victory less probable and, hence, public finances less sustainable. On the contrary, favorable news causes inflation to recede.

Thus, in terms of the long standing debate attributing evolutions in the price level during the Restriction Period to either real or monetary factors, I propose a novel, third explanation. This one is based on the fiscal determinants of the price level. These results are of timely relevance, since they corroborate the effects of mounting fiscal pressure on

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<sup>3</sup>A similar strain of argumentation could be applied to financial crises or any other circumstances that entail a surprisingly large burden to an economy's budget.

prices in a fiat currency regime with flexible exchange rates, features that characterize most industrialized economies today.

The remainder of the article is organized as follows. Section 2 outlines links to the relevant literature. Insisting on the interactions between the Bank and the Treasury, section 3 recalls the events that led to the suspension and resumption of the gold standard. Section 4 then details the econometric procedure used to detect the events shaping fiscal anticipations and, hence, asset prices. The following section 5 comments on the results. Section 6 discusses the hypotheses underlying my interpretation of events, while section 7 concludes briefly.

## 2 Related Literature

Two analytical frameworks have been put forward in the economic literature to formalize the link between people's expectations of how debt will be stabilized in the future and price evolutions today. The first one goes back to seminal contributions by Sargent (1982) and Sargent and Wallace (1981) and has been dubbed the 'unpleasant monetarist arithmetic'. The second approach is owned to Leeper (1991), Sims (1994) and Woodford (1995 and 2001) and is called the Fiscal Theory of the Price Level (FTPL henceforth).

Paraphrasing Keynes, Sargent (1982) points out that the size of a government's gold reserve is not the determinant of whether it can maintain or return to convertibility with gold; its fiscal policy is. According to this view, a government is like a firm, for which the value of its debt equals the present value of current and future surpluses. Thus, in order to assign a value to public debt, it is necessary to anticipate the government's revenue streams as a function of the state of the economy now and in the future.

In particular, in Sargent and Wallace's (1981) framework, agents anticipate that un-sound fiscal policy today will make it necessary for the government to raise revenues by printing money tomorrow. However, agents' demand for money holdings declines with anticipated inflation. For a given current money supply, the value of money, therefore, declines and the price level increases. By this mechanism, fiscal profligacy today may

necessitate future money supply growth, causing inflation through seigniorage.

The FTPL also explains movements in the aggregate price level by changes in government debt sustainability. Here it is, however, agents' investment, consumption, and price setting decision that induce the price level to adjust the real value of outstanding debt. Long-term debt sustainability is, hence, guaranteed by movements in the price level, rather than by adjustments in the real backing of debt through seigniorage (Leeper, 2013).

In both frameworks current and future fiscal deficits affect inflation. As fiscal policy determines prices, the central bank is incapable of controlling inflation. This hinges on the existence of a point beyond which a government's possibilities of financing its expenditures are constrained for economic or political reasons. In fact, this restriction is equivalent to relaxing the assumption that the fiscal authority accommodates the central bank's policies by keeping debt on a sustainable path.

Institutional settings of the time and observed evolutions in the price level and public debt fit well with the FTPL. As posited by the framework, the fiscal authority was the leading one, in the sense that monetary policy decisions were subordinate to fiscal needs. At the time, the Bank of England primarily financed government expenditures and it was Parliament that made decisions regarding the suspension and resumption of cash payments (Clapham, 1944 and Homer and Sylla, 1991). Moreover, the suspension of convertibility was clearly understood as part of the Nation's war effort (Newby, 2012; O'Brien, 2010).

Another precondition for the workings of the FTPL was fulfilled by the absence of outright default on government debt. As various authors have pointed out, outright default on public debt became absent of British public finances after Parliament gained broad decisionary powers over public expenditures and taxation through the Glorious Revolution (North and Weingast, 1987; Sussman and Yafeh, 2006). Partisan constellations made hard default even less likely (Stasavage, 2007) (refer also to discussion further below).

As will be shown further below, the adjustment of outstanding government debt was operated by discrete jumps in the price level. When unfavorable news brought about a change in expectations regarding the sustainability of public finances, a higher price level increased the nominal backing for public debt. On the contrary, seignorage accounted for less than 5% of war revenues (Bordo and White, 1991). Given that seignorage contributed so little to the real backing of public debt, it seems unlikely that anticipated future money growth affected agents' inflationary expectations.

Finally, there is an inherent contradiction between Sargent and Wallace's predictions for and observed evolutions of the price level. In their framework, expansionary monetary policy reduces the need for future money growth and seignorage, being, thus, disinflationary (Loyo, 1999). However, most scholars have put forward that around the 1813-14 price peak, the BoE's monetary policies were at their most expansionary (Duffy, 1981).

Fiscal determinants of the price level are also the principal component that differentiates my contribution from a long standing literature that has sought to explain evolutions in the price level during the Restriction Period by either real or monetary factors. This debate can be traced back to the opposing views of Tooke (1857) and Ricardo (1817) that were linked to the Real Bills Doctrine and the Bullionists respectively. More recently, Bordo and Schwartz (1981) have taken position vis-à-vis Lewis (1978) and Rostow (1948 and 1978), emphasizing the importance of monetary factors for price level determination, in line with the quantity theory of money.

I propose a novel, third explanation, drawing on existing research. As Bordo and Reddish (1992), I emphasize the importance of terminal conditions in order to capture the link between people's expectations of how debt will be stabilized in the future and contemporary price evolutions. Based on Arnon (1990) and Rostow (1978), I rely on financial data to capture agents's expectations regarding fiscal sustainability, avoiding the caveats of noisy data and lacking price indices. Finally, because of its duration and policy relevance, I view the Restriction Period as an integral monetary policy regime, rather than a lapse from the gold standard (Chadha and Newby 2013).

Other authors have treated the impact of war fare on capital markets and inflation-

ary outcomes over the Restriction Period. The channel that Barro (1987), Barsky and Summers (1988), Benjamin and Kochin (1984), or Williamson (1984) highlight, relies on the eviction of private investment and consumption by public expenditures. As war time spending crowds out private expenditures, adjustments in the interest rate have to match the rising marginal product of capital during war times.

Over the period under consideration, the credit market did, however, rarely reach equilibrium through changes in interest rates alone, but balanced rather through quantities (Ashton, 1959; Temin and Voth 2005). Usury laws, only abandoned in 1833, set a maximum interest rate of 5%; a market clearing mechanism based on a price signal does, therefore, not seem applicable to the Restriction Period.

Parallel to this fact, various authors do not find that mounting government debt and expenditures displaced much private investment (Clark, 2001; Heim and Mirowski, 1987). International capital flows (Neal, 1990 and 1991) and the safe haven nature of British government debt (O'Brien, 2011) certainly contributed to meeting Britain's important financial needs during the Napoleonic Wars.

The above contributions analyze the part of the nominal interest rate that reflects the real expected interest rate. Although Bordo and Kydland (1995) demonstrate why long-term inflationary expectations could have been stable over the period, there is no series available that could definitely corroborate this hypothesis. In the absence of such evidence, movements in interest rates may also reflect changes in anticipated inflation or the default premium (Barro, 1987). This is my underlying assumption for what follows, as it has been the case for Calomiris (1988), Frey and Kucher (2000), Guinnane et al. (1996), and Webb (1986).

### **3 Course of Events**

#### *The Onset of Convertibility Suspension and the Bullion Report*

The Reign of Terror in France beginning in early 1793 produced a sharp outflow of cap-



ital, inducing silver and gold to leave France for Britain. This provided ample liquidity for the British banking system (Neal, 1991; Sargent and Velde, 1995). When the assignats collapsed in France in 1795, money for ordinary payments was in short supply and those with claims or credit in Britain drew on them to fill the gap. The ensuing outflow of capital put deflationary pressure on Britain (Kindleberger, 1984).

Under these circumstances, minor French military actions in February 1797 triggered a bank run, converting bank notes into gold coin. The consequences of this run were felt throughout the country, putting numerous (country) banks out of business (Feavearyear, 1964). Subsequently, on 27 February 1797 the Bank of England (BoE) was given permission to cease payment of its notes in gold before running out of reserves. With this suspension, local bank notes were convertible only into BoE notes, shifting Britain's monetary system from a commodity standard to a flexible exchange rate.

The paper pound's exchange rates into gold and foreign currencies started depreciating around 1809. Classical value theory, beginning with Ricardo (1817), held that the equilibrium price of a good was determined by its production costs. As the production prices of gold and silver were relatively stable over the period, a rise in the sterling price of gold bullion, and, hence, an increase in the difference between the mint and the market price of gold, i.e. an increase in *the agio*, was perceived as evidence for inflation. After the suspension of convertibility, a fall of the exchange rate on foreign currencies was interpreted identically (Laidler, 2000).

Figures 1, 2, and 3 depict the evolutions of *the agio*, *ex-post* constructed price indices and the exchange rate on Hamburg, respectively. As can be seen, all three series exhibit a marked decline in the pound's purchasing power of 30% to 40% over the whole suspension period (shaded area), and particularly after 1809.

These developments induced government to appoint an investigating committee that published its work in 1810 as the Bullion Report. According to the latter, rising prices and falling exchange rates had a common source in the BoE issuing too many notes.<sup>4</sup>

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<sup>4</sup>Neal (1991) argues that the interruption of trade with the Continent caused the exchanges to fall. By implementing the Continental System, Napoleon consciously sought to undermine British war financing.

Notes were issued to buy government debt, in turn, used to finance the Napoleonic Wars, which would have been impossible had the BoE still the obligation to convert its liabilities into bullion.

The BoE had indeed expanded its note issue, but the peak of it was only reached when the burst of the South America bubble in late 1810 induced wide spread panic and business failures (Feavearyear, 1964; O'Brien, 2010). Amid spreading commercial distress, country banks started to contract their note issue drastically. The liquidity shortage was broadly acknowledged and authorities attempted to overcome it by issuing Exchequer Bills. Thus, at least part of it could be accounted for to its normal function as a lender of last resort, when other forms of credit disappeared (O'Brien, 2010; Clapham, 1944; Flinn, 1961).

### *Fiscal Pressure and Interactions between the Bank and the Treasury*

At the same time, the year 1809 proved disastrous for the British in military terms, on all war fronts. Over the first quarter of the year, the French forced the British to evacuate Spain and occupied Northern Portugal.<sup>5</sup> In July, the Fifth Coalition, the Austrian and British led alliance against France, was defeated at the battle of Wagram. By the end of the year, the French beat the remaining forces in the South of Spain; the area was taken in the following winter, imposing French control in most of the Iberian Peninsula.

While these events took their toll on public finances, room for maneuver in terms of taxation was very limited. The introduction of the income tax (1799) had only been possible under highly exceptional circumstances, i.e. when grave doubts about the stability of public securities had emerged, as the national debt had doubled during the first six years of unsuccessful warfare against Revolutionary France.<sup>6</sup> How strong the opposi-

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In particular, by rendering it difficult to import British goods, Napoleon was attempting to constrain corresponding capital flows from the Continent to Britain.

<sup>5</sup>In the meantime, Napoleon had initiated the Peninsular War. In order to punish the Portuguese for not enacting the Continental System against the British, French and Spanish troops invaded Portugal in November 1807. Napoleon turned on its former ally by attacking Spain in February 1808.

<sup>6</sup>Between February 1793, the beginning of the French Revolutionary Wars, and February 1799, the price of consols fell by 26%, to the lowest levels of the French Wars.

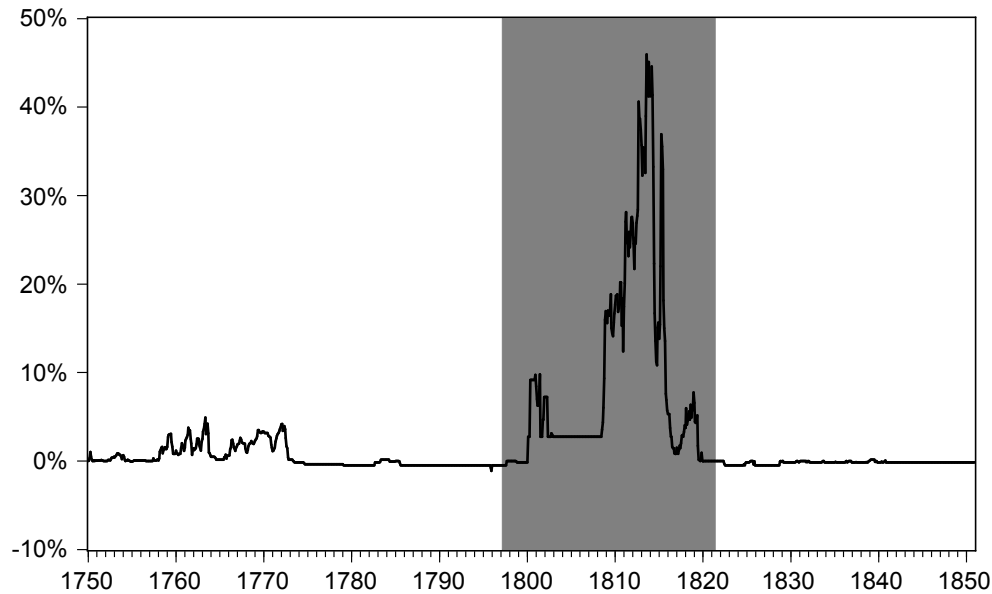


Figure 1: The agio, difference between the market and mint price for gold, 1750 to 1850.

*The shaded area marks the suspension of the gold standard from February 1797 to May 1821. Sources: Neal, 1990.*

tion to the ‘repugnant tax’ was, can be seen from the fact that it was instantly repealed at the Peace of Amiens in 1802 and after the victory at Waterloo in 1816 (O’Brien, 1988).

In addition, a broad social consensus entailed that it was indecent to tax the poor’s necessities, taxing, hence, mostly goods consumed by the affluent. Between 1793 and 1815, two thirds of the extra taxation required to finance the French Wars emanated from taxes levied on the incomes and consumption patterns of the wealthy.<sup>7</sup> The government had, thus, somewhat exhausted its possibilities for taxation. Further increases in tax rates had become self-defeating - as when notable families ceased to exhibit armorial bearings or to use hair powder (O’Brien, 1988 and 2007).

This situation entailed that the Treasury had to heavily rely on the BoE for war finance. Large loans against bonds, funded debt, were agreed upon for England, Ireland, and

<sup>7</sup>The remainder was mostly levied on widely approved objects of taxation, alcohol and tobacco.

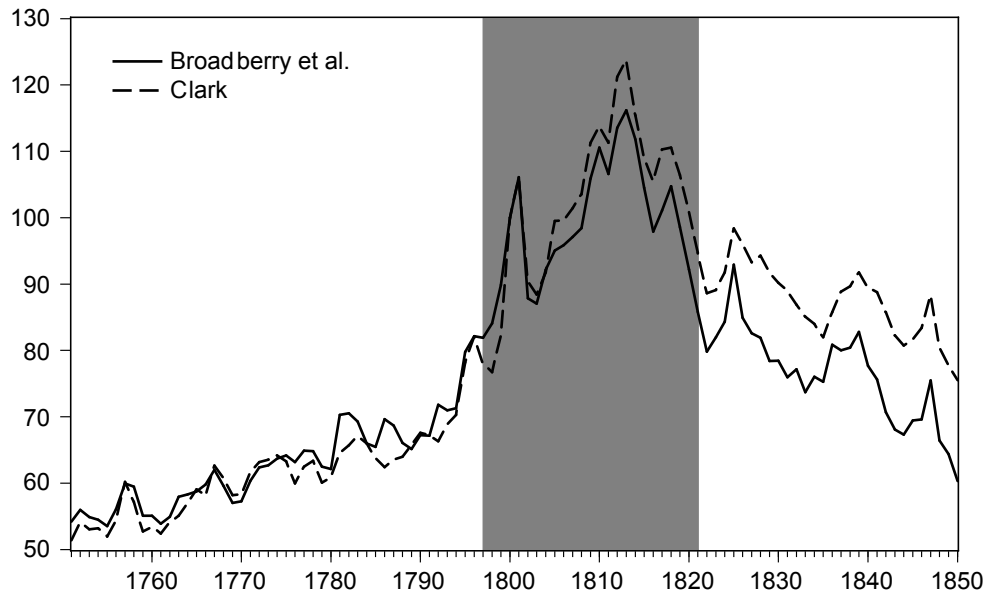


Figure 2: Price indices, 1800=100, 1750 to 1850

*The shaded area marks the suspension of the gold standard from February 1797 to May 1821. Sources: Broadberry et al., 2012; Clark, 2014.*

Portugal (Grellier, 1812). Short-term borrowing in the form of Exchequer or Navy bills, unfunded debt, increased by 22% over the year (Mitchell, 1988). Unfunded debt had the great advantage of not necessitating Parliamentary ascent and did not come with earmarked taxes.<sup>8</sup> It was, thus, often used to finance unforeseen expenditures (O'Brien, 2006). As manager and primary holder of public debt, the Bank of England became essential for financing the war effort.

The Bank could hardly refuse requests for credit from the Treasury in times of war. Moreover, the monopoly of issue it enjoyed in the wider London area was subject to periodic renewal. These Bank charter renewals could be negotiated at any time, well before their expiration. Bargains over renewals were, hence, often reached over war loans, as

<sup>8</sup>As soon as Britain went to war in 1793, 33 Geo. III, c. 32 officially legalized the already usual practice of advancing funds for exchequer bills without Parliamentary authorization or funding, a practice not in compliance with the Bank's Foundation Act (5 and 6 William and Mary, c.10)

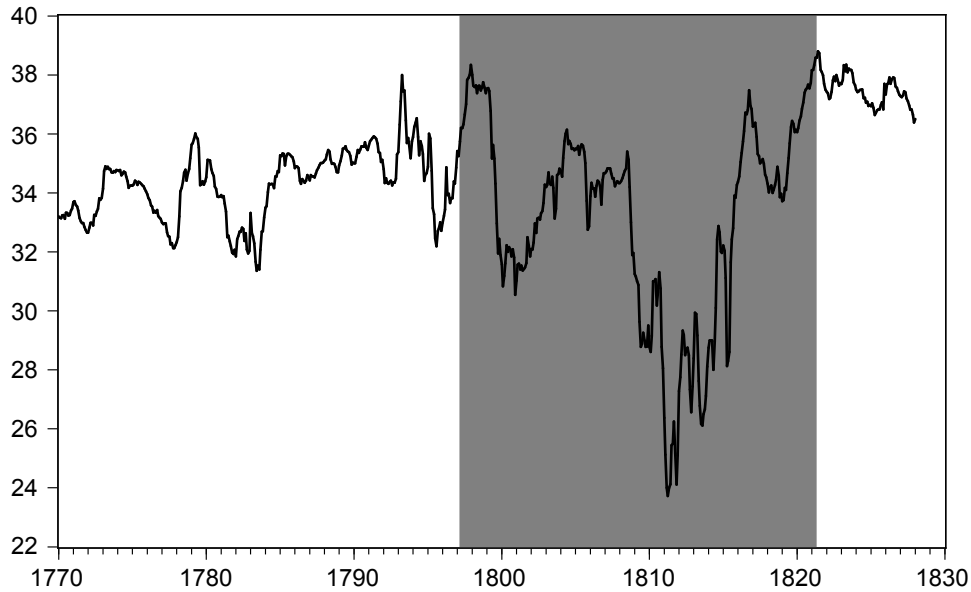


Figure 3: Exchange rate on Hamburg: Schilling per Pound Sterling, two months' usance, 1770 to 1828.

*The shaded area marks the suspension of the gold standard from February 1797 to May 1821. Sources: Boyer-Xambeu et al., 1994.*

was the case in 1781 and 1800 in the midst of the American and French Wars respectively (Clapham, 1944).

War finance was, nonetheless, a very lucrative business for the BoE. Figure 4 displays the evolution of the Bank's stock price over the 25 years from January 1796 to December 1821. The price index is set to 100 in January 1797, the last month before the suspension. As can be seen, the stock price more than doubled between the suspension of convertibility (solid right line) and its peak in 1818. Especially after the beginning of the Third Coalition War against France in May 1803 (dashed line) the stock price increased quasi monotonically.<sup>9</sup>

<sup>9</sup>The increase encompasses the years preceding the battle of Trafalgar (October 1805) at which the French fleet was defeated, averting the danger of French invasion. The absence of any sizable departures from the increasing trend in the stock price cast doubts on whether financial markets perceived the

Quite intuitively, the BoE's stock price reflected evolutions in its expected cash flows. As the latter hinged largely on the management of public credit, times of increasing debt, war times, were good times for the BoE. In particular, beyond the interest the Treasury paid on the majority of loans with the Bank, the latter also charged management fees for handling the public debt. Billing £450 per million of public debt, the Bank's income increased mechanically when war debts soared.

'The increased advantages derived by the Bank from war conditions and war loans' had, thus, not escaped successive Chancellors of the Exchequer.<sup>10</sup> Consequently, management fees charged to the Treasury were substantially lowered by Perceval in early 1808, rendering them regressive in the size of the public debt. Shortly before, the BoE had increased its yearly dividends to 10% (Clapham, 1944).

As was the case after Waterloo, the Bank's income and stock price decreased after the decision to resume the gold standard in May 1819 (solid left line). Yet, they did not fall again to the levels usual before the suspension of payments. Despite revised management fees and falling discounts, the sheer size of the public debt assured a comfortable level of revenue to the Bank. Parliament's refusal to maintain the income tax certainly helped that cause as well, since it implied that borrowing continued when war-related expenses ceased.<sup>11</sup>

### *The Long Path to Resumption*

Once Britain had won the war, fiscal pressure delayed resumption. The Bank Restriction Act<sup>12</sup> had initially determined that specie payments would be resumed six months after threat of French invasion as a real one.

<sup>10</sup>Sir Henry Petty, Chancellor of the Exchequer 1806-1807, Committee of Treasury Books 5, March 1806.

<sup>11</sup>Winding down the Army and the Navy was costly; so were the public measures necessary to cope with after war depression (Clapham, 1944; Flinn, 1961).

<sup>12</sup>The suspension was regularized in November 1797, by Geo. III, c.1 and extended several times. In December 1803, Geo.III, c.1 finally fixed its end at six month after the ratification of a definitive peace treaty.

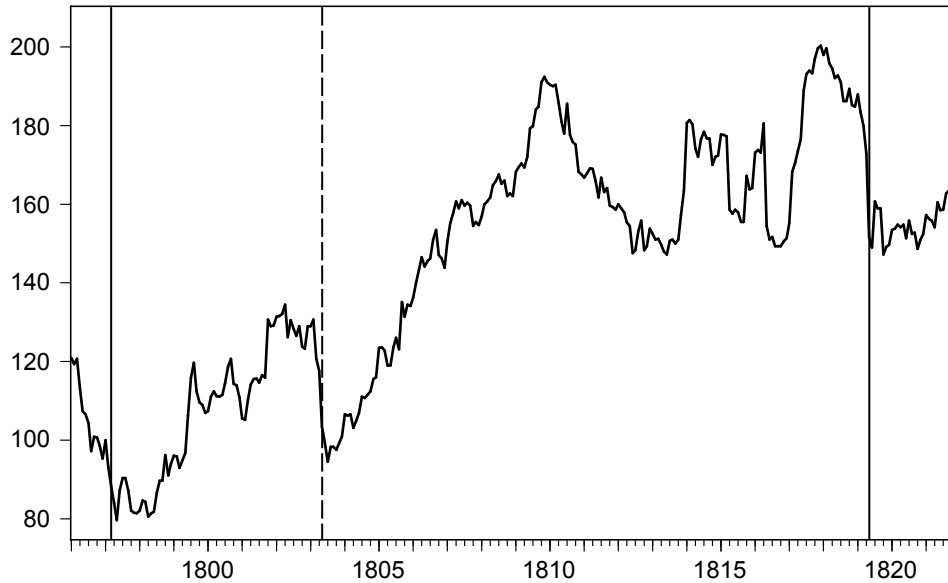


Figure 4: Stock price Bank of England, Jan 1797=100, January 1796 to December 1821.

*The solid right and left lines mark the convertibility suspension and the decision to end it in February 1797 and May 1819 respectively; the dashed line depicts the beginning of renewed hostilities between Britain and France. Sources: Neal, 1990.*

the end of the war. Yet, between the end of the Napoleonic Wars in June 1815 and the resumption of the gold standard, the legal limit was extended several times, carrying the restriction to the 5th of July 1819.<sup>13</sup>

Cannan (1919) explains that the BoE's unfortunate financial situation in 1816 was caused by its lending to the Treasury. Clapham (1945) emphasizes that the Bank's high average of notes outstanding in 1817 and 1818 was due to the to the same reason; commercial lending was abnormally low over the period. In total, the Bank's holdings of public securities had increased by 40% between February 1816 and August 1818. This evolution reflected the sizable increase of public debt over the period: by 1815, the debt to GDP ratio had reached 226%, up from 120% in 1793. World War 1 would cause an increase

<sup>13</sup>The different pieces of legislation are summarized in the Report from the Secret Committee on the Expediency of the Bank Resuming Cash Payments of 1819.

in public debt of the same order of magnitude (see figure 5).

Over the whole after-war period, BoE directors had insisted that an effective resumption was only possible if the government reimbursed a substantial amount of debt to the Bank. Along with the definite resumption of specie payments - Peel's Act, enacted 2 July 1819 - a separate act imposed the repayment of £10 million of government short-term debt<sup>14</sup> and forbade the Bank to lend to government for more than three months without express Parliamentary approval.

This paved the way for resumption, planned for May 1823 and eventually undertaken in May 1821. In the meantime, the suspension of cash payments was to be maintained until 31 January 1820. Effective debt reimbursement had not yet begun: so late as January 1820, the Bank was still pressing the Treasury for repayment (Clapham, 1944). Bank stock and gold, however, reacted immediately in May 1819 by suffering sizable declines; the Pound's exchange rate on Paris appreciated. The change in market sentiment and its impact on asset prices hinged on the mere anticipation of an important debt reduction that came with the reversion to the old monetary standard.

## 4 Econometric Methodology

### 4.1 The Data

In order to capture the connection between expectations regarding the sustainability of public finance and evolutions in prices, I focus on the series that contemporaries used to assess inflationary tensions. This ensures historical coherence between my findings, contemporaries' information set, and the Bullion Report's sources and basic hypotheses.<sup>15</sup> Contemporaries paid attention to prices of specific, widely traded goods, such as wheat, gold bullion and sterling bills of exchange. Of these data, I will concentrate on the difference between the market and the mint price of gold bullion, the *agio*, for the following reasons.

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<sup>14</sup>59 Geo.III,c. 76

<sup>15</sup>Price indices were not available to contemporaries, since the first one was only published in 1863 by William S. Jevons.



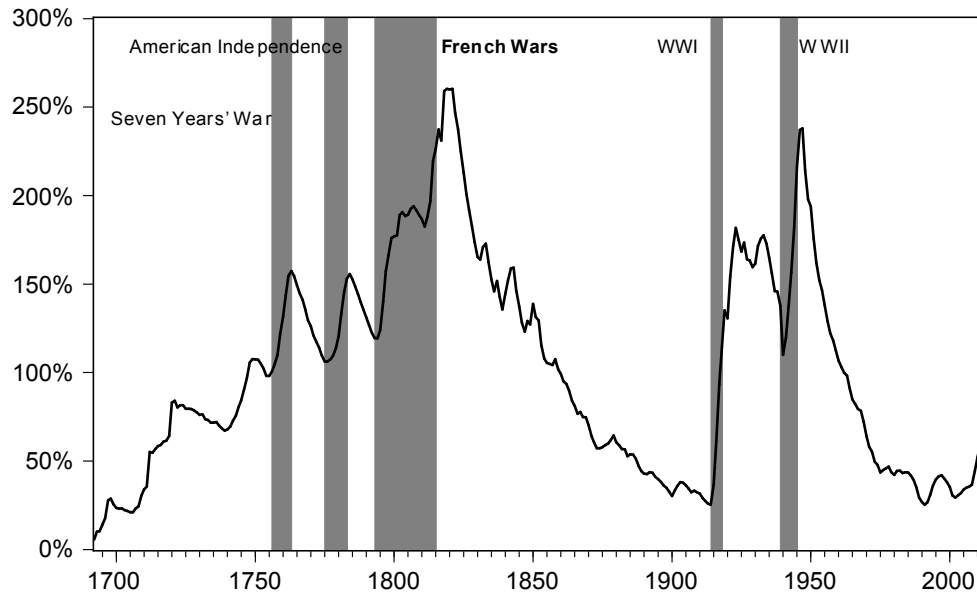


Figure 5: Debt to GDP ratio, 1692-2011

Sources: *Mitchel, 1988; Officer and Williamson, 2013*

Wheat prices were affected by several real factors, such as bad harvests (Tooke, 1824) or the various trade barriers installed during the period under consideration (for the Continental System, see Crouzet, 1964; for the US embargo, see Frankel, 1982). These factors stood in no connection with agents' expectations regarding fiscal sustainability.

On the contrary, financial data offer the advantage of reflecting subjective expectations of decision makers about the future. In addition, as financial decisions have pecuniary consequences this implies incentives to behave as a profit-maximizer. In other words, traders attempt to pin down what did or will happen, not for its own sake or historical purposes, but in order to assess the future value of the asset they hold or intend to acquire (Frey and Kucher, 2000). This avoids certain selection biases such as 'wishful thinking'.

Finally, evolutions in the *agio* reflect the movements in the aggregate price level accu-

rately. For the available monthly and yearly price indices, correlation coefficients range from 0.65 to 0.72 and from 0.68 to 0.79 respectively during the suspension period. Table 3 in the appendix presents more detailed statistics.<sup>16</sup>

The data set spans the years 1718-1873 and is based on Castaing's Course of the Exchange, published twice a week. As presented in figure 1, the *agio* increased substantially after 1808 and reached a peak of 45% mid 1813. Absent any significant changes in the supply of gold, to contemporaries these evolutions meant a sizable internal devaluation of the pound. In particular, an increase of gold's market value in terms of paper pounds entailed that more pounds were required to purchase the same commodity.<sup>17</sup> Table 4 in the appendix provides descriptive statistics for the *agio*.

## 4.2 Identification Strategy and Estimation Procedure

### *Contemporaries' Views and Actions*

Regardless of prior policy commitments, agents could rationally be expected to incorporate all available information that could help anticipate the future state of public finances (see section 2). Based on their assessment regarding the sustainability of British public debt, agents would then adjust their consumption, investment, and pricing decisions. These, in turn, would affect the aggregate price level, through which adjustments in real outstanding public debt would operate.

The aggregate price level, therefore, reflected agents' assessment of fiscal sustainability in the future. Important changes in the price level, should, thus, convey information on the events that caused contemporaries to alter their predictions regarding public finances.

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<sup>16</sup>I can exclude that gold prices were affected by evolutions in supply, as the latter was stable during the Restriction Period (Barro, 1987). In addition, melting down and export of British coin were prohibited. I also assume that changes in the demand for non-monetary uses of gold did not occur during the Restriction Period. In particular, it is well known that prices for precious metals increase in times of financial or political turmoil. This reflects precautionary motives, i.e. a hedge against future inflation, and can, therefore, be considered a monetary use of gold.

<sup>17</sup>In 1717, Newton fixed the pound sterling at a gold price of £3 17s 10.5d. This mint price lasted with lapses for the two restriction periods until 1931.

Hence, I should be able to identify these unexpected<sup>18</sup> events as structural breaks in the price level, measured by the *agio*.

This type of analysis is different from an event study or the narrative approach, as the starting point is not a predefined list of historically important dates with the data telling which matter. On the contrary, the methodology employed here allows detecting the events that contemporaries considered to be significant for the future course of British finances without any *ex post* bias. This pays attention to the concern that historical events are not a prequel to what ensues but have to be analyzed in their historical context.

In addition, the understanding of contemporaries' perception is enhanced by the use of financial market data. The latter are highly informative when one wishes to assess the contemporaneously perceived importance of events, since any misinterpretation of incoming information has adverse pecuniary consequences (Frey and Waldenström, 2008 and Oosterlinck et al. 2013).

### *Archival Evidence: The Press and the Bank*

My approach bears, however, the risk of 'over-interpretation', i.e. the risk that historical events of minor importance are matched with the determined break dates at any costs. I verify the importance of events matched with the detected break dates by considering contemporary sources and archival evidence. In particular, I consult the *The London Times*, Britain's highbrow daily newspaper of the period, for which archives are available over the whole period (Bignon and Flandreau, 2014).

I also examine *The London Gazette*, government's official journal. The latter was published twice a week (on Tuesdays and Saturdays) and as a 'Gazette Extraordinary' whenever deemed necessary by the nature of news. The *The London Gazette* contained official government announcements, such as declarations of war and peace, and intelligence from different war fronts. The enclosed intelligence came in the form of dispatches, composed by the actors of war themselves (to a lesser extent that was the case for the *The London*

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<sup>18</sup>Market efficiency entails that expected events would have been incorporated beforehand.

*Times* as well).

Therefore, these sources also conveyed information regarding transmission times for news. For instance, Madrid capitulated to the French on 4 December 1808, news of the capitulation, however, only reached London on the 19th. I, thus, pay close attention to the fact that break dates have to coincide with the moment at which information concerning an event attained Britain, rather than with the timing of the event itself.

While it is rather straightforward that Madrid's capitulation made the news in December 1808, it is less easy to determine which event affected contemporaries' perceptions when there were several important battle lines. In these cases, I search both journals for keywords in the vicinity of the break date and retain the event obtaining the highest number of references. Along this dimension, I pay particular attention to the frequency of mentions in the *The London Times* lead articles. In August 1812, for example, intelligence from neither the Russian nor the Spanish fronts made the headlines, it was the American declaration of war that occupied most news space.

In addition to these sources, I rely on evidence from the BoE archives. I consider ledgers and related documents<sup>19</sup> that contain prices for gold and different titles of public debt. These publications also record significant events of the time, establishing a direct link between observed price movements and the events that caused them. In other words, contemporaries were well aware of the fact that political and military events had their bearing on the evolutions of asset prices.

In particular, the ledger used (see figure 8 in the appendix), records fortnightly averages of price data and was completed over time. This makes the ledger an adequate reflection of how the importance of events was appreciated in real time. It is, therefore, reassuring that practically all estimated break dates and related events are also mentioned in the ledger.

My approach is, thus, freely inspired by Webb (1986) in that it allows detecting the events that influenced contemporaries' perceptions in real time by combining *ex-ante*

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<sup>19</sup>BoE archives, items 10A270/1 and 10A321/1.

agnostic break tests and the reading of contemporary sources. The appendix (subsection A2) provides an example of how this methodology forestalls detecting events that suffer from *ex post* bias - while historiography regards the Battle of Leipzig in October 1813 as Napoleon's decisive defeat, contemporaries' perception of the event explains why it did not affect asset prices.

### *Some Econometrics*

The procedure used to estimate the break dates is based on Bai and Perron (1998 and 2003).<sup>20</sup> It has the advantage of allowing for a very wide range of specifications (serial correlation and heteroskedasticity in the errors, lagged dependent variables, trending regressors, as well as different distributions for the errors and the regressors across different segments). The procedure also encompasses a whole battery of different break point tests (sequential and global methods), increasing the robustness of results.

Consider the following multiple linear regression model with  $m$  breaks and  $m+1$  regimes:

$$y_t = x_t' \beta + z_t' \delta_j + u_t \quad (1)$$

for  $t = T_{j-1}+1, \dots, T_j$  and  $j = 1, \dots, m+1$ .  $y_t$  is the observed endogenous variable,  $x_t(p \times 1)$  and  $z_t(q \times 1)$  are vectors of co-variates and  $\beta$  and  $\delta_j$  are the corresponding vectors of coefficients.  $u_t$  is the disturbance at time  $t$ . Given the  $T$  observations of  $(y_t, x_t, z_t)$ , I estimate the unknown regression coefficients  $\beta$  and  $\delta_j$  and break dates. For the *agio*, I will posit that all coefficients are subject to change, obtaining a pure structural change model ( $p = 0$ ) of the following form:

$$y_t = z_t' \delta_j + u_t \quad (2)$$

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<sup>20</sup>Various other studies in the field of economic history have used break point tests; a non-exhaustive list includes: Guinane et al., 1996; Brown and Burdekin, 2000; Frey and Kucher, 2001; Oosterlinck, 2003; Frey and Waldenström, 2008; Zussman et al., 2007; Flandreau and Oosterlinck, 2011.

Note that the variance of  $u_t$  does not need to be constant. Breaks in the variance are permitted, provided they occur at the same dates as the breaks in the parameters of the regression.

I define a break in the series as a change in the conditional mean of the series  $y_t$ , i.e. I specify that the intercept can change ( $z_t = 1$ ). The focus is here on abrupt structural changes in the mean that reflect the advent of unexpected news affecting Britain's war fate and, hence, public finances. For that reason, I also exclude past values of the endogenous  $y_t$ . When lagged values are included, changes in the level of  $y_t$  also depend on the auto-regressive dynamics of the series; thus, the change takes effect gradually. On the contrary, when specifying  $x_t = \emptyset$ , all the dynamics are contained in the error term and the change is, hence, abrupt (Bai and Perron, 2003).<sup>21</sup>

In the following, I first run the break point procedure on monthly data for the 1795-1823 period. This data set is comparable to the ones used in earlier studies (Neal, 1990) and contains 340 observations. I then use the daily data, in order to detect more precise break dates. Due to data availability issues, I only estimate daily break dates for the 1811-1823 period. The daily data set encompasses 1350 observations.

Increasing the number of observations included in the sample, also allows detecting more break dates, as the number of breaks depends on the possible size of segments, i.e. the number of observations between two adjacent breaks (Bai and Perron, 2003). A minimal segment size warrants that each segments contains sufficient observations to estimate parameters precisely. In addition, when very large confidence intervals indicate an imprecise estimation of break dates, I do not consider these dates.<sup>22</sup>

In the presence of autocorrelation and heteroskedasticity, as it the case here, each segment should include at least 24 observations (Bai and Perron, 2003). Finally, a trimming parameter  $\epsilon$  links the minimal segment size,  $h$ , to the maximal number of breaks,  $k$ , allowed:  $\epsilon = \frac{h}{T}$ . For a sample of  $T$  observations one obtains the maximal number of breaks,

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<sup>21</sup>When no lagged variable is part of  $(z_t, x_t)$ , the conditions on the residuals allow for autocorrelation and heteroskedasticity.

<sup>22</sup>For the daily series, one such date in July 1813 was excluded from the list of breaks.

$k$ :  $\epsilon = 0.05 \Rightarrow k = 10$ ;  $\epsilon = 0.10 \Rightarrow k = 8$ ;  $\epsilon = 0.15 \Rightarrow k = 5$ ;  $\epsilon = 0.20 \Rightarrow k = 3$ ;  $\epsilon = 0.25 \Rightarrow k = 2$ ;

## 5 Results

### 5.1 Monthly Data

The monthly break dates are displayed in figure 6 and table 1 (table 5 in the appendix provides confidence intervals and parameter estimates). The events that coincide with the detected break dates are outlined below:

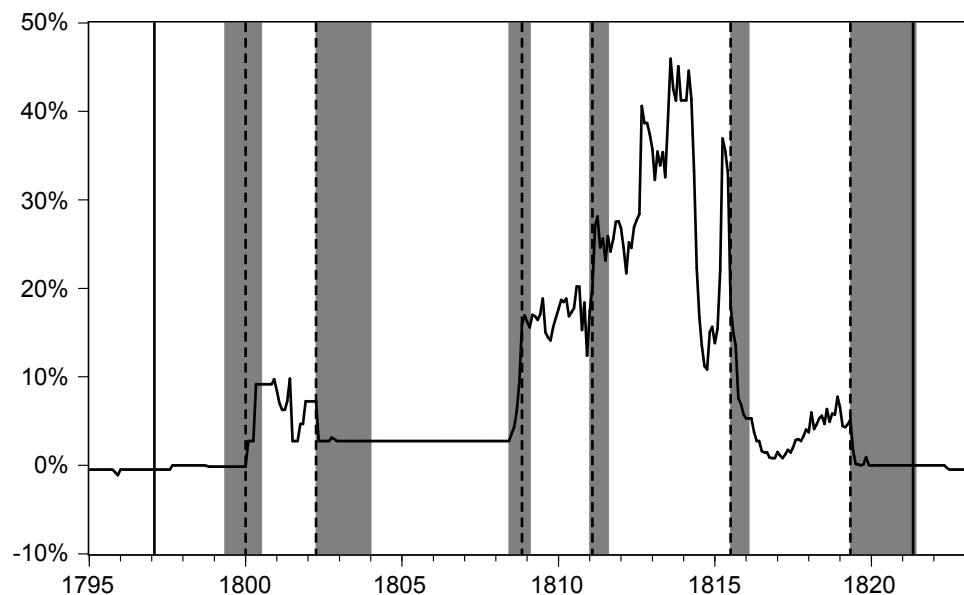


Figure 6: Break dates, monthly data, January 1795 to May 1823

*Solid lines mark the beginning and end of the gold standard's suspension, February 1797 and May 1821 respectively. Dashed lines highlight the detected break dates; the shaded areas represent the 95% asymmetric confidence intervals.*

- **January 1800:** The winter of 1799 brought Napoleon to power as first Consul of

Table 1: Break dates, monthly data, January 1795 to May 1823

Break date	Event	Agio
January 1800	Coup of 18 Brumaire and ensuing constitution install Napoleon as sole ruler over France	↗
April 1802	Treaty of Amiens ends hostilities between France and Britain	↘
November 1808	French victories at Tudela and Somosierra enable Napoleon's brother Joseph to become King of Spain (Britain's ally)	↗
February 1811	French forces nearly destroy Spanish Army of Extremadura and capture Badajoz	↗
July 1815	Prussians seize Paris, Napoleon surrenders to the British	↘
May 1819	Peel's Act definitely fixes details and timing for resumption of convertibility	↘

France, a position granting him broad and unchecked authority. Given his military successes during the war of the First Coalition (1792-1797), his accession to power was thought to reestablish France's place in the concert of nations (Mignet, 1826). When Britain declined Napoleon's offers to begin peace negotiations - as announced in the *London Times* on 6 January 1800 - the *agio* increased.<sup>23</sup>

- **April 1802:** The Treaty of Amiens ended hostilities between the French Republic and the United Kingdom and, thus, the war of the Second Coalition (1798-1802). The Bank Restriction Act would have expired six months afterward, and the Bank of England had signaled its readiness to resume convertibility at several occasions (Clapham, 1944; Newby, 2012).<sup>24</sup> At the announcement of these to Britain favorable events, 29 and 30 March in the *London Gazette* and the *London Times* respectively, the *agio* decreased.<sup>25</sup>

<sup>23</sup>Market sentiment proved right in that the following months would play out unfavorably to Britain. The battles of Marengo (14 June 1800) and Hohenlinden (3 December 1800) sealed Austria's defeat, leaving the British as the only army opposing France.

<sup>24</sup>It was the government that had urged Parliament to extend the Act several times, until a new war would put an end to the discussions about the early resumption in April 1803.

<sup>25</sup>The large confidence interval surrounding this break date is due to the absence of variation in the *agio* between May 1802 and October 1808. According to the Bank of England's bullion broker, the house



- **November 1808:** The battle of Burgos (10 November, announced in the *London Times* on the 26<sup>th</sup>) resulted in the complete victory of the French over the Spanish, and opened central Spain to invasion. The battle preceded Madrid's capitulation on 4 December and the installation of his brother Joseph as the King of Spain. In line with these events, the *agio* increased.
- **February 1811:** An outnumbered French force nearly destroyed the Spanish Army of Extremadura at the battle of Gebora (19 February). This victory allowed the French to seize the important fortress and well supplied town of Badajoz, opening the route to Portugal. The siege of Badajoz and the city's strategic importance are first mentioned in the *London Times* by mid February. The city's fall is announced in the *London Times* on the 12th of March, included in the confidence interval. At this occasion, the *agio* increased further.
- **July 1815:** The month of July witnessed decisive military events, sealing Napoleon's final defeat. Wellington and Louis XVIII enter Paris after the Battle of Issy, won on the 3 July.<sup>26</sup> On 15 July, Napoleon surrendered to the British<sup>27</sup> and was sent to the the island of Saint Helena, where he died in May 1821 (see section on daily data).
- **May 1819:** Peel's Act definitely fixed the details and time-line for the resumption of the gold standard (see section 3 and results for daily data further below).<sup>28</sup>

## 5.2 Daily Data

I now turn to the results of the break date estimation on the daily data, presented in figure 7 and table 2 (tables 6 and 7 in the appendix provide confidence intervals and

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of Mocatta, no prices were recorded for this period, as trading volumes were not sufficient (Report from the Select Committee on the High Price of Bullion, 1810). When trading resumes after a suspension, exceptionally large and momentary price movements may occur (Mitchell et al., 2002). This should not be an issue here, as prices increased monotonically for the following six years and as the absence of transactions seems to have been induced by market participants themselves.

<sup>26</sup>*London Gazette*, 11 July.

<sup>27</sup>*London Gazette*, 21 July.

<sup>28</sup>The large confidence interval surrounding this break date is due to the absence of variation in the *agio* afterward. Once resumption is definitely decided in May 1819, the *agio* returns to the level and volatility observed before the suspension of the gold standard.

parameter estimates). The results for overlapping periods from the daily procedure corroborate the monthly results. The following events coincide with the detected break dates:

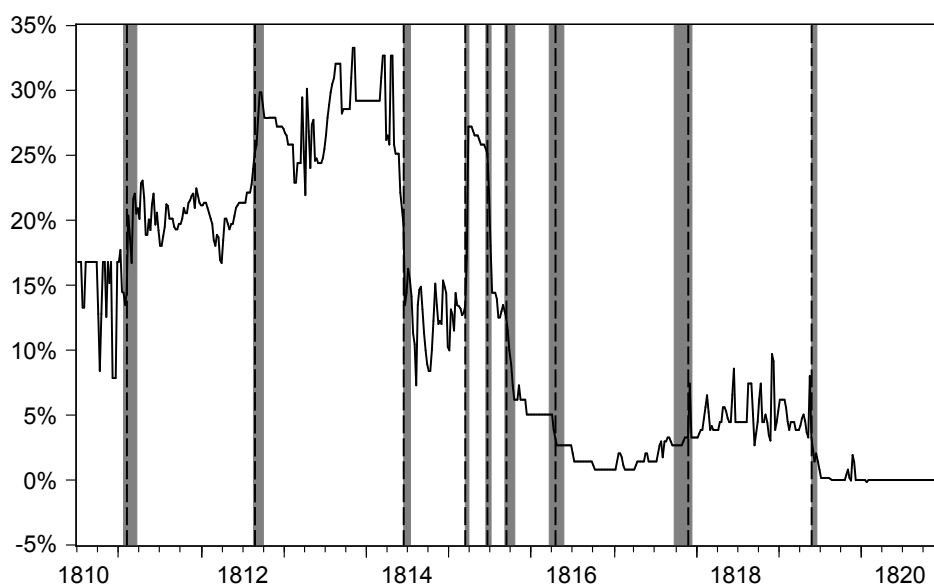


Figure 7: Break dates, daily data, July 1810 to December 1820

*Dashed lines highlight the detected break dates; the shaded areas represent the 95% asymmetric confidence intervals.*

- **8 February 1811:** No military or political events occurred at this exact date. However, the confidence interval encompasses the battle of Gebora and the ensuing fall of Badajoz (refer to monthly results). Following these events, the *agio* on gold increased.
- **25 August 1812:** During the summer of 1812, a great deal of uncertainty surrounded the state of war with America, causing upheaval in the trading community and fluctuations in the funds.<sup>29</sup> While the American declaration of war had reached London by the end of July, its primary cause, Britain's demand to cease trade with

<sup>29</sup> *London Times*, 21 August and 4 September.

Table 2: Break dates, daily data, January 1811 to May 1823

Break date	Event	Agio
8 February 1811	French victory at Gebora and capture of Badajoz	↗
25 August 1812	American declaration of war	↗
17 June 1814	Treaty of Paris temporarily ends Napoleonic Wars	↘
17 March 1815	Napoleon enters Paris after having escaped his exile on Elba	↗
17 June 1815	Napoleon suffers his decisive defeat at Waterloo	↘
15 September 1815	Ultimatum 'regarding Second Treaty of Paris	↘
16 April 1816	Currency reform	↘
28 November 1817	After war depression, new issuance of public debt, and political upheaval	↗
25 May 1819	Peel's Act definitely fixes details for resumption of convertibility; reimbursement of government debt	↘

France, had been removed in the meantime. It was, thus, expected that Lord Liverpool's repeal of the Orders of Council would have put an end to hostilities. It came as a surprise when news regarding the American decision to continue warfare reached London towards the end of August.<sup>30</sup> The opening up of a new war front amid ongoing war in the Peninsula caused a rise in the *agio*.

- **17 June 1814:** The Treaty of Paris, signed on 30 May 1814, ended the War of the Sixth Coalition. The peace treaty and its ratification were published in the *London Gazette* on the 2 and 18 June respectively. As restoring a strong and stable French state was part of getting back to the Pre-Napoleonic balance of power, Britain relinquished reparation payments. The counterpart to this was eliminating the French threat to Britain's commercial interests around the world (White, 2001). At this occasion, the *agio* fell by 60%.
- **17 March 1815:** After having escaped his exile on Elba, Napoleon entered Paris on 20 March.<sup>31</sup> Upon reaccession of the throne, he started to organize his armed forces.

<sup>30</sup>*London Times*, 21 August and 4 September.

<sup>31</sup>The *London Times*, 24 March

By the end of May, he had formed ‘l’Armée du Nord’, consisting of approximately 200,000 troops ready for deployment in the Waterloo Campaign (Chesney, 1868).

At the mere prospect of a new war against Napoleon, the *agio* doubles (Viner, 1937). The evolution of the *agio* at this particular event emphasizes that it is the expectation of future public spending that affects the price level. This is clearly a fiscal news shock, as no war-related spending has yet occurred, which rules out the hypothesis that inflationary tensions are caused by monetary expansion.

- **17 June 1815:** Napoleon suffered his decisive defeat at Waterloo on 18 June, ending his Hundred Days of reign.<sup>32</sup> At this occasion, the *agio* declined by almost 60% (refer also to section on monthly data).
- **15 September 1815:** Negotiations for the second Treaty of Paris were truly set in motion when the Allies delivered an ultimatum to the French government for a new peace on 20 September.<sup>33</sup> This time around the Allies’ demands included sizable reparation payments, to be disbursed over the following five years (Marion, 1914). Absent any bargaining power for the newly restored Bourbon monarchy (White, 2001), the *agio* decreased in line with this event.
- **16 April 1816:** While the Restriction Period was due to end on 5 July 1816, government postponed the resumption for another two years in mid April. The public still remained sanguine regarding resumption, since Government’s prior currency reform was understood as a necessary step towards stabilization of the Pound (Clapham, 1944). The gold standard was officially adopted, and bimetallism abandoned by the Coinage Act of 1816, also known as Liverpool’s Act.<sup>34</sup> The act installed gold as the sole standard of value, complementing gold coinage by a token silver coinage - the legal tender of silver coins was limited to £2 (Redish, 1990; Sargent and Velde, 2002). On this occasion the *agio* on gold declined.
- **28 November 1817:** After-war depression and deflation started in Britain in early 1816 (Broadberry et al., 2011; Clapham, 1944). Due to a bad harvest, and even more so to the Corn Laws, wheat and bread prices rose, however. Eventually,

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<sup>32</sup>*London Gazette*, 22 and 24 March.

<sup>33</sup>*London Times*, 7 and 10 October.

<sup>34</sup>56 Geo. III, c.68

this combination caused social unrest.

The political *status quo* was called into question by riots claiming electoral reform and universal suffrage. A prerequisite for becoming a Member of Parliament were property qualifications that guaranteed an important intersection between Members of Parliament and creditors of public debt (Johnston, 2013). Since deflation increased the real value of debt to the advantage of creditors, parliamentary support for the reimbursement of public debt was strong. Universal suffrage could have seriously challenged this.<sup>35</sup>

On this situation, a new issue of Exchequer Bills (Flinn, 1961) and the recent abolition of the income tax further increased government's outstanding short-term debt, making resumption of cash payments less probable (Clapham, 1944). At this occasion the *agio* rose again.

- **25 May 1819:** Parliamentary debates regarding the resumption of convertibility started on 21 May and were concluded unanimously on 26 May, stating the exact resolutions governing the resumption of specie payments.<sup>36</sup> The final version of Peel's Act<sup>37</sup> was made law by July 2 and provided for gradual resumption of payments at the pre-war parity over a period of four years (see section 3).<sup>38</sup> Clapham (1944) emphasized the immediate impact the new regulation had on the Paris exchange and the *agio* on gold, which fell to zero; the *London Times* made the same observation on 29 May.

Overall, the detected break dates coincide with events that command a revision of expectations regarding public finances. This emanates from the reading of contemporary newspapers and is corroborated by the analysis of ledgers in the archives of the Bank of England that clearly link military and political events to the evolution of asset prices. Along this dimension, it is reassuring that practically all estimated break dates are also

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<sup>35</sup>The most ardent proponents of maintaining the paper pound indefinitely could be found among industrialist in the North of Britain (Clapham, 1944). Not only did the Northern parts of the kingdom suffer economically, they were also lacking political representation. Manchester and Birmingham, for instance, had a population of 100,000 each but were not represented by Member of Parliament at the national level.

<sup>36</sup>I Hansard XL, 802-04, 26 May 1819.

<sup>37</sup>59 Geo. III, c.49

<sup>38</sup>The BoE resumed specie payments on 1 May 1821, two years ahead of schedule.

mentioned in the ledger (see section 5.2).

In terms of robustness, it is finally noteworthy that the analysis conducted on the returns of British bonds in Brown et al. (2005), reveals that the same type of events also affected bond yields. In addition, for overlapping periods (1810-1823), shifts identified in the bond yield series were either identical to the break dates detected here (Napoleon returns from Elba in March 1815) or related to connected events (bond yields decrease by the end of March 1814 when Paris surrenders; the *agio* decreases in June 1814 when the Treaty of Paris ends the Napoleonic Wars).

## 6 Discussion: How monetary regimes shape expectations

Monetary regime choices and their operation shape how people expect debt to be stabilized. This has a bearing on how default and inflation premia evolve and on how inflation forecasts are formed. The following section discusses these issues.

### 6.1 Hard versus Soft Default: Narrative Evidence

If expectations regarding the sustainability of public finances are to affect the price level, debt adjustments cannot occur by outright default. Any type of outright default - debt restructurings, interest rate reductions, etc. - that place public debt on a sustainable trajectory, imply that devaluing the currency is not necessary to guarantee the sustainability of public finances. Hence, fiscally induced inflations occur, when any other type of default is off the table. Given the importance of this assumption, this section lays out narrative evidence that contemporaries were not concerned with the risk of default.

Many authors have pointed out that contemporaries excluded the possibility of outright default from the politically acceptable (Acworth, 1925; Neal, 1990). O'Brien (2010) states that 'neither domestic nor foreign investors in the securities of the island could have rationally contemplated [...] that the government's debt be repudiated either as an outcome of conquest or as the result of any unmanageable fiscal and financial crisis [...]. Reasons for this certainty were numerous.

Britain's institutional setting exerted strong constraints on the Executive. Parliament gained broad powers over public expenditures and taxation through the Glorious Revolution, which meant that loans to the government and the taxes that were earmarked to service them necessitated Parliamentary assent (North and Weingast, 1987; Sussman and Yafeh, 2006). The Government created, in addition, a separate sinking fund that was to cover the planned reimbursements in case revenues earmarked for specific loans proved insufficient (O'Brien, 2006). Partisan politics - the Whig's supremacy that continued well after the Napoleonic Wars - further contributed to excluding outright default from the politically acceptable (Stasavage, 2007).

The BoE acted as an additional private constraint on the government. The Bank was responsible for assuring the continuity of promised reimbursements. As such, it could have refused to grant new loans whenever arrears on existing ones occurred. Channeling all public credit through the Bank, implied, therefore, that it would become difficult to utilize funds of current loans whenever previous obligations were not honored (Macaulay, 1914; North and Weingast, 1987).

At the time of the Napoleonic Wars, British public finances, had, hence, been in order for more than a century. What is more, the credibility of British public debt was to be safeguarded, since it was essential for the funding of war. Credible public finances were consequence and part of an institutional environment that facilitated war finance, which, in turn, was crucial for Britain's military and commercial supremacy over most of continental Europe (Bordo and White, 1991; Brewer, 1988).

Thus, a broadly acknowledged consensus implied that national elites, regardless of their partisan allegiance, supported the war effort by holding government debt. In return, war debt would not be defaulted on, as successful wars enhanced prospects for growth and investment opportunities at home and abroad, thus, rendering war debt self-amortizing (Ritschl, 1996). In addition, property qualifications for the eligibility of Members of Parliament entailed an important intersection between the latter and creditors of public debt. This made default even more unlikely, given Parliament's prerogatives on the issue (Dickson, 1967; Johnston, 2013).

The institutional framework and political economy of the time excluded outright default. The alternative, alleviating the debt burden by resuming the gold standard at a lower parity and, hence, monetizing some of the outstanding public debt could, by contrast, not be precluded. This was the first long suspension of the gold standard. The discussion around resumption and its exact modalities was lively: no options, including devaluing the pound and maintaining the paper pound indefinitely, were excluded *ex ante*.

In particular, when the suspension of convertibility was for the first time reiterated after hostilities had ceased in the spring of 1816, *London Times* lead articles were concerned with the possibility uttered by Bank proprietors that cash payments would never be resumed.<sup>39</sup> The decision to resume at the pre-war parity was, therefore, by no means predetermined (Acworth, 1925; Fetter, 1965; Kindleberger, 2000).

Moreover, alleviating the debt burden by devaluation would have involved a more extensive mutualization of war debts, as the decrease in the pound's purchasing power would have affected everybody. This option could have been easily implemented, since political representation was limited at the time. As the Parliamentary franchise was largely linked to property rights, merely the affluent 1.5% of the British population were able to vote in Parliamentary elections before the Reform Acts of the 1830s (Johnston, 2013).<sup>40</sup>

The above entails that the choice between soft and hard default was above all a redistributive one. Outright default would have commanded a capital levy on the holders of government debt, while default by devaluation induced inflation would have affected everybody. Given the political economy of the time, it is likely that contemporaries attached a higher probability to a broad mutualization of war debts than to outright default vis-à-vis powerful government debt holders.

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<sup>39</sup>*London Times*, 13 April 1816.

<sup>40</sup>Denominations of government debt were large enough to exclude the broader public from holding them. Loans to the public were subscribed in minimum units of £100 (Grellier, 1812). In 1815, farm laborers earned an annual salary of approximately £40; white collar workers gained £120 a year (Lindert and Williamson, 1983).



## 6.2 Forecasting Inflation

The operation of the gold standard pins down a nominal exchange rate of domestic paper money into gold. Such a system yields a relatively stable price level in the long run, implying on average low rates of inflation (Barro, 1979; Bordo 1981). The path of inflation during a suspension is, by the same token, affected by the exchange rate at which convertibility will be resumed and by the expectations thereof. For the suspension period, a forecast of on average zero inflation in the long-term is an accurate one, if people are convinced that resumption at the pre-war parity is certain.<sup>41</sup>

It has already been pointed out that the parity between the paper pound and gold at which resumption was going to take place was up for debate. The timing of resumption was another source of uncertainty. Resumption depended on the conclusion of a definite peace treaty. Over the 22 years of the French Wars, this was often a remote and uncertain prospect. Peace treaties proved to be inconclusive as the ones of Amiens (April 1802) and Paris (in June 1814) and even peaceful times got their share of postponed resurrections. Finally, as debt continued to accumulate and inflationary pressure persisted, resuming convertibility at the pre-war parity became increasingly costly rendering it less likely.

These uncertainties regarding future policy must have influenced the evolutions of anticipated inflation over the period. In a long term perspective, inflation premia compensated the risks of not returning to the pre-war parity of the pound. In the shorter term, real returns on assets were preserved, given the evolutions in prices illustrated in figures 1 and 2 (Clapham, 1944). Put into perspective, the preceding two sections would imply that asset prices during the Restriction Period were affected by evolutions in anticipated inflation rather than by changing default premia.

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<sup>41</sup>Being on the gold standard provides little information for forecasting short to mid-term rates of inflation. The adjustment mechanism embedded in the gold standard requires that inflationary outbursts are countered by deflationary episodes. This induces high short to mid-term volatility in prices and activity, making both series hard to predict (Meltzer and Robinson, 1989). In line with these characteristics of the gold standard, Barsky (1987) finds that Pre-World War I inflation in Britain was practically white noise.

These pieces of evidence are in line with the assumption that monetary policy choices have a bearing on the type of debt stabilization that is anticipated. When a fiat currency is in place, outstanding public debt can be adjusted by soft default, i.e. inflation; this affects premia for anticipated inflation. When the monetary regime ties policy makers' hands, default premia increase, as outright default is anticipated in the worst case scenario.

## 7 Concluding Remarks

I provide evidence on how expectations regarding the sustainability of public finances affected the price level during Britain's first experience with fiat money. Significant changes in prices coincided with events that commanded a reassessment of Britain's expected military fate. In particular, unfavorable news had an inflationary impact, as it potentially made a British victory less probable and, hence, public finances less sustainable. On the contrary, favorable news caused inflation to recede.

In addition, narrative evidence underline that inflation rather than default premia influenced the evolutions of asset prices during the suspension period. Under a fiat currency regime, premia for expected inflation augment, since the real value of outstanding public debt can be adjusted by soft default, i.e. inflation. This implies also that the monetary policy regime in place determines the type of debt stabilization agents anticipate for the future, if ever the public debt becomes unsustainable.

Thus, in terms of the long standing debate attributing evolutions in the price level during the Restriction Period to either real or monetary factors, I put forward a novel, third explanation. This one is based on the fiscal determinants of the price level, a finding in line with the predictions of the Fiscal Theory of the Price Level.

These results are of timely relevance, since the parallels between Britain then and modern economies today are striking. Britain disposed of well functioning financial markets that allowed for an ever increasing national debt. For a quarter of a century, Britain operated a fiduciary currency regime with flexible exchange rates, features that characterize most

industrialized economies today. These similarities should, thus, allow drawing some conclusions for contemporary policy issues.

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## A Appendix

### A.1 Tables and figures

Table 3: Correlation coefficients between the *agio* and price indices

	1750-1850	Restriction Period
<b>Monthly indices</b>		
Gayer, Rostow and Schwartz (1953)		
Total goods	0.72	0.72
Domestic goods	0.72	0.69
Imported goods	0.64	0.65
<b>Yearly indices</b>		
Broadberry et al. (2012)	0.59	0.79
Clark (2014)	0.53	0.74
Schumpeter (1938)	0.66	0.69

Table 4: Descriptive statistics for the *agio*, monthly data

	Whole sample 1718-1873	Pre-restriction 1718-1797	Restriction Period 1797-1821	Post-restriction 1821-1873
Mean	0.06	0.02	0.35	-0.01
Median	0.00	0.01	0.11	-0.01
Maximum	1.79	0.19	1.79	0.01
Minimum	-0.04	-0.04	-0.02	-0.02
Standard Deviation	0.22	0.04	0.45	0.00
Skewness	5.02	1.60	1.54	-1.38
Kurtosis	30.48	5.33	4.39	6.25
Jarque-Bera	66681.45	618.78	137.89	477.76
Probability	0.00	0.00	0.00	0.00
Observations	1870	948	291	631

1797

Account	Exchange	Gold	Silver	Coin	Price	Notes
35.1	3.17.6	5.4	35	6.56		Lord St Vincent's vic-
35.5	3.17.6	5.4	38	.52		tory - Feb <sup>r</sup> 14 <sup>th</sup>
35.2	3.17.6	5.4	42	.53		Lord Duncan's vic-
35.2	3.17.6	5.5	40	.50		tory - Oct <sup>r</sup> 10 <sup>th</sup>
34.9	3.17.6	5.6 1/2	30	.46		The Bank decline
36.	3.17.6	5.7 1/2	35	.48		paying Gold, - Feb <sup>r</sup> 25 <sup>th</sup>
36.8	3.17.6	5.6 1/2	34	.55		New Copper coinage at
36.	3.17.6	5.6 1/2	37	.50		Birmingham. 21 <sup>st</sup> p. 4
36.	3.17.6	5.6	32	.51		Spanish Dollar stamp
36.2	3.17.6	5.5 1/2	32	.52		for circulation in Britain
36.4	3.17.6	5.3	38	.53		Gold seven shilling
36.4	3.17.6	5.3	32	.51		pieces issued.
36.6	3.17.6	5.1 1/2	40	.55		Fred <sup>k</sup> William 2 <sup>nd</sup> of
36.8	3.17.6	5.1 1/2	40	.55		Prussia, vic.
36.8	3.17.6	5.1 1/2	38	.56		Lord Macartney's 2 <sup>d</sup>
36.10	3.17.6	5.1 1/2	40	.60		visit to Paris: acco
38.	3.17.10 1/2	5.1	48	.70		to quit, July 19 <sup>th</sup>
38.	3.17.10 1/2	5. - 1/2	50	.73		Dollars were issued by the Gov
37.7	3.17.10 1/2	5. - 1/2	42	.65		in 8 months at 1/2 p each, which are
37.10	3.17.10 1/2	5. - 1/2	42	.54		called in 31 <sup>st</sup> October 1797.
38.	3.17.10 1/2	5. - 1/2	40	.56		(the number of 2,325,099)
38.1	3.17.10 1/2	5. - 1/2	40	.56		
38.2	3.17.10 1/2	5. - 1/2	30	.54		
38.4	3.17.10 1/2	5. - 1/2	30	.52		
33.			505	.100		

Figure 8: Ledger entry for the year 1797 containing asset prices and significant events

Sources: Bank of England Archives, item reference 10A270/1

Table 5: Break dates, monthly data, January 1795 to May 1823

Break date	1-1800	4-1802	11-1808	2-1811	7-1815	5-1819
Confidence Interval	5-1799 ; 7-1800	4-1802 ; 1-1804	6-1808 ; 2-1809	1-1811 ; 8-1811	7-1815 ; 2-1816	5-1819 ; 6-1821
Regime	1-1795 - 1-1800	2-1800 - 4-1802	12-1802 - 11-1808	12-1808 - 2-1811	10-1811 - 7-1815	8-1815 - 5-1819
Constant	-0.01	0.23	0.12	0.73	1.17	0.17
Observations	61	27	72	27	46	46

Table 6: Break dates, daily data, July 1810 to May 1823 (1)

Break date	8-2-1811	25-8-1812	20-7-1813	17-6-1814	17-3-1815
Confidence Interval	22-1-1811 ; 22-3-1811	21-8-1812 ; 2-10-1812	13-4-1813 ; 17-8-1813	14-6-1814 ; 15-7-1814	14-3-1815 ; 31-3-1815
Regime	6-7-1810 - 8-2-1811	12-2-1811 - 25-8-1812	25-8-1812 - 20-7-1813	23-7-1813 - 17-6-1814	21-6-1814 - 17-3-1815
Constant	0.68	1.00	1.40	1.59	0.56
Observations	63	161	94	95	78

Table 7: Break dates, daily data, July 1810 to May 1823 (2)

Break date	23-6-1815	15-9-1815	16-4-1816	28-11-1817	28-5-1819
Confidence Interval	13-6-1815 ; 4-7-1815	5-9-1815 ; 20-10-1815	19-3-1816 ; 21-5-1816	26-9-1817 ; 9-12-1817	25-5-1819 ; 18-6-1819
Regime	21-3-1815 - 23-6-181	27-6-1815 - 15-9-1815	19-9-1815 - 16-4-1816	19-4-1816 - 28-11-1817	2-12-1817 - 28-5-1819
Constant	1.35	0.69	0.24	0.07	0.20
Observations	28	52	61	169	156



Table 8: Descriptive statistics for the residuals from comparison between observed and anticipated inflation, March 1797 - April 1821

	1 year before suspension	2 years before suspension	5 years before suspension
Mean	2.10	-7.33	-4.69
Median	1.71	-7.73	-5.08
Maximum	35.32	25.89	28.53
Minimum	-28.42	-37.85	-35.21
Standard Deviation	11.89	11.89	11.89
Skewness	0.18	0.18	0.18
Kurtosis	2.89	2.89	2.89
Jarque-Bera	1.75	1.75	1.75
Probability	0.42	0.42	0.42
Observations	290	290	290

## A.2 A famous absentee: the battle of Leipzig

Ex-post historiography has posited that the battle of Leipzig (16-19 October 1813) sealed Napoleon's defeat well before the French surrender in March 1814. This date does, however, not show up as a break-point. The readings of contemporary sources allow understanding contemporaries' perception surrounding that event and, hence, its absence among break dates.

Not only was the outcome of the battle anticipated and, hence, as posited by market efficiency, already factored in. Uncertainty also prevailed regarding the strength of the French army's remnants, entailing the necessity to continue martial and budgetary efforts. In particular:

- **The French defeat was largely anticipated**

“In point of fact they (the French) have, for the most part, been compelled to abandon the right bank of the Elbe; and the attempt, already thrice repeated, of penetrating into Bohemia, has every time had no other effect than the discomfiture and destruction of the troops employed.

All accounts agree in stating, that the French army in the Saxon Erzgebirge is a prey to the most dreadful privations; that they daily, from want of forage, lose hundreds of horses; and that, the men, to satisfy the cravings of hunger, are obliged to have recourse to horse flesh.” *London Gazette, 19-23 October 1813*

“We feel little apprehension for the consequences. The chances of war are, indeed, proverbially uncertain; but neither his 160,000 men, nor his imperial title, nor his military talents, affect us with the slightest doubt as to the result of a conflict.” *Times, 21 October 1813*

- **A high degree of uncertainty surrounded French strength after defeat**

“It is difficult to calculate the diminution of the Tyrant's force, produced by these three days of heroic achievement.” *Times, 4 November 1813*

“The extent of the result of this important day cannot as yet be ascertained. Near half a million of soldiers fought in this battle, probably one of the most extensive

and most generally engaged that ever took place, at least modern history.” *Dispatch from General Viscount Cathcart, dated 19 October; published in London Gazette, 23 November*

“The force of Buonaparte, as he retired on the great line of his communications, was probably augmented by troops at Erfurt, and other places on its march, and in his battles with General Wrede, he seems to have brought forward seventy or eighty thousand men, a force much beyond what we estimated him to possess, after his various losses.” *Dispatch from Lieutenant General Charles Stewart, dated 11 November; published in London Gazette, 24 November*

- **It was repeatedly announced that martial and budgetary efforts needed to continue**

“I cannot but deplore most deeply the continuance of this extended warfare, and of all those miseries which the insatiable ambition of the Ruler of France has so long inflicted upon Europe.

The restoration of that great blessing upon principles of justice and equality has never ceased to be my anxious wish; but I am fully convinced that it can only be obtained by a continuance of those efforts which have already delivered so large a part of Europe from the power of the enemy.” *Prince Regent’s opening speech of Lords Sitting, 4 November; published in London Gazette, same date*

“.. it is not yet time to lay aside our arms. The enemy is defeated; he is humbled beyond any former period; but he may, he will, rise again, should the Germans prematurely imagine that they may take rest. It ought not to be concealed, that for a time to come, ample sacrifices, as well as further efforts of our long-trying valour, are indispensable.” *Letter from the Privy Councilors of the King of Great Britain, 4 November*

The above example shows that the combination of ex-ante agnostic break tests and the reading of contemporary sources allows detecting the events that influenced contemporaries’ expectations, without any historiographical *ex post* bias. This pays attention to the concern that historical events have to be analyzed in their contemporary context.