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Waterloo: a Godsend for French Public Finances?

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Waterloo: a Godsend for French Public Finances?

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Abstract

Following Waterloo, managing French public finances represented a daunting task. Defeated France had lost a substantial part of its population and territory. The country was partially occupied and France was to pay huge amounts as reparations to the victors. Furthermore, France's reputation had been tarnished by several defaults on its debt in the preceding decades. Despite all these elements, in the ten years between 1815 and 1825, not only did France manage to place a huge amount of debt on the market (resulting in a threefold increase) but it did so with a spread, compared to the British consol, falling from more than 400 basis points to a meagre 100 basis point. Based on an econometric analysis of the yields of the French rentes, we show that the military threat of the Allied coupled to a significant improvement in French institutions explain the dramatic decrease in yields.

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I. Introduction

In view of the imbalance between the power of the issuer and the lender, holders of sovereign bonds require, even in peaceful periods, guarantees that the state will not unilaterally decide to default on its debt. Regarding sovereign debt, the loss of reputation following default is often viewed as a factor important enough to force states to respect their commitments. Nonetheless, history is replete with cases of sovereign defaults. These defaults have been linked, among others, to macroeconomic imbalances, the size of the debt burden, past defaults, regime changes and wars.

This paper analyzes the evolution of the French sovereign debt in the ten years following Napoleon's defeat at Waterloo. At the end of 1815, incentives for an investor to buy French sovereign bonds were low as France's prospects looked terrible. Following the defeat, France had to come back to its frontiers of January 1st, 1790 losing 5,000 square km of frontiers (White, 2001). It was furthermore forced to pay 700 million francs as war reparations for the Hundred Days War. This amount was substantial as it was the equivalent of one year of fiscal revenues. On top of that, additional expenses were imposed, most notably occupation costs for the part of France where an Army of 150,000 men was stationed.

The track record of French public finance was also terrible. France had defaulted on its debt at the eve of the French Revolution. In 1793, Pierre-Joseph Cambon one of the most active members of the Committee of Finance, undertook one of the main reforms of French public finances by creating the *Grand Livre de la Dette Publique*, a book centralizing all public debt. This creation simplified the management of the public debt since it transformed complex annuities in simple 5% bonds. This transformation also amounted to a partial default under the cover of

reform (Velde and Weir, 1992). In 1797 the French government declared itself bankrupt. The 1797-default had a dramatic impact for bondholders since by law two-thirds of the public debt was simply erased. As stressed by Bordo and White (1991), “revolutionary France had squandered its modest endowment of credibility”. In June 1799, the French government imposed a forced loan leading to spikes in required yields (White, 1995). Despite the almost continuous state of war the public debt only increased from 40 million of *rentes* in 1799 to 63 million in 1814. Instead of issuing debt or printing money, Napoleon covered the state’s deficit by delaying payments. This led to a dramatic increase in the amounts left in arrears. Thus, even if France was not issuing long term loans, it was in fact accumulating a huge floating debt (Jèze, 1925, pp. 284-285). Napoleon was actually counting on his victories to prevent financial troubles (Gabillard, 1953). This strategy worked until the disastrous Russian campaign which proved extraordinarily expensive (Bordo and White, 1991). Under the Empire, the credit of the state improved at first but “even at its apogee, Napoleon’s system of finance did not engender enough confidence to permit the government to return to large scale borrowing” (White, 1995, p. 315). Eventually in 1814 France imposed a forced loan levied on the wealthy to meet its financial obligations. Interest rates on traded debt had jumped to 8.6% in 1815, whereas comparable yields on British consols did not even reach 5%.

In view of all these elements, one would expect France to have had trouble issuing debt and, if it did manage to do so, to have had to pay dramatically high interest rates to compensate bondholders for their risks. Empirical evidence however is completely at odds with this intuition. As shown in Figure 1, between 1815 and 1825 not only did France manage to issue so many bonds that its debt increased threefold¹, but it did so while paying lower and lower coupons. Bondholders’ confidence increased so much that by 1825 the spread between the French and British sovereign bonds was only 1% (100 basis points) (Figure 2). If one looks at the evolution over the whole 19th century (Figure 3), the magnitude of the spread following Waterloo stands out (for the Napoleonic period itself, the spread is sometimes low but this is due to the fact that Great Britain was most of the time at war with France and thus also had to deal with war finance).

Insert Figure 1, 2 and 3 about here

¹ In terms of Debt/GDP the figures rose from 10% to close to 40%. Even if these figures may look small nowadays, with the structure of taxation existing at the time this represented a serious burden. If the US is taken as comparison point, servicing a debt estimated at 31% of national income was viewed as impossible following American independence (Garber, 1991).

This paper aims at understanding how France managed to resurrect its public finances following Waterloo. Only the firm commitment to honor its debt could have led investors to revise their vision of French public finance. We argue that two elements allow understanding the extraordinary change in investors' expectations regarding French public finances. First, as the Liberation of the country was conditional on repaying the occupation costs, the French government had a strong incentive to balance its books. Defaulting on foreign loans contracted to cover reparation and occupation costs was not an option. Foreign bondholders indeed viewed the troops stationed in France as guarantor of the debt. The credibility of France's commitment to improve its public finances was thus in a first period guaranteed by the occupation of part of the country which would only be lifted if reparations were paid. Forced to act in investors' interest, France managed to regain a good reputation. New institutions guaranteeing repayment were created and the French government adopted a credible position when it stressed the priority given to debt reimbursement. Paradoxically, Waterloo, by imposing reforms and a credible commitment to honor its debt, led to an improvement in French public finances.

In order to develop our point, the paper is organized as follows. The first section reviews the literature on sovereign debt with a special emphasis on institutions and military interventions. The second section presents the historical context while the third section highlights the institutional changes which took place at the Restoration. The fourth section describes the data and the methodology. To determine which events changed investors' perception of French public finance, the paper relies on two approaches, one endogenous and one exogenous. Results confirm the role of military threat and of institutions. The last section concludes.

II. Sovereign Debt, Institutions and Military Threat

Sovereign bonds are peculiar financial instruments: whereas finance textbooks tend to present sovereign bonds as risk free assets, a large part of the literature has tried understanding states' motivations to repay. The literature has emphasized several reasons which could explain why states eventually repay their debt. The willingness to maintain a good reputation is often presented as the key to understanding states' good behavior (see for example Eaton and Gersowitz, 1981; Bulow and Rogoff, 1989; and Rogoff and Zettelmeyer 2002). The role of trade sanctions (Rose, 2005) has also been investigated. In the 19th century, sovereign bonds were not only financial instruments; they had often a role to play in international relations. Several papers

stress that diplomacy and the relationship between borrower and lender had an impact on bond issues and prices (Feis, 1930; Ivanov and Tooze, 2011; Oosterlinck and Ureche-Rangau, 2012). This paper attributes the major changes experienced by bond prices to two elements: the military threat exercised by the Allies and the establishment of new and credible institutions. In view of their central role in the analysis, a special attention is given to both elements.

Historically, interventions on behalf of bondholders depended crucially on a given country's practice. Great-Britain refused most of the time to intervene (Platt, 1968; Lipson, 1989). French and German governments seemed to be more willing to support their bondholders (Eichengreen and Portes, 1989). Eichengreen and Portes (1989) go as far as to suggest that sovereign defaults were used as an excuse to intervene. According to them, military actions were mostly driven by strategic or geopolitical considerations. For a long time however, military sanctions were viewed as rare and isolated episodes (Lindert and Morton, 1989; Lipson, 1989). Mitchener and Weidenmier (2010) have challenged this view. They show that supersanctions (military interventions or political control applied following a debt default) were commonly used during the gold standard period. They find that 64% of sovereign defaulters experienced a form of sanction. Sanctions differed from one case to the other and, as pointed out by Borchard (1913), military interventions were limited to weak states. The literature has also for a long time overlooked the impact of a credible threat on bond prices. The Roosevelt corollary to the Monroe doctrine had a dramatic impact on the prices of sovereign bonds issued by Central American and Caribbean countries (Mitchener and Weidenmier, 2005). By threatening to intervene in case of default, and by actually intervening in San Domingo to show that the threat was credible, the United States managed to reassure bondholders about the security of their investment.

Another strand of the literature has attempted to determine to which extent good institutions could increase the probability of reimbursement. As pointed out by North and Weingast (1989), having good rules is not sufficient if a sovereign can easily overthrow these rules. The conjunction of adequate rules and credible commitment is thus required. North and Weingast (1989) argue that the constitutional changes following the Glorious Revolution dramatically altered the balance of power between the British Parliament and the Crown of England. By imposing limits on the power of the Crown, the new institutions protected property rights and reduced the likelihood that the state would renege on its obligations. North and Weingast (1989) attribute the decline of the long-term borrowing rate (from 14% in 1693 to 3% in 1739) to these institutional changes.

The role of institutions has since been investigated in many other instances. Acemoglu et al. (2005) argue that institutions exported from colonizer to colonies are instrumental in understanding economic growth. La Porta et al. (1997 and 1998) link investor protection to the origin of the legal system in a given country. They argue that countries whose legal system has been inspired by the British common law benefit outside investors. Rajan and Zingales (2003) have revisited this interpretation. They show that there is no obvious mechanism linking legal system and financial development. At the beginning of the 20th century, financial markets of common law countries were not more developed than those of civil law countries. The reversal observed at the end of the 20th century is attributed not to legal origins but to the ability of incumbents to oppose financial development. In the same vein, Musacchio (2008) convincingly shows that there is no strong relationship over time between creditor protection and the development of bond markets. Indeed, the supposed link between a legal “family” and creditor protection cannot be established on the long run. Regarding sovereign debt and institutions, Sussman and Yafeh (2006) have reassessed the case of the Glorious Revolution. They find that new institutions did not immediately lead to a lower cost of government borrowing. They conclude that the rewards from institutional reforms take a long time to materialize. For the same historical episode, Cox (2011) has stressed the importance of ministerial responsibility. Other elements certainly play a role in the development of public finance, and institutions are only part of the explanation. As pointed out by Dincecco (2009) and Gelderblom and Jonker (2011) sound institutions and a credible commitment are necessary but not sufficient conditions to see interest rates decline and public debt grow.

Sound institutions and credible commitment may emerge in different settings. In the 17th century’s Dutch case, changes were gradual (Gelderblom and Jonker, 2011) whereas for the English case in 1688, it was the Glorious Revolution which brought about the changes (North and Weingast, 1989). In both cases however, the changes were the result of endogenous evolutions. Following the Glorious Revolution, the institutional changes were nevertheless not enough to guarantee reimbursement. If political parties in power favored default, then one could question the credibility of the commitment. Indeed, as stressed by Stasavage (2007, p.150), “Great Britain’s revolution in public finance may have been initiated during the Glorious Revolution of 1688, but the British state’s credibility as a borrower was only consolidated after 1715, once the Whig party established lasting political supremacy”. New institutions didn’t thus directly lead to an increase in credibility.

In contrast to other papers in the literature, this paper focuses on a case where the government was forced to regain credibility within a matter of months. Following Waterloo, defeated France signed the Second Treaty of Paris on November 20th, 1815. The Treaty was a means for the Allies to guarantee their safety but also to make France pay for the Napoleonic episode. France was to pay reparations amounting to 700 million FF, an amount close to the total yearly revenues of the country in 1815 (White, 2001). On top of that, the Treaty provided that a large part of the country would remain occupied (from Calais to the Swiss border). The Army of occupation was meant to guarantee that France would honor the Treaty. If France was to pay ahead of schedule, occupation forces could be reduced and the actual occupation could even be lifted by 1818. The heavy-handed approach devised by the Allies meant that defaulting on reparations was out of question. In contrast to the cases discussed by Mitchener and Weidenmier (2005 and 2010), the military intervention had taken place before default. In the French case, the threat was not to invade France but to refuse to liberate it fully. Financing reparations was not an easy task. This paper argues that the threat of a long-lasting occupation forced France to implement reforms to improve the state of public finance. These reforms allowed France to regain its creditworthiness. The renewed credibility remained even when the threat of occupation had subsided. Whereas initially the threat of military intervention guaranteed repayment, thereafter the institutional changes took over the role of reassuring markets.

III. Historical Context

During the two decades following the French revolution, France was almost always in a state of war. Peace treaties only lasted for short periods and new coalitions were formed against France. The War of the Sixth Coalition (1812-1814) began when Russia refused to apply the continental blockade, the system devised by Napoleon to attack Great-Britain's economy. To force Russia to implement the blockade, Napoleon invaded Russia in June 1812. The disastrous Russian campaign allowed the members of the coalition to drive the French out of Germany in 1813 and to invade France in 1814. Napoleon was forced to abdicate on April 6th, 1814 and was sent into exile in Elba. The victors were left to devise a new political order. Great-Britain and Austria envisioned a future where France would regain its place in the concert of nation but with a guarantee that its territorial ambitions would be limited. Prussia and Russia on the other hand were eager to increase their territories.

Eventually, the members of the coalition restored the throne of France to Louis XVIII. The terms of peace were spelled out in the First Treaty of Paris signed on May 30th, 1814. The Treaty was incredibly soft on defeated France. Article 2 of the Treaty defined the borders of France as the ones existing on January 1st, 1792. Article 18 declared a reciprocal waiver on all claims related to war. The coalition however imposed political changes to France. Most notably, the kingdom became a constitutional monarchy. Article 70 of the Constitutional Charter guaranteed the public debt even if the situation of public finances inherited from Napoleon was disastrous. To balance the budget, drastic cuts were made and demobilized soldiers paid only half their normal wages. Short-term bills bearing 8% interest were issued and several domains from the state put for sale. In July 1814, Baron Louis suggested, in his presentation of the situation of French public finances at the Chamber of Deputies, to resume the amortization of the public debt (Vührer, 1886, p. 101).

In comparison to the pre-1789 period, the King's power had dramatically decreased. Even if in theory the King was the only one allowed to suggest laws, in practice, the legislative power (represented by two Chambers, the *Chambre des Pairs*, with members appointed by the king for life or in an hereditary manner, and the *Chambre des Députés*, elected for 5 years by the "wealthy") gained a greater say than ever before (Aglan, 2006). The design of the electoral system led to an alignment of interest between electors and bondholders. Indeed, only citizens older than 30 years and paying a yearly amount of 300 FF as direct contribution were allowed to vote. In practice, the approximately 100,000 citizens fulfilling this condition were from the wealthiest class. They were thus likely to hold *rentes* and therefore willing to protect creditors' rights. In this respect, the French case differed from the British one and the critiques raised by Stasavage (2007) on politics unlikely to apply.

The new repartition of power between the European major countries was disrupted when the news broke out in March 1815 that Napoleon had managed to escape from his exile in Elba and was attempting to regain the control of France. French troops joined the Emperor and Louis XVIII had no alternative than to flee France again. To prevent a resurrection of an Empire ruled by Napoleon, the coalition sent troops to stop the French advance. Following his defeat at Waterloo on June 18th, 1815 Napoleon lost the confidence of the chambers and was forced to abdicate for a second time on June 22nd, 1815.

After the episode of the Hundred Days, the Allied restored the throne to Louis XVIII who by then "looked less like a sun king than a paper lantern carried by foreigners" (Longford, 1972, p. 34). Whereas the First Treaty of Paris had been incredibly soft on defeated France, the Second

Treaty of Paris, signed on November 20th, 1815 took a much harder stance. When the First Treaty mentioned a just repartition of power, the Second Treaty emphasized the need to provide fair compensations for the past and solid guarantees for the future². Compensations were both of territorial and financial nature. Article 1 set the borders of France as the ones existing on January 1st, 1790. Several forts were to be destroyed or ceded to the victors. Article 4 fixed the amounts to pay as war indemnity at FF 700 million. Article 5 imposed the presence of an Army of occupation. The size of this army was limited to 150,000 men for which France had to provide for. The occupation Army was to remain for a maximum of five years but could leave after three years if the Allied forces, in agreement with the King of France, found that their presence was no longer required. An additional convention detailed the mode of payment of the war indemnity. Eventually, France was forced to compensate the British holders of French bonds which had been defaulted upon after 1793.

The amounts involved by the Treaty were extremely high. White (2001) estimates the overall payment made by France over the years at FF 1,863.5 million. To comply with the Treaty, France had thus to find funds. Unfortunately, as pointed out by Lafitte (1824, p. 33), “Thirty years of war, two invasions, the buy-back of the territory, required treasures that France couldn’t find”. Credit was needed. Indeed, it was impossible to cover reparations by relying on taxation as shown in Table 1 which reports the evolution of the French public revenues and expenditures from 1816 to 1835. In terms of public finances, France suffered from terrible reputation (Lafitte, 1824; Aglan, 2006). The budget was still burdened by the budgetary arrears inherited from the Empire and by the claims made by the *Emigrés* (White, 2001). Repudiating the debt from the previous regime was hardly feasible, since it would have been unconstitutional, it would have ruined the *rentiers* and given a bad signal to the markets. Therefore, an order dated July 28th, 1815 explicitly recognized the debt from the Empire (Kang, 2007).

Insert Table 1 about here

The political climate was tense from the first day the new legislature took office in August 1815. Nicknamed the “*Chambre introuvable*” (the Unobtainable Chamber), because the king himself could not have wished more royalist deputies, it quickly proved to be too much dominated by Ultra royalists (Ultras) to be manageable. More royalist than the king, the Ultras wished to come back to pre-1789 France. They attacked fiercely the law of finance presented on April 28th, 1816 (Colling, 1949, p. 188). Among others, they opposed the sale of lands previously in possession of the Church to pay for the arrears inherited from Napoleon (Boiteau, 1866, p. 158). After a series

² « De justes indemnités pour le passé et des garanties solides pour l’avenir. »

of heated debates and in view of the political impasse in which the government had felt and under the pressure of Wellington and the Allies, Louis XVIII dissolved the Chamber on September 5th, 1816 (Wellington, 1864; Bruguière, 1977). These political troubles had however made a victim: France missed the November installment³. The Allied refused to diminish the burden of the war indemnities and instead put more pressure on France by increasing the number of occupation troops (White, 2001). On the other hand, Louis XVIII had shown in this episode that reimbursement was a priority. There was thus a clear commitment from the king to find a way to pay all existing debt.

Foreign credit became the only alternative to cover the government's liquidity shortage. Foreign governments had a strong incentive to support a loan since repayment of the war indemnity was conditional on France managing to get funds (Boiteau, 1866, p. 165). Negotiations with Hope and Baring were undertaken at difficult times for the French government facing food shortage, pressure from the Allies and a strong opposition from the Ultras (Bruguière, 1977). The correspondence of the Duke of Wellington with Alexander Baring is a testimony of his involvement to make sure the loan would be accepted (Wellington, 1864, 1865). The Duke of Wellington took also a very active role to persuade the members of the coalition that the loan should be agreed upon (Longford, 1972). He was convinced that without foreign funds France would be "aground" (Wellington, 1864, p. 564). He was also very much concerned by the eventuality of lacking resources to feed his troops and had threatened to refuse fighting during the war if funds were not provided (Kaplan, 2006). Since reparations were intrinsically linked to the loan itself, many problems related to the various claims of the Allies had to be dealt with. By the end of 1817, the Duke of Wellington had become the sole arbitrator regarding the claims (Longford, 1817). The concentration of power in the hands of just one man certainly played an important role in the final execution of the Treaty. By comparison, disputes amongst the Allies following World War I explain part of the failure to "make the Germans pay" even though the amounts requested were not the highest observed in history⁴.

On February 9th, 1817 Baring and Hope received a green light from the Allies for their proposal. Negotiations had taken a long time as Baring was in competition with the Rothschilds to float the loan (Kaplan, 2006). The loan helped reduce the stationed troops by 30,000 men (Colling, 1949, p. 191). The first installment of the loan was issued on February 10th, 1817. By

³ The first war indemnity payments were due on March and July 31st, 1816. Cut in expenditures and tax increases, as well as the issue of a small short term loan in London and Hamburg in April 1816 allowed the government to repay on time (White, 2001; Kang, 2007).

⁴ On reparations see Oosterlinck (2010), on amounts to be paid see Occhino, Oosterlinck and White (2007 and 2008) and for a sovereign-debt perspective on reparations following World War I, Ritschl (2012).

April 1817 the loan was almost sold out, with close to 60% bought in France, the remainder being sold in London and Amsterdam. Even if the terms of the loan were extremely costly for France, the successful flotation and the signal given by Hope and Baring had a positive impact on the price of the French *rentes* (Kang, 2007). On March 11th, a new agreement was signed to float an additional 100 million francs, followed on July 22nd by another one for 115.2 million (White, 2001). The increase in the price of the *rente* enabled the French government to secure better terms (Kang, 2007). Success was such that in 1818, France tapped the French market without the help of foreign underwriters. The third loan targeted the rich since it imposed buying a minimum amount of 5,000 FF of *rentes*. The length to manage the sale of this loan led the government to resume working with foreign underwriters for the fourth issue (Kang, 2007). This series of loans not only helped France pay its war indemnities but it also marked the revival of the Paris Bourse (Colling, 1949, p. 190). Furthermore, French *rentes* were traded in most European markets and acquired during the 1820s the characteristics of “an internationally mobile asset whose ownership could be easily transferred” (Michie, 1999, pp. 51-52).

The success of the successive loans allowed France to repay the war indemnities due to the victors of 1815. Despite the payments, France was still partly occupied at the beginning of 1818. The Allied troops were there not only to guarantee the execution of the terms of Second Treaty of Paris but also to stop any revolutionary attempt (Longford, 1972). Many accounts suggest that the occupying forces were in some places exploiting the conquered lands leading to a strong hatred of foreign troops by the local population (Wellington, 1864 and 1865; Longford, 1972). The Prime Minister, the Duke de Richelieu, began negotiations with the Tsar Alexander to determine a way to liberate France as soon as possible. The Tsar, in collaboration with the Duke of Wellington, paved the way for a final settlement. In April 1818, a commission to put an end to the war indemnities and withdraw the troops was formed (Boiteau, 1866, p. 170). Five months later, at the Congress of Aix-la-Chapelle, a final peace settlement was agreed upon. At the time, France still owed 280 million FF to the Allies. As a result of the negotiations, this amount was reduced to 265 million FF (White, 2001; Kang, 2007). Out of this amount, Baring would pay 165 million FF in the form of bills of exchange; the remaining 100 million FF would be settled by giving French *rentes* at the price (75.57 FF) of October 5th, 1818 (Boiteau, 1866, p. 171). On October 9th, 1818 the convention detailing the departure of the foreign troops was signed (Nervo, 1865, pp. 317-318).

Shortly afterwards, the stock exchange experienced a dramatic decline. The price of the *rente* fell and the Minister of Finance, Corvetto, dedicated 40 million FF to buy back *rentes* on the

market. Despite this measure, the price of the *rente* kept on falling. This forced a new round of discussion with the Allies, which ended up on November 19th (de Nervo, 1865, p. 319). Eventually, a new protocol altered slightly the conditions of payment. The departure of foreign troops had a double impact on the *rentes*. On one hand, the departure reduced the burden on the French budget. In view of the huge costs incurred to pay for the occupation army, the situation regarding French public finances could only be perceived as improved. On the other hand however, this departure meant that the implicit guarantee provided by the troops disappeared. Even though the troops were in theory only meant to guarantee the execution of the Treaty (e.g. the payment of reparations and occupation costs), the financing through bonds meant that actors probably viewed the presence of the troops as an additional guarantee for the bonds themselves. This was certainly the case for Alexander Baring, the banker who managed to float the French loans abroad. In February 1818, Baring asked the Duke Wellington whether it would be possible, as expressed by Longford (1972, p. 76), to “persuade the Allies to safeguard his loan by occupying France for a further period”. The Earl of Liverpool, the British Prime Minister, shared Baring’s concerns. In a letter addressed to the Duke of Wellington he mentioned that he was “strongly inclined to think that we shall find it [the appetite for French stock] grow weaker every day as the period for the evacuation of France by the Allied armies approaches” (Wellington, p. 268).

The following years (1819-1821) were not marked by any major innovation or change (Boiteau, 1866, p. 173). In October 1822, representatives of Austria France, Prussia, Russia and the United-Kingdom met in Verona notably to discuss the Spanish Question. Ferdinand VII of Spain was indeed at the time struggling to retain his throne. As a result of the Congress of Verona, French troops entered Spain in April 1823 to support the king. Following their victory at Trocadero on August 31st, 1823 the French troops restored Ferdinand VII to the throne. The French intervention marked its come back in the concert of the Great Powers. The quick military victory was also positively perceived on the stock exchange (Colling, 1949, p. 199).

On March 23rd, 1824 in a speech to open the Chambers, Louis XVIII stressed the need to “mend the last wounds from the revolution” and to convert part of the public debt. The restoration had brought back Louis XVIII but had left many Ultras frustrated. They considered that little had been done to address their rightful claims for the losses suffered during the revolution. The elections of February 1824 had led to such a landslide victory for the Ultras that the Chamber had been nicknamed the *Chambre retrouvée* in reference to the *Chambre introuvable*. To pay for the compensation, de Villèle, the *Président du Conseil*, had devised a simple scheme. The

gains expected from the conversion (thanks to the reduction in interest payments) would be used to pay for the compensations. The conversion and the compensation were thus clearly linked (Vührer, 1866, pp. 109-110). The Chamber of deputies voted in favor of the law despite strong opposition from the street and the bourgeoisie (Vührer, 1866, pp. 177-178) but the *Chambre des Pairs* rejected the law. This setback did not alter Villèle conviction that a conversion was possible. Less than a year later, he came back with a new project which would render the conversion optional. This new project passed in both Chambers. On April 27th, 1825 a law setting aside 1 billion FF for the *Emigrés* was voted, followed four days later by the conversion law.

IV. Financial Innovations, Public Finances and Institutions

In 1815 French investors were unlikely to believe words. Indeed, the many constitutions drawn up by the preceding government⁵ had all pledged to honor the public debt (Aglan, 2006). To overcome its bad reputation, the French government had to show its good will by respecting creditors' rights while at the same time creating institutions to guarantee reimbursement. In the five years between 1814 and 1819, the parliament gradually managed to get the control of the states' public finance (Aglan, 2006). The law of March 25th, 1817 increased the government's accountability since it required ministers to present the expenses made during the previous fiscal year. The law of May 16th, 1818 gave more control of parliament over the expenses. Collection of taxes was improved during the Restoration. Tax revenues became more centralized and better accounting methods were implemented (Kang, 2007). From 1814 on, budgets were expressed in a clearer way by using a double-entry bookkeeping. After 1817, credits were voted for each ministry, increasing transparency and accountability. Eventually, the Law of April 28th, 1816 dramatically revised the structure of the state finance by regulating the Budget, the Treasury, the Brokers association (*Chambre Syndicale des agents de change*), the *Caisse d'amortissement* (Sinking Fund) and the *Caisse des Dépôts*.

The amortization of the public debt was at the time viewed as one way to provide guarantees of the state's good faith. Even if several sinking funds had existed previously, their record in terms of amortization was extremely limited. For a new *Caisse* to work, its creators had to convince investors that the amounts set at its disposal would be used for amortization. An institution (the *Caisse générale d'amortissement*) meant to guarantee the reimbursement of the public

⁵ The Constituante in 1789, the 1791 and 1793 Constitutions.

debt had been created in 1749. In practice however, most of the collected revenues were used to pay interests and the reimbursements made never came close to matching the new debt issues (Jèze, 1925, p. 264). This *Caisse* remained active up till 1759 when its actions were suspended because of the Seven Years War. In 1764, two new caisses were born: the *Caisse des arrérages* (meant to cover the expenses of the consols, tontines and life annuities) and the *Caisse des amortissements*: a sinking fund meant to reimburse the consols. The latter served its purpose during 4 years. In 1770, when abbot Terray became finance minister, the amounts of the *Caisse* were instead affected to the reimbursement of the short term debt. Terray also modified the terms of existing debt contracts, in what amounts to a partial default (Jèze, 1925). The *Caisse d'amortissement* was suppressed in 1775 only to be recreated in 1784. The results were extremely limited since yearly reimbursements amounted to 4 or 5 million to be compared with new loans worth 100 million or more (Jèze, 1925). Napoleon also recreated a *Caisse d'amortissement* (Plessis, 2006, p. 45). This *Caisse d'amortissement* had the mission to restore the credit of French public finances. However Napoleon soon used it to stabilize the price of the French *rente* on the stock exchange and not as a sinking fund *stricto sensu* (Jèze, 1925; Gabillard, 1953; Bruguière, 1977; Kang, 2007, Plessis, 2006).

The Count Corvetto, proposed on December 23rd, 1815 to create a new sinking fund (Vührer, 1886, p. 102). In his presentation, he stressed the need to protect the funds dedicated for the amortization from any arbitrary enterprise⁶. Without surprise, the Chamber adopted the law creating the *Caisse d'amortissement* on March 27, 1816 with 131 out of 132 votes in favor (Vührer, 1886, p. 105). A yearly budget of 14 million was devoted to the *Caisse*; it was increased to 40 million in 1817. Under the Restoration, the *Caisse d'amortissement* served mostly to buy back debt and the *Caisse* played a major role on the stock exchange (Kang, 2007). Systematic buy orders automatically led to price increases. They also had a psychological impact: investors could see that the state was serious about repaying its debt.

The other *Caisse* created in 1816, the *Caisse des Dépôts* was meant to receive, guard and give back deposits given to it, voluntarily, or as a result of the application of laws or decrees, of legal contests and administrative decisions (Kang, 2007). The amounts deposited gradually reached very substantial amounts. Since the amounts were just deposited at the *Caisse*, caution was required when investing. Therefore, the asset management policy of the *Caisse* was to invest only in French public funds or in securities guaranteed by the state (Kang, 2007).

⁶ « L'expérience (...) nous a révélé les prodiges opérés par l'amortissement quand une rigoureuse et imperturbable fidélité le défend contre toute entreprise arbitraire... »

Institutions alone were however unlikely to restore the state's credit. The inheritance from Napoleon was mixed. On one hand Napoleon had created a national bank, the *Banque de France*. To further restore the French credit, Napoleon had imposed in 1800 the resumption of specie payment for the public debt (Jèze, 1925, p. 280). In 1803, Napoleon had set France on a bimetallic standard by creating the *Franc Germinal*. However, mistrustful of paper money Napoleon had built a very rigid monetary system. Even though the *Banque de France* was allowed to issue banknotes, the minimal denomination of 500 FF dramatically limited their use (Gabillard, 1953). As a result, payments thus remained mostly done with specie. Furthermore under Napoleon, the most common way to finance public deficits was to let short term debt accumulate, leaving a massive amount of debt under the form of arrears. For the new French government the payment of the arrears inherited from the Napoleonic Regime was an additional way to show its good faith. By the laws of 28 April 1816 and 25 March 1817, the Crown agreed to settle the arrears by issuing notes exchangeable for *rentes* in five installments beginning on January 1st, 1821 (White, 2001). When the first installment became due, the government honored its word by issuing a loan to cover the expenses (de Nervo, 1865, p. XVI).

Even if mistakes were made under the Restoration, there were major improvements in comparison to earlier periods. Jèze (1925, p. 312) considers that issue of sovereign debt was rendered possible thanks to political stability, public discussion and approval of budgets and the introduction of financial controls. Even if some institutions, such as the *Caisse d'Amortissement* had existed before, there was previously no credible commitment to respect the objectives given to these institutions. In this respect, the Restoration marked a clear departure from previous regimes.

However, as argued by Gelderblom and Jonker (2011), even commitment and efficient fiscal policies may not be sufficient in explaining the decline in the interest of public debt. These mechanisms have to take place in an economic environment characterized by abundant savings and changes in investors' preferences regarding the composition of their portfolios. In the French case, capital flows changed direction, from Great Britain to the Continent, following Waterloo (Neal, 1998). The newly issued 5% French *rentes* offered a more attractive investment opportunity than holding the British consols. Indeed, the rise in the price of British government bonds induced by the governmental policy aimed at retiring high-interest debt and reducing expenditures, contributed to a decrease of their yields which in turn altered their attractiveness as investments. Moreover, as public bonds represented the highest source of income for underwriters, the new market conditions regarding the British debt forced traders on the London

stock exchange to propose new securities to their customers in order to maintain their profits⁷. This successful portfolio rebalancing to include French *rentes* opened a new era for capital investment, also fueled by the significant financing needs of the newly created Latin American states following the collapse of the Spanish empire. Neal (1998) stresses that those Latin American bonds included higher risk premiums compared with the “now-seasoned and solid French government debt” (p. 63) and by the mid-1820s, the British holders of those foreign bonds experienced their first experience with sovereign bond defaults. Over that time period, the French public debt seems thus to have been a good investment opportunity in terms of risk and return.

The next section provides an empirical investigation of the impact that these substantial improvements had on the yield of the French *rentes*.

V. Data and Methodology

Data

In order to perform our empirical analysis we built up a hand collected original database. It consists of the weekly (Friday closing price) bond market prices published by the *Moniteur Universel* for the 5% French *rente* and the 3% English consol on the time period stretching from July 7, 1815 to January 13, 1826. On bank holidays we generally use the last quoted price; for the coupon payment period, either the “reduced” consol price or the price obtained from a linear interpolation based on the prices of other consols is used.

In the French case, investors faced a conversion risk. The bonds providing the highest nominal rates were the most likely to be converted and therefore present the highest yields. To avoid potential bias, the consol with the lowest coupon, i.e. the 3% consol, was chosen. An additional advantage of this choice is that the 3% consol also happened to be the most traded sovereign bond on the London stock market, thus, a highly liquid asset. For the French market, the solution was less obvious as there was only one sovereign bond traded over the period under study, i.e. the 5% *rente*. To address the conversion issue, we computed an implied option price by using the Black and Scholes (1973) formula and derived the price of a non-convertible *rente* as the sum of the price of the convertible *rente* and the option price. Since the conversion was a new

⁷ For a more detailed discussion of the role played by underwriters on the sovereign debt markets also refer to Flandreau *et al.* (2010).

concept in France and only became discussed in 1824, as a robustness check, results were also tested on basis of the bonds' yield to maturity.

Methodology

To determine the elements which led to the drastic improvement in French public finances one would ideally like to create time series on variables suspected of playing a role and then to test their impact. Unfortunately, constructing such variables is extremely hard for institutions. There is indeed no measure of the quality of institutions showing enough variation for our period (for example, Polity IV data attributes the same value for institutions for the whole period suggesting that these had a constant quality). In order to overcome this limitation, the analysis relies on an indirect approach. Since it is impossible to construct an "institution" variable and regress it on the yields, we rely on changes in the yields and base the analysis on the events linked to the dates when these changes occurred. The objective of our empirical analysis is thus twofold. First of all we want to check for the presence of potential fundamental changes in the evolution of the French yields, to identify the exact timing of such changes as well as their cause. Second, we aim at measuring the potential short-term impact of specific events/decisions on the evolution of these yields. To reach these objectives, we apply a structural break methodology completed by a regression with dummies.

Structural breaks may be computed on yields or on spreads. Using the spreads with the British consols allows controlling for "global" shocks. This comes however at a cost, since by construction the series will also react to British idiosyncratic events. To overcome this issue, the analysis is conducted primarily on the French yields but explanations are searched both on a global and on local scale. As robustness check, breaks have also been detected on the French yields corrected for the trend of the British consol. This approach limits the impact of pure British events since only the consols' trend is considered. Using this method leads to very similar results in terms of breaks.

The most commonly encountered method for detecting the number and location of structural breaks that might appear in a time series is the one introduced and developed by Bai and Perron (1998, 2003). More specifically, we estimate the following general model subject to m breaks ($m+1$ regimes):

$$y_t = \delta_j z_t' + u_t \quad t = T_{j-1} + 1, \dots, T_j, \quad j = 1, \dots, m+1 \quad (1)$$

where y_t represents the dependent variable, in our case the French yields, $z_t(q \times 1)$ is the vector of covariates, u_t is the error term at time t , δ_j is the corresponding vector of coefficients and the indices (T_1, \dots, T_m) stand for the unknown break points. In this approach, the unknown coefficients and the endogenous breakpoints are estimated simultaneously; moreover, this general approach allows the coefficients to change while also taking into account potential breaks in the variance of the disturbance term provided they occur at the same dates as those in the parameters of the regression. The algorithm computes the estimates of the break points based on the minimization of the sum of OLS squared residuals segment by segment (Bai and Perron, 2003) and convergence of the estimation is obtained under a large set of assumptions (however precluding variables with autoregressive unit root), namely different distributions both for the regressors and the errors⁸.

In testing for multiple potential breaks we use a supF test of no structural break, i.e. $m = 0$, versus $m = k$ breaks. The choice of the trimming parameter ε will determine the minimal length h of a segment, i.e. $\varepsilon = h/T$, with T being the number of observations. Following Bai and Perron (1998), first we apply the double maximum tests of the null hypothesis of no structural break against an unknown number of breaks, UD_{\max} and WD_{\max} ⁹ and use their reported critical values for $\varepsilon = 0.05, 0.10, 0.15, 0.20$ and 0.25 (with the corresponding maximum number of breaks, i.e. 10, 8, 5, 3 and 2 respectively). Then we implement a test for l versus $l+1$ breaks, i.e. $\sup F_T(l+1|l)$, applied to each segment that includes observations from T_{i-1} to T_i , $i = 1, \dots, l+1$. The model with l breaks is rejected in favor of a model with $l+1$ breaks whenever the overall minimum value of the sum of squared residuals is larger than the sum of squared residuals of the $l+1$ breaks model. Finally, we use the Bayesian Information Criterion (BIC) and the modified Schwartz criterion (LWZ) to select the dimension of the model¹⁰.

The structural break approach has been used in many economic history papers (Guinane, Willard and Rosen, 1996; Brown and Burdekin, 2000; Frey and Kucher, 2001; Weidenmier, 2002; Brown and Burdekin, 2002; Oosterlinck, 2003; Frey and Waldenström, 2004; Zussman et al., 2007; Flandreau and Oosterlinck, 2011; Oosterlinck and Ureche-Rangau, 2012). Its main

⁸ Potential serial correlation and/or matrix robust heteroscedasticity are taken into consideration and corrected in order to obtain consistent estimators.

⁹ UD_{\max} is an equal weighted test while WD_{\max} applies weights to the individual tests in order for the marginal p-values to be equal across values of m .

¹⁰ In the presence of serial correlation and even when no serial correlation is present in the errors but a lagged dependent variable, with large coefficient, is present, Bai and Perron suggest using a sequential application of the $\sup F_T(l+1|l)$ test based on sequential estimates of the breaks.

advantage is that breaks are determined endogenously, hence allowing to understanding the perceptions at the time of the events, excluding any *ex-post* bias. This advantage is enhanced by the use of financial market data, highly informative when one wishes to assess the perceived importance of given events at the moment they happened, as any misinterpretation of information could heavily penalize the market operators (Waldenström and Frey, 2007). However, this approach also presents some limits, namely a risk of “over-interpretation” (i.e. econometrically determined break for which one seeks a historical reason at any costs) and a risk of omission, particularly in the presence of simultaneous events producing opposite effects.

In order to infer more information regarding the response of the French yields to the implementation of several institutions with direct link to public debt management as well as to decisions leading to an enhancement of their credibility, we test the changes in the French yield at the dates these decisions were made. Thus, we are able to capture a short-term effect in the yield, at the dates for which there is an *a priori*. To do so, we apply a two steps procedure. First of all, to take into account market trend, the French yields are detrended by using the British consol as the benchmark for the sovereign bonds market at that time, i.e.

$$y_t = c_0 + c_1 trend_consol_t + e_t \quad (2)$$

where y_t represents the French yield, $trend_consol_t$ is the Hodrick-Prescott trend¹¹ of the British consol over the same time-period, c_i are the coefficients and e_t the residual. In a second step, residuals are described by a GARCH(1,1) model with dummies in the mean as proxies for the chosen dates as follows:

$$e_t = \alpha_1 e_{t-1} + \sum_{i=1}^N \alpha_{2i} D_i + \varepsilon_t \quad (3)$$

$$h_t = \beta_0 + \beta_1 \varepsilon_{t-1}^2 + \beta_2 h_{t-1} \quad (4)$$

with D_i standing for the chosen N dummies, h_t is the conditional variance, α and β are the different coefficients.

The advantage of this approach is that there is no risk of over-interpretation, as the events are chosen exogenously for a specific reason. However, the reverse is that by doing so, there is potential *ex-post* bias (choosing events that are nowadays considered as major by most historians while they were perceived as minor at the time they arrived).

¹¹ The smoothing parameter λ was chosen according to the frequency power rule of Ravn and Uhlig (2002) and a power rule of 2, following Hodrick and Prescott (1997).

Both methods perform poorly when markets only gradually integrate news. This would for example be the case for institutions' credibility. Therefore, if anything, finding positive results for such variables should be interpreted as a minimum impact as their effect could be even higher if the analysis was based on an alternative method. With those caveats in mind, we apply these two methodologies on our sample of French yields. Results are presented and discussed in the next section.

VI. Empirical evidence

We aim at studying the presence of potential structural changes in the evolution of the French bond yields over a time period of ten years, between 1815 and 1825 as well as the impact of several identified events on the same yield. More specifically, we analyze to what extent the newly created institutions following the Waterloo defeat along with the different decisions meant to enhance their credibility, but also the occupation of the French territory by the enemy, could explain the observed decline in the French debt yields.

We start by reporting some descriptive statistics for both the French and British yields, i.e. 5% French *rente* and 3% British consol. Table 2 shows that the yields of the French *rente* are, on average, higher than those of the British consol (by almost 2.5%), while also being more volatile (e.g. higher standard deviation). The French yield culminates at almost 10%, which is twice as much as the maximum British yield. Both yields are non-Gaussian, more specifically leptokurtic and positively skewed (significantly in the case of the French one).

Insert Table 2 about here

We also check for the presence of potential unit roots in our two series, by performing the Augmented Dickey-Fuller test. Our results, as reported in Table 3, show evidence that while for the British consol we cannot reject the presence of a unit root, the French *rente* is stationary when we take into account an intercept and a trend.

Insert Table 3 about here

We then apply the structural break approach in order to check for the presence of potential major changing points in the evolution of the French yields. More specifically, we estimate the following version of the general model presented in (2), namely

$$y_t = \delta_{1,j} + \delta_{2,j}t_j + \delta_{3,j}\Delta y_{t-1} + u_t \quad t = T_{j-1} + 1, \dots, T_j \quad j = 1, \dots, m+1 \quad (5)$$

The choice of this model was motivated by the results of the ADF tests performed on the French yields, where the inclusion of an intercept and a trend seems to correct for the presence of a unit root. Finally, our series of yields shows significant autocorrelation up to lags as high as thirty¹²; therefore we include the lagged dependent variable in the right side of the equation.

Results are provided in Table 4 for a trimming parameter of $\varepsilon = 0.10$ and a maximum number of breaks equal to 8 which corresponds to segments with a minimum length¹³ equal to 55.

Insert Table 4 about here

First of all, both the supF tests and the double maximum tests (UD_{\max} and WD_{\max}) of no break allow rejection of the null hypothesis at the 5% conventional risk level. Hence, there is at least one break point in our yield series. Regarding the exact number of breaks the three criteria (BIC, LWZ, and sequential procedure) select 4, 6 and 5 breaks respectively. Following Bai and Perron's recommendations, namely in the presence of serial correlation, we choose to discuss the sequential estimates of the breaks, i.e. 5 breaks.

The first break falls on February 7, 1817 and has a confidence interval of one observation before and one after the exact location the observed break. Historically, this date corresponds to Baring and Hope & Company issuing the first tranche of a loan which made the payment of the indemnity possible and may therefore explain the descending pattern of the yields.

The loan was important in many respects. First, it allowed France to pay the due installment of the war indemnity. Second, this payment was also linked to the withdrawal of 30,000 troops from the occupied part of the country. Third, it showed that foreign investors were recognizing the improvement in French public finances and future prospects. The fact that foreign underwriters had agreed to take interest in the loan was regularly mentioned (Aglan, 2006). At the time, the Duke of Richelieu went as far as to say that Baring was one of the six main powers in Europe jointly with Britain, France, Austria-Hungary, Russia and Prussia (Ahamed, 2010). Baring was indeed one of the leading underwriters (Flandreau and Flores, 2010). Eventually, this issue

¹² For space reasons, we choose not to report the results of the Ljung-Box Q-statistics; they are however available upon request.

¹³ The choice of these trimming parameters was dictated by Bai and Perron recommendations; as our sample is composed by 550 weekly observations we chose segments long enough to provide statistically significant evidence and avoid short lived noise being treated as a break. Meanwhile, the use of too long periods potentially leads to missing "true shifts" in the series. However, we performed our computation with several other values for the trimming parameters and the results are similar.

lifted the Paris stock exchange from its apathy (Colling, 1949, p. 192). With a more active market, the government could expect a decline in interest rates for future issues of the *rente*.

The second break is detected on November 27, 1818 and is also characterized by a very thin confidence interval, i.e. one observation on each side of the break point. Historical evidence shows that at this date the Allied troops quit France, which determines a definitive change towards a continuous decrease of the yield, after a period of downside but also upside variations of the same yield. A look at figure 4 indicates that this period was marked by a sharp change in the yields. Indeed, the yields were following a steady declining trend which brutally stopped. This change in regime is attributed to two elements: in a first phase speculators were hoping that the departure of foreign troops would diminish the costs for France. When the agreement finally came, fears that the departure of foreign troops would remove the implicit guarantee provided by their presence prompted many foreigners to sell their holdings of French *rente*, driving prices down and leading to a spike in yields.

The impact of the final departure of foreign troops from the French soil was certainly a major event at the time. The liberation of the territory was a central element in Louis XVIII's speech for the opening of the Chambers on December 10th, 1818. During the same speech, he insisted on his willingness to reduce the public debt (de Nervo, 19865, p. 326). The departure of foreign troops was indeed the sign that France had managed to repay all its war indemnities. The country was now back to a normal track. The massive amounts paid as reparations were part of the past and France would from then on save the amounts used to pay reparations (Riva, 2006). According to Colling (1949, p. 193) investors were betting on the results of the Congress of Aix-la Chapelle and on the future liberation of the territory. Speculation thus played a major role at the time. During the summer of 1818, the French government had speculated on the *rentes* to increase their price on the Paris Bourse. As the amount due to the Allies was to be paid in *rente*, a higher price meant would imply giving a lower number of *rentes* (Gontard, 2000; Riva, 2006). Investors who hoped that the treaty of Aix la Chapelle would drive prices even higher were disappointed and many market operators who had speculated on this hope faced heavy losses (Riva, 2006). Once the departure of the foreign troops became certain, foreign investors began to fear that the evacuation of the army would remove the guarantee it represented for the holders of French sovereign bonds. Gontard (2000) notes five elements mentioned at the time to explain the crisis: 1) The too high volume of *rentes* issued by Baring, 2) The action of speculators transforming paper gains in real ones (following the increase of the *rentes*), 3) The sale by British investors fearing troubles in liberated France, 4) The contractionary actions of the *Banque de*

France, 5) The presence of short-term speculators destabilizing the market. To get out of the crisis, brokers were asked to support the price of the *rentes*, an action also undertaken by the Treasury (Riva, 2006). Following this crisis which led to the insolvency of several important brokers, the Bourse mutualized for the first time counterparty risk (Riva and White, 2011).

The third break is the most controversial; detected on **May 25, 1821** it has the largest confidence interval and is the one missing when applying the BIC criteria. The only potential explanation could be Napoleon's death on May 5th, 1821; however, it can also fall under the risk of over interpretation.

The fourth break appears on January 10, 1823 and has a confidence interval similar in lengths to the one reported for the first two breaks. The corresponding events that might explain this change in the evolution of the yields, namely a switch towards an increase of their level, could be the outbreak of the war with Spain (*Expédition d'Espagne*) associated to an extraordinary credit voted by the legislature in order to sustain this war. Colling (1949, p. 199) attributes the sharp decline of the *rente* in January 1823 to the prospect that the war would break out.

Finally, **the last break is detected on March 27, 1824** with the same thin, one observation around, confidence interval. After a period of new decrease in the yield, the victory of the Ultras at the new elections (*Chambre retrouvée*) that followed the dissolution of the legislature in December 1823 determines a new upside move in the French yield.

The increase in the yield is likely due to the announcement by Louis XVIII at the opening session of the Chambers that measures would be taken to convert existing bonds and to close the last wounds of the revolution (Boiteau, 1866, p. 175¹⁴). This speech was a clear announcement of two major changes: the conversion of the *rente* (leading thus to a reduction on the interest rate) and the payment of an indemnity to the *Emigrés* who had been “despoiled” by the revolution. Both elements could only have a negative impact on the price of the *rente*: the first one because there were at the time debates regarding the legality of the conversion and because it paved the way for future conversions; the second one because the indemnity would have to be somehow financed. The heated debates related to the conversion show that many viewed the conversion as a direct threat, an element which would put into question the faith one could have in the French *rente* (Aglan, 2006).

¹⁴ « Des mesures sont prise pour assurer le capital des rentes créés par l'état dans des temps moins prospères ou pour obtenir leur conversion en des titres dont l'intérêt soit plus d'accord avec celui des autres transactions. Cette opération qui doit avoir une heureuse influence sur l'agriculture et le commerce permettra, quand elle sera consommée, de réduire les impôts et de fermer les dernières plaies de la révolution ».

Insert Figure 4 about here

We enlarge the former analysis of the structural changes in the evolution of the French yield (long term perspective) by a study of the short-term effects in the same yield produced by several major decisions regarding the implementation of institutions aimed at managing the public debt, as well as political and fiscal decisions that contributed to enhancing France's credibility. To do so, we proxy these dates for which there is an a priori by dummies and run a GARCH(1,1) model. It is nowadays well-established that financial time series' volatility is time-varying¹⁵; therefore, one cannot ignore this important stylized fact and consider it unchanged, particularly during troubled times and over such a long time period (10 years) as the one under study. This issue is even more stringent as we show evidence that there are structural changes in the pattern of the financial variable that we are modeling, i.e. the French yield. Therefore we favored a GARCH framework instead of the simple OLS regression.

Table 5 provides the list of nine dummies chosen based on Vaslin (1999) and White (2001). Some of these dates were already mentioned in the description of the historical context (e.g. the Second Treaty of Paris, the reintroduction of a *Caisse d'amortissement*, the *Chambre introuvable*, the settlement of debt arrears by the crown, the acceptance of wartime claims). To these, we add three more events that shaped the credibility of the French government in fulfilling its debt obligations and maintaining sound public finances. The first one is the payment of debt arrears by the *Banque de France*. Introduced in 1800 following Gaudin's proposal, (Finance minister at that time), this practice was seen as a major measure for restoring public finances and France's credibility with respect to its creditors (Vaslin, 1999) as it imposed the resumption of specie payment for the public debt. However, it was implemented as a short-term measure and indeed, it only lasted for four years. As the French state continued experiencing financial difficulties, this type of intervention was used several times afterwards (following a reform of the Bank's statute in March 1806). It was namely the case on December 14, 1815 when the Bank insured the payment of the coupons pending since September 22, 1815 and on June 11, 1817, when the payment of the war indemnity created huge problems to the treasury. Corvetto insisted then on the necessity to insure the payment of the 5% *rente* in a "normal" delay and the Bank was again designated to meet this objective.

The two other events that we decided to add are both the consequences of the laws introduced by Villèle from 1822 to 1827. These laws were meant to guarantee the principles of

¹⁵ For syntheses of the literature on ARCH-GARCH modeling please refer to Bollerslev et al. (1992), Bollerslev et al. (1994) among others.

unity, integrity, specialization and periodicity of the public budget. The first one is the budgetary order of September 14, 1822 regarding the liquidation of public expenses during the 9 months following the end of the fiscal year while the second one is the financial account order of December 10, 1823 (Vaslin, 1999).

Insert Table 5 about here

Table 6 provides the results of our dummy analysis. For many dates one can observe a statistically significant negative impact on the yields. The first payment of debt arrears by the *Banque de France* and the dissolution of the chamber were clearly perceived positively by the markets. Both showed the state's willingness to honor the debt of the previous regimes, either by a direct intervention on the market (payment of the pending coupons) or by politically evicting any potential advocates of a moratoria on the existing debt. The different laws increasing the accountability of the government and promoting more transparency in public finances were also positively perceived, and were followed by a decrease in the yield. Restoring a sound management of the public finances was indeed one key action that contributed to restoring creditors' confidence in France's capacity to sustain its debt. Surprisingly, the creation of the *Caisse d'amortissement* is not linked to any decrease in yields. The previous aborted attempts in the matter might explain the reluctance of the markets, at least in the short-run, regarding the success of such an institution. Moreover, investors probably needed more time in order to assess the credibility of this institution and particularly government's willingness to support its functioning and respect its objectives. Finally, the second intervention of the Bank to insure the payment of the debt service has an opposite effect on the French yield (e.g. increase). One potential explanation might come from the fact that by asking for a new intervention of the Bank, the French government signaled its recurrent financial difficulties. In addition, these interventions also raised additional expenses for the state; as an example, for the 1823 intervention, the Bank charged a commission of $1\frac{1}{2}\%$ on the amounts paid to the creditors as well as on the advances insured to the *Caisse d'Amortissement* (110,000 FF per day) and a guarantee amounting at 2 million of FF in *rentes*. The guarantee was returned to the Treasury in March 1819.

Insert Table 6 about here

Our empirical evidence supports Sussman and Yafeh (2006) who argue that lack of immediate market response to institutional reforms may be explained either by the time needed to assess the credibility of the newly created institutions or by the fact that the process itself has to be cumulative. In order to check this last argument we tested for the presence of a co-

integration relationship between our two series of yields, both on the whole period under study and on different sub periods delimited by the nine events mentioned previously. Our results go in line with the idea that the institutional reforms implemented following Waterloo had a gradual and cumulative effect as illustrated by a gradual decrease in the yield spread with respect to the British consol. Indeed, the results of the Johansen test reported in Table 7¹⁶ show the existence of one co-integration relationship between the yields only in the last sub period, 1823-1825. Thus, by the end of 1823 the French and British yields started to move together. The French government's borrowing conditions became close to those required from the major player on the international financial markets.

Insert Table 7 about here

VII. Conclusion

Following Waterloo, France was in a terrible situation. Public finances were in shambles and whereas victors had been inclined to show mercy in 1814, following the episode of the 100-days they imposed harsh terms to defeated France. Despite all these elements, in the ten years between 1815 and 1825 not only did France manage to place a huge amount of debt on the market (resulting in a threefold increase) but it did so with a spread, compared to the British consol, falling from more than 400 basis points to a meagre 100 basis point. How did France manage to regain its credibility?

This paper argues that the Second Treaty of Paris imposed upon defeated France set into place a context in which almost all actors had an incentive to make sure that France would pay its debt. The 100 days had shown to the world the fragility of the rule of Louis XVIII. Louis XVIII had thus good reasons to please the Allies who had twice restored him. The electoral law limiting the vote to the richest men of the nation also guaranteed a form of alignment of the interests of members of the parliament and bondholders. Neither Louis XVIII, nor the wealthy had an incentive to repudiate the debt inherited from the revolution and the Empire, even less to default on future loans. Coming back to pre-1789 public finances was not possible. The financial crisis of 1788-1789 was viewed as a trigger for the revolution and reverting to such a system would have increased the risk of revolution. The presence of the Army of occupation also forced France to pay its debt. The threat not to leave the country if war reparations were not paid was credible. The presence of this (unpopular) Army of occupation also allowed France to pass measures

¹⁶ To ease the presentation, we only report the results for the two sub periods before and after December 1823. However, all results are available upon request.

which might otherwise have met a much stronger opposition. The importance of liberating parts of occupied France could hardly be questioned whereas at the same time the Allied Army guaranteed that no revolution would take place. Last, but certainly not least, Wellington acted as “*chef d’orchestre*” allowing a smooth transition from the defeat to the liberation of the whole country. Great Britain had an interest in seeing France pay the war indemnities. In the first years France needed external finance to make sure that it could meet its obligations. Wellington kept a regular correspondence with Alexander Baring to ensure that Baring would lend to France, thus giving some time for the country to restore its finances. The iron fist imposed on defeated France could thus also prove to be a lending hand.

The empirical analysis shows that the features of the Second Treaty of Paris had a double impact on the French state’s credibility. The imposition of an Army of occupation led markets to consider that default was not an option. Baring, the main foreign banker involved in lending to France considered in 1818 that occupying France was safeguarding its loan (Longford, 1972). The imposition of huge war indemnities on defeated France also forced the government to take drastic measures. As pointed out by Margairaz (2006), the 100 days and Waterloo forced the persons in charge of French finances to implement laws and institutions leading to the creation of a real credit system.

Structural breaks on the French yields show that Waterloo had indeed a positive long-lasting effect on French public finances. Credible institutions and actions consistent with the preservation of creditors’ rights improved the state’s credibility. In terms of actions, not only did France recognize all previous debt but it also took measures to make sure the reimbursement of this debt would happen. Arrears which had been the tool Napoleon used to finance his regime were paid. The desire to pay all former debts faithfully was tested twice: first by the opposition of the *Chambre introuvable* in 1816, second when the king suggested converting the 5% *rentes* to pay for an indemnity for the *Emigrés*. Both events show up in the analysis, confirming the major role played by credibility. The payments themselves appear to have had a positive short term impact on the yields. By the same token, elements linked to the repayment of the war indemnities also clearly show up in the analysis. Both the issue of a large international loan allowing the payment and the actual settlement of the war leading to the withdrawal of foreign troops induce statistically significant structural breaks.

Institutions such as the creation of the *Caisse d’Amortissement* don’t seem to have induced a major break, at least at their creation. This might be due to the fact that many sinking funds had been created by previous regimes and had systematically been used to other means than the debt

amortization. In this case, one would expect a gradual impact as investors realize as time goes by that the restored government is serious about amortizing its debt. Laws increasing the accountability of ministers and leading to a better management of public finances appear however to have had a positive short term impact on the yields. The conjunction of all these institutional reforms and the credible commitment of the French government to guarantee the respect of all the public debt engagements finally translated into French and British yields starting to move together by the end of 1823.

In most studies the credibility of the state is analyzed through the lenses of its actions or its institutions. The French case following Waterloo is dramatically different. Indeed, the credibility of the French government was in a first phase guaranteed by the military threat posed by the Allied occupation Army. Investors knew that France had no choice but to find ways to pay. During the occupation period (1815-1818), France managed to reimburse the war indemnities. As such, this fact alone would certainly have increased its credibility. However, the manner in which the repayment was made possible played probably an even more important role. Indeed, in these three years, France created new institutions to better manage its debt, passed laws dramatically enhancing the power of parliament in financial matters and increased the accountability of ministers regarding their expenses. In terms of public finances, Waterloo and the 100 days marked the beginning of a new, and better, era for France. Whereas previous attempts to improve French public finance had proved unsuccessful up till then, the pressure set by the defeat and the Army of occupation forced the government to act in such a way as to recover its credibility. Ouvrard (1827, p. 223), one of the French bankers involved in Baring loan of 1817, highlighted the role played by the occupation. According to him¹⁷, out of necessity, France had discovered the extent of its resources and the Allied had created its creditworthiness. In this respect Waterloo was indeed a godsend for French public finances!

¹⁷ « Il manquait à la France la loi de la nécessité pour connaître toutes ses ressources : *vous venez de fonder son crédit* ».

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Figure 1: French Debt, 1801-1835

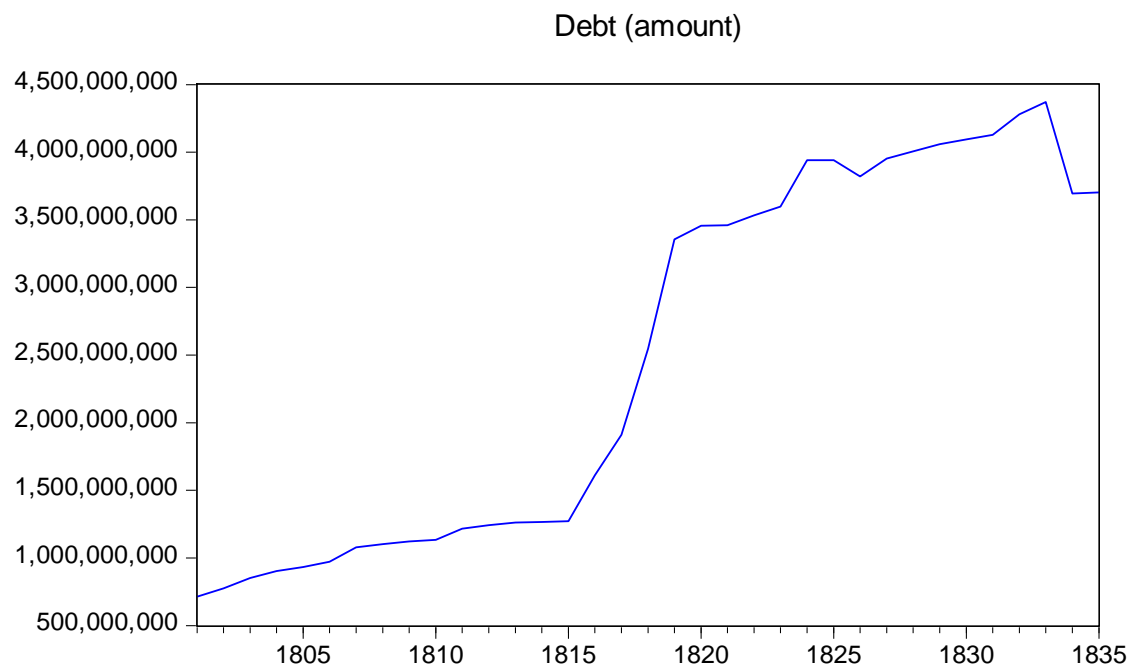
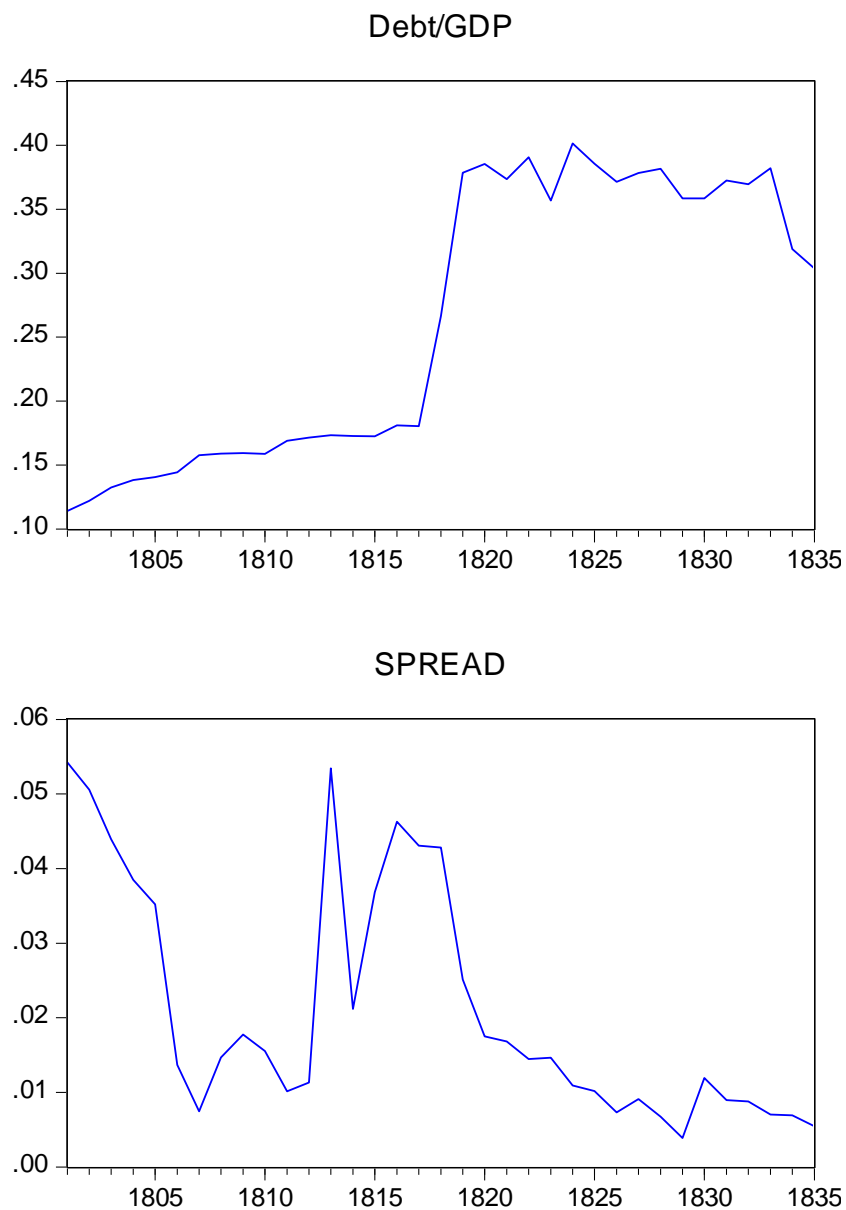


Figure 2: The French Debt-to-GDP ratio and the French 5% *rente* – British 3% consol spread: comparative evolution, 1801-1835



Sources: Debt amounts and yields: authors' computations. GDP: Banque de données macroéconomiques, INSEE, <http://www.insee.fr/fr/bases-de-donnees/>, Série 000870383

**Figure 3: The spread between the French yield and the British consol over one century
(Annual data, in basis points)**

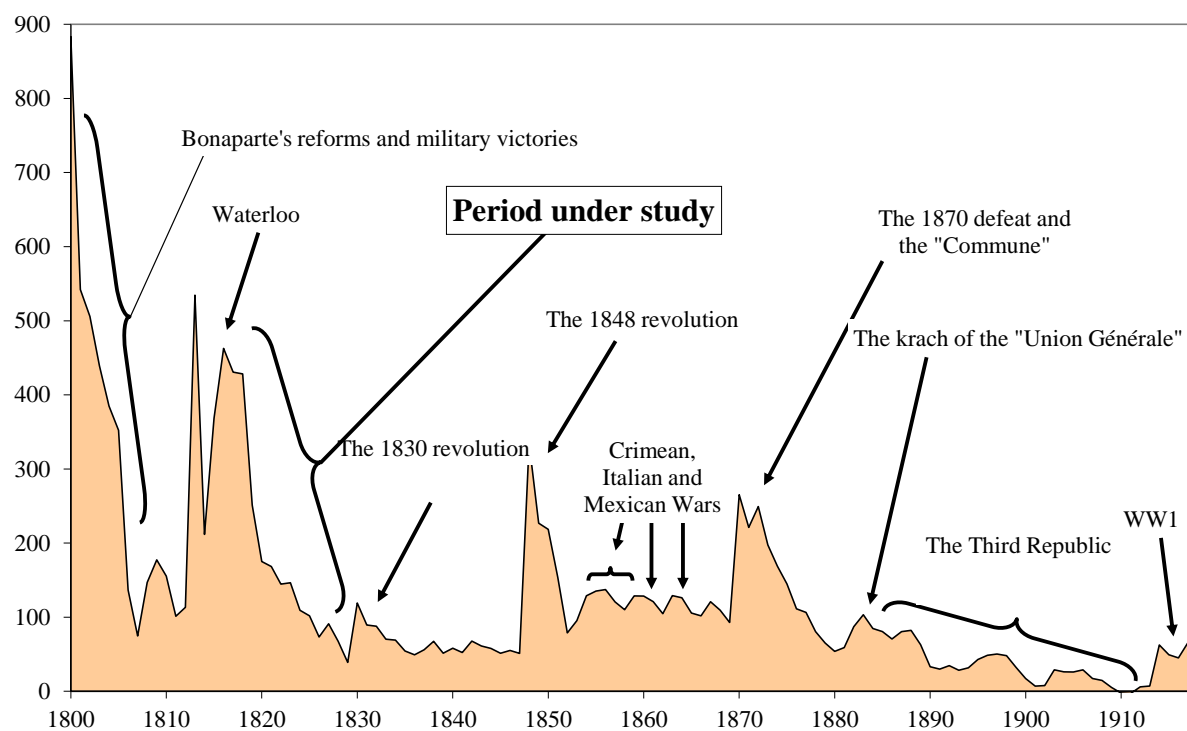


Figure 4: The evolution of the French yield and the detected break points with their confidence intervals

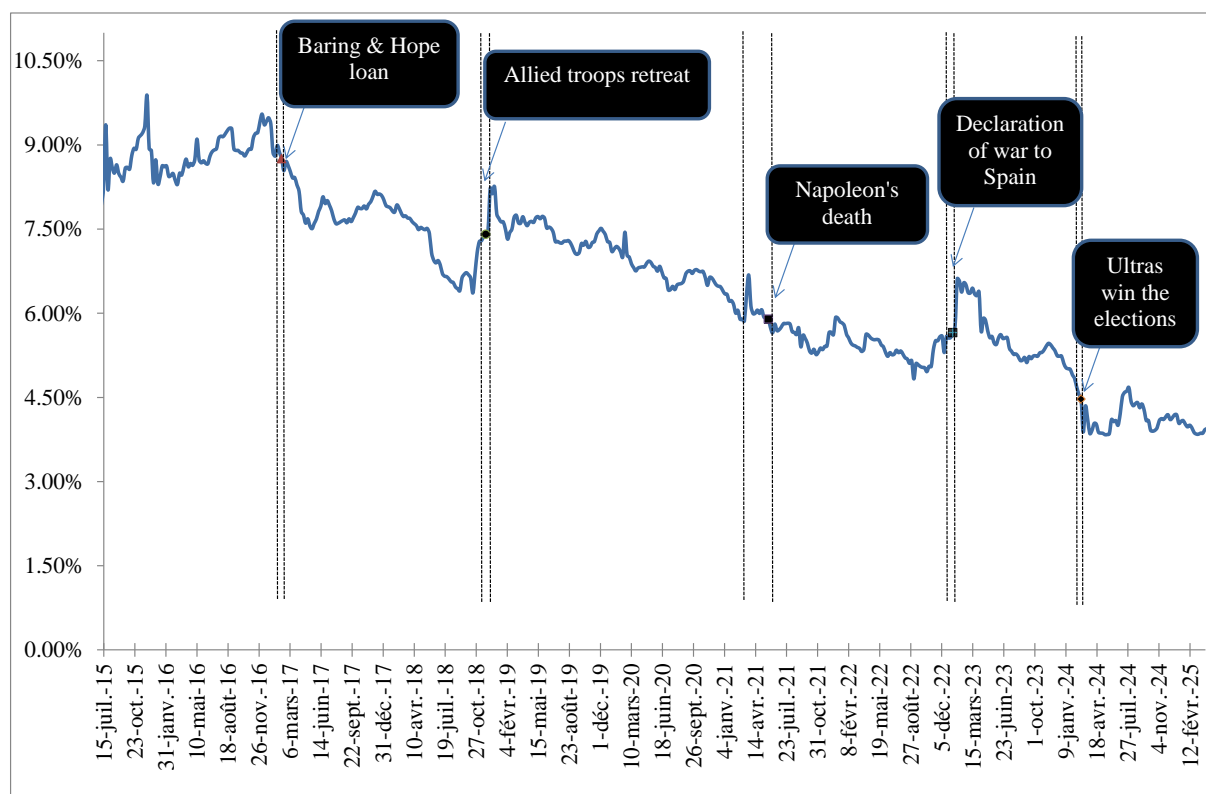


Table 1: The evolution of public revenues and expenditures between 1816 and 1835

	Fiscal revenues (millions of French francs)	Budgetary deficit/surplus (millions of French francs)	Interests on public debt as % of public expenses (%)
1816	729	-19	9.10%
1817	879	81	10.44%
1818	900	-20	13.54%
1819	938	41	18.66%
1820	895	33	18.44%
1821	933	26	18.64%
1822	928	1	18.86%
1823	933	-75	19.59%
1824	919	3	20.52%
1825	960	-3	20.12%
1826	979	6	19.84%
1827	983	-38	20.84%
1828	948	5	20.45%
1829	978	7	20.36%
1830	992	-124	21.01%
1831	971	-270	21.71%
1832	949	-189	21.62%
1833	985	-144	22.02%
1834	990	-56	18.25%
1835	1008	-26	18.12%

Source : Mitchell (1980) and Vaslin (1999).

Table 2: Descriptive statistics of the French *rente* and the British consol

	CONSOL	RENTE
Mean	4.03%	6.47%
Median	3.92%	6.54%
Maximum	5.40%	9.88%
Minimum	3.12%	3.84%
Std. Dev.	0.54%	1.58%
Skewness	0.400*	0.027
Kurtosis	2.541*	1.903*
Jarque-Bera	19.50*	27.62*
<i>p-value</i>	<i>0.0001</i>	<i>0.0000</i>

* stands for significance at the 5% conventional risk level

Table 3: ADF unit root test on the French *rente* and the British consol

	ADF t-Statistic (constant, trend)	p-value
CONSOL	-1.6118	<i>0.7874</i>
RENTE	-4.4743*	<i>0.0018</i>

* stands for significance at the 5% conventional risk level

Table 4: Structural breaks analysis

Model			Specifications						
$y_t = \delta_{1,j} + \delta_{2,j}t_j + \delta_{3,j}\Delta y_{t-1} + u_t$			h = 55			m = 8			
Tests									
sup F_T (1)	sup F_T (2)	sup F_T (3)	sup F_T (4)	sup F_T (5)	sup F_T (6)	sup F_T (7)	sup F_T (8)	UD_{\max}	WD_{\max}
303.30*	304.63*	289.87*	272.81*	257.14*	242.61*	248.12*	196.19*	304.63*	452.26*
sup F (2 1)	sup F (3 2)	sup F (4 3)	sup F (5 4)	sup F (6 5)					
227.08*	216.44*	208.11*	77.71*	16.02					
Number of breaks selected									
we use a 5% size for the sequential test sup $F_T(l + 1 l)$									
Sequential	5								
LWZ	6								
BIC	4								
Estimates with 5 breaks									
<i>t-values in italics for $\hat{\delta}_{i,j}$</i>									
<i>the 90% confidence intervals for \hat{T}_i</i>									
$\hat{\delta}_{1,1}$	$\hat{\delta}_{1,2}$	$\hat{\delta}_{1,3}$	$\hat{\delta}_{1,4}$	$\hat{\delta}_{1,5}$	$\hat{\delta}_{1,6}$				
0.0857*	0.0976*	0.1039*	0.0745*	0.1673*	0.0208*				
<i>147.19</i>	<i>74.43</i>	<i>71.53</i>	<i>18.90</i>	<i>20.23</i>	<i>4.58</i>				
$\hat{\delta}_{2,1}$	$\hat{\delta}_{2,2}$	$\hat{\delta}_{2,3}$	$\hat{\delta}_{2,4}$	$\hat{\delta}_{2,5}$	$\hat{\delta}_{2,6}$				
0.0001*	-0.0002*	-0.0001	-0.0001*	-0.0003*	0.00004*				
<i>5.45</i>	<i>-17.15</i>	<i>-23.81</i>	<i>-5.06</i>	<i>-13.56</i>	<i>4.62</i>				
$\hat{\delta}_{3,1}$	$\hat{\delta}_{3,2}$	$\hat{\delta}_{3,3}$	$\hat{\delta}_{3,4}$	$\hat{\delta}_{3,5}$	$\hat{\delta}_{3,6}$				
-0.0049*	0.8309*	0.3872*	0.3055	0.2811	0.2906*				
<i>-2.61</i>	<i>3.55</i>	<i>2.45</i>	<i>1.29</i>	<i>1.41</i>	<i>1.39</i>				
\hat{T}_1	\hat{T}_2	\hat{T}_3	\hat{T}_4	\hat{T}_5					
02/07/1817	11/27/1818	05/25/1821	01/10/1823	02/27/1824					
<i>[01/31 - 02/14]</i>	<i>[11/20 - 12/11]</i>	<i>[03/09 - 06/01]</i>	<i>[01/03 - 01/17]</i>	<i>[02/20 - 03/05]</i>					
<i>R-squared</i>	<i>Adj. R-squared</i>								
0.975	0.975								
* denotes significance at the 5% confidence level									

* denotes significance at the 5% confidence level

Table 5: Dummies and corresponding chosen events

Dummy	Date	Event
D1	20 November 1815	Second Treaty of Paris
D2	14 December 1815	<i>Banque de France</i> pays debt arrears
D3	28 April 1816	Creation of the <i>Caisse d'Amortissement</i> Law settling debt arrears
D4	5 September 1816	Dissolution of the legislature (<i>Chambre introuvable</i>)
D5	25 March 1817	Crown settles debt arrears Increase of government's accountability
D6	11 June 1817	<i>Banque de France</i> pays debt arrears
D7	9 May 1818	French legislature accepts wartime claims
D8	14 September 1822	Budgetary order to liquidate public expenses during the 9 months following the end of the fiscal year
D9	10 December 1823	Financial annual account order

Table 6: Regression results – short-term impact of chosen events

	Coefficient	p-value
$\hat{\alpha}_1$	0.9587*	0.0000
$\hat{\alpha}_{2,1}$	0.0046	0.2224
$\hat{\alpha}_{2,2}$	-0.0002*	0.0000
$\hat{\alpha}_{2,3}$	-0.0007	0.7703
$\hat{\alpha}_{2,4}$	-0.0032*	0.0000
$\hat{\alpha}_{2,5}$	-0.0010*	0.0000
$\hat{\alpha}_{2,6}$	0.0010*	0.0000
$\hat{\alpha}_{2,7}$	-0.00002	0.5114
$\hat{\alpha}_{2,8}$	-0.0003*	0.0012
$\hat{\alpha}_{2,9}$	-0.0006*	0.0000
$\hat{\beta}_0$	0.0000	0.0548
$\hat{\beta}_1$	0.1732*	0.0093
$\hat{\beta}_2$	0.6085*	0.0000
R-squared	0.8956	
Adj. R-squared	0.8938	

* denotes significance at the 5% confidence level

Table 7: Co integration of the French and British yields

July 1815 - December 12, 1823

Integration diagnosis	ADF t-Statistic (constant, trend)	p-value
CONSOL	-1.8247	0.6913
RENTE	-4.4381*	0.0021
Johansen test for co-integrating vectors	Trace (p-value)	Max eigenvalue (p-value)
CONSOL & RENTE	9.41 (0.147)	4.95 (0.484)

December 19, 1823 - January 1826

Integration diagnosis	ADF t-Statistic (constant, trend)	p-value
CONSOL	-1.9116	0.6417
RENTE	-2.5714	0.2942
Johansen test for co-integrating vectors	Trace (p-value)	Max eigenvalue (p-value)
CONSOL & RENTE	15.92* (0.012)	14.43* (0.013)

*denotes significance at the 5% confidence level

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