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Working Paper

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Working Paper, No. 1999-24

Provided in Cooperation with:

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Suggested Citation: White, Eugene (1999) : Making the French Pay: The Costs and Consequences of the Napoleonic Reparations, Working Paper, No. 1999-24, Rutgers University, Department of Economics, New Brunswick, NJ

This Version is available at:

<https://hdl.handle.net/10419/94257>

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**Making the French Pay:
The Costs and Consequences of the Napoleonic Reparations**

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November 1999

I wish to thank the many useful comments from the participants of the 1997 All-UC Conference at U.C. Santa Barbara, the 1999 European Historical Economics Society Conference, and seminars at the University of North Carolina-Chapel Hill, Caltech, and Harvard University. I owe special thanks to Peter Lindert for copies of David Ricardo's papers and Rolf Dumke and his colleagues who provided me with German materials.

Reparations are often part of the financial settlements that follow war. Most economists are familiar with the German Reparations after World War I, as they are often presented to demonstrate the folly of attempting a huge forced international transfer or are cited as a factor contributing to the Great Depression. But, reparations are more common than usually supposed and have a long and varied history. The reparations paid by the French after the Napoleonic wars and the Franco-Prussian War were two of the largest successful coerced transfers, contrasting other reparations cases and revealing how major transfers were effected.

The post-1815 and post-1871 French reparations were unlike the largely uncollected post-World War I German reparations. Not once, but twice the French paid in full and ahead of time. In analyses of the post-World War I German reparations, the French have often been depicted as impossibly intransigent, demanding unpayable reparations from their adversary. John Maynard Keynes (1919) considered these reparations to be a “policy of reducing Germany to servitude for a generation, of degrading the lives of millions of human beings, and of depriving a whole nation of happiness.” They were “abhorrent and detestable.” Although Étienne Mantoux (1946) assailed Keynes, offering evidence that the reparations claims were not excessive, destructive, or uncollectible, Keynes’ position was generally accepted. From a French viewpoint, France had not shirked from meeting its reparations obligations. The Germans might protest that they could not pay because their country was exhausted after a prolonged war, a great portion of territory had been lost, and their new government was not firmly established.

But, the French could point to very similar conditions in both 1815 and 1871. French politicians felt entitled to demand that "Le Boche Paiera" or "Let the Hun Pay."

While the French reparations of the nineteenth century helped to provide the basis for the French demands from the Germans, most discussions of the post-Napoleonic reparations in the twentieth century have been at best cursory. This paper examines five issues: (1) Why were reparations selected as an instrument of the postwar settlement and what were France's treaty obligations? (2) What was the method of reparations payment? (3) How does the burden of reparations compare with other episodes? (4) How were the French induced to pay reparations? and (5) What were the economic consequences of paying reparations?

1. Why Were Reparations Imposed in 1815?

When the armies of the Fourth Coalition entered Paris on March 31, 1814, the victorious Allies were faced with the task of the political reconstruction of Europe after years of French domination. Of the four great powers, Britain and Austria, under the leadership of Viscount Castlereagh and Prince Metternich, quickly decided that a lasting peace required that France be contained not destroyed and a balance of power established. To attain this "just equilibrium," gains by the victors, especially the territory hungry Russians and Prussians, had to be restrained (Chapman, 1998). A stable, moderately strong France was part of this equation; and initially reparations played no role.

To forestall any renewed attempt by the French to reestablish hegemony, Britain, Austria, Prussia and Russia had signed the Treaty of Chaumont on March 9 that joined

them together in a defensive alliance for the next twenty years. Napoleon Bonaparte abdicated on April 11 and Louis XVIII was given the crown and promised to rule according to the constitutional charter. The Allies took the position that they had not entered France as conquerors but were restoring the throne of France to the rightful heir. Although the Prussians pressed for severe treatment of France, the other Allies decided that permanent peace with the French required a rehabilitation that integrated France into the European system and terms of peace would be accepted domestically. Thus, while the wars had been long and bitter, the first Treaty of Paris was relatively magnanimous (Chapman, 1998). France's borders were set at their 1792 limits, conceding some of the Revolution's gains along the Belgian, German and Italian borders, although some colonies were forfeited. All Allied claims to war damages were waived and the looted art treasures were retained. The treaty was signed on May 30 and the Allies departed Paris three days later and began a general evacuation of the whole of France (Jardin and Tudesq, 1983; Veve, 1992).

Redrawing the map of Europe began seriously at the Congress of Vienna, which opened on October 1, 1814. The divergent interests of the Allies almost re-ignited war. Prussia and Russia had signed the Treaty of Kalisch in February 1813, promising to deliver as spoils of victory, Poland to Russia and Saxony to Prussia. Alarmed at the military advantages these territorial gains would confer, Britain and Austria refused to accept the Treaty. When the signatories, threatened war to protect their treaty rights, Britain and Austria signed a not-so-secret treaty with France on January 3, 1815. Prussia and Russia quickly relinquished their position. These events emphasized the crucial role

of France in the balance of power; and on January 9, France was recognized as one of the five great powers at the Congress of Vienna (Chapman, 1998).

While the Allies negotiated, Napoleon escaped from his imprisonment on Elba on March 1 and began a military re-mobilization. Napoleon's "Hundred Days" threatened to re-establish French hegemony. After Waterloo, Napoleon abdicated a second time on June 22 and was sent in exile to St. Helena, far from France. Upon Louis XVIII's return a "white terror" was visited upon Jacobins and Bonapartists, and elections returned a vengeful ultra-monarchist legislature. The Allies were not inclined to be so generous a second time. Instead of the quick 1814 evacuation, an army of occupation of 1.2 million was encamped on French soil to be paid for by requisitions and French funds.¹ While they were appalled by the fact that the French had rallied to Napoleon, the Allies still believed that a balance of power in Europe with a stable, reasonably strong French state was necessary for peace. Reparations now became part of a tougher peace package, assessing a penalty for threatening the new European order and a deterrent against future ventures. Payment of reparations was also an incentive, whose fulfillment would allow France to resume its role as a great power in the management of European affairs.

On September 20, 1815, the Allies delivered an ultimatum to the French government for a new peace. With a few modifications giving the once again restored Bourbon monarchy a fig leaf of bargaining power, it became the basis for a new treaty (Veve, 1992). The Second Treaty of Paris was signed on November 20, 1815. Its design

¹ To meet France's financial obligations to the Allies, the government levied a forced loan of 100 million francs on the wealthy (Jardin and Tudesq, 1983; Wolff, 1962; and Marion, Vol. IV, 1914).

reflected the Allies' efforts to guarantee that France play its assigned role in the new balance of power. To better contain any further aggression, France was reduced to her borders of January 1, 1790, losing 5,000 square kilometers of strategic frontier (Chapman, 1998). War reparations for the Hundred Days were set at 700 million francs. This figure was a compromise between the Allies original demand of 800 million and France's offer of 600 million francs (Marion, Vol. IV, 1914). The reparations were to be paid in five years in fifteen installments of 46,666,666 francs, every four months, beginning December 1815. They would be paid in bearer notes that had an interest rate of 5 percent, in the event that immediate payment was not forthcoming (Vuhrer, 1886; Nicolle, 1929). When France was declared completely free of this obligation in September 1821, the total sum of payments and interest amounted to 701.7 million francs (Vuhrer, 1886; Fachan, 1904).

The new government was also obliged to pay for the cost of the Allied occupation of 1815 and wartime damages to allied nationals. The treaty set the cost of the 1815 occupation at 180 million francs. Potential claimants for damages were required to submit their claims by March 1, 1817 (Nicolle, 1929).² Citing the Anglo-French Treaty of 1786, the British had refused to accept France's default on the prewar debt and demanded that all its subjects holding French securities as of January 1, 1793 be compensated for the principal and the interest in arrears. A mixed British-French commission examined the claims and found a total debt of 60 million francs owed to British subjects. The continental claims represented the requisitions and borrowings. Austria presented claims of 189 million francs, Prussia 132 million, Spain 262 million, Britain 170 million, and the remaining

continental states—mostly German principalities—691 million francs (Nicolle, 1929).³

Surprised by these claims totalling over 1.5 billion francs, the French protested they were highly exaggerated, including even demands for repayment of seventeenth century debts. The French lobbied the Russian Tsar who persuaded the Allies to create a special commission. Headed by the Duke of Wellington, the claims were reduced to 320.8 million francs (Nicholle, 1929, Vuhrrer, 1886; and Fachan, 1904). This claim was grudgingly accepted by the French legislature in May 1818, which greeted the proposal with an "éloquent silence d'une noble résignation" (Vuhrrer, 1886).

To ensure compliance with the treaty, military and financial penalties were created. Part of northern and eastern France would to be occupied by an army of 150,000 men for five years. The zone of occupation stretched from Calais to the Swiss border with a demilitarized zone between the occupied departments and the French Army. If payments were made ahead of schedule, the occupation force could be reduced to 100,000 men and the occupation could end in three years. The cost of occupation was set at 3 francs per soldier per day or approximately 150 million francs per year.⁴ As a financial guarantee, the Allied mixed commission supervising the reparations was given 7 million francs of rentes (5 percent consols), representing a capital of 140 million francs, which could be sold in the event of non-payment (Nicolle, 1929). Half of these rentes served as a guarantee for British debts and half for continental debts. The French were induced to deliver these

2 The Second Treaty of Paris required looted art treasures to be returned (Chapman, 1998).

3 The German states were apparently goaded to increase their demands at the behest of Prussia.

4 The occupation costs were composed of 50 million francs for salaries of the army, plus 100 million for rations, forage and lodging.

securities by January 1, 1816 to secure the prompt return of the colonies of Martinique and Guadeloupe (Nervo, 1865).

Table 1
Reparations
(millions of francs)

	Treaty Requirements	Actual Payments
War Reparations for the Hundred Days	700	685.8
Indemnity to Allied Nationals	320.8	320.8
Occupation Costs for 1815	180	180
Annual Occupation Costs 3 to 5 Years	450 to 750	453
Interest Penalties and Arrears		16.8
Additional Indemnity to Foreign Nationals		180.4
Additional Occupation Costs		26.7
Total	1,650 to 1,950	1863.5

Source: Nicolle (1929), pp. 186-189. Nicolle lists the total final cost at 1,906 million francs. Here the foregone 42.5 million francs of foreign debts held by the French are omitted.

Table 1 presents the reparations as ordered by the Second Treaty of Paris. Total reparations were composed of reparations for the Hundred Days, indemnities to Allied nationals, the cost of the 1815 occupation, and annual occupation costs of 150 million for three to five years. The expected total cost without penalties or delays would amount to between 1,650 million and 1,950 million francs. When the duc de Richelieu, the Crown's chief minister took the treaty to the legislature, the ultra-royalist majority was appalled that the new Bourbon France would have to pay for Napoleon's sins. But, they accepted the king's plea to support the treaty---if only because the Allies had promised to support the new regime against any future revolutionary convulsion.

As seen in Table 1, the total actual payments were somewhat below the maximum.

War reparations were reduced by 15 million because of early payment, but there were 800,000 additional francs paid to the counts of Bentheim and Steinfurt. Interest penalties and arrears added another 16.8 million. Damages to foreigners were increased by 180.4 million, and exit of foreign troops required further costs of 26.7 million. The total reparations bill paid by the French thus totalled 1,863.5 million francs.

However, reparations were not France's only contentious obligations. There were substantial budgetary arrears, arising from the last disastrous years of the Napoleonic era and 1815 and 1816, plus claims for compensation by royalist émigrés. The Crown settled the arrears with the laws of April 28, 1816 and March 25, 1817, which ordered the issue of notes that would be exchanged for rentes in five installments as determined by a lottery, beginning on January 1, 1821. On March 15, 1818, a limit of 61.8 million francs was set for the debts of 1801 to 1810 and 297.6 million francs for the debts of 1810 to 1816. The claims of the émigrés for their properties lost during the Revolution were settled in 1825 with the creation of 3 percent rentes for one billion francs. These debts were thus pushed into the future while the government struggled to pay reparations.

2. How the Reparations Were Financed

Once the total reparations claims were settled, the problem that faced the restored monarchy was how to manage their payment. As Richelieu conceded, the policy of fulfillment of the treaty obligations was not one "likely to foster love for the family that has been given back to France" (Jardin and Tudesq, 1983, p. 42). To make the payments that would allow France to rejoin the Great Powers and further her interests on an international

level, domestic discontent about reparations had to be minimized. Louis XVIII's ministers groped for a solution.

If the Crown had been the representative agent of a nation of consumers maximizing utility over an infinite horizon at a constant rate of time preference and no borrowing constraints, the optimal method of financing such an international transfer, according to a simple modern intertemporal macroeconomic model (Obstfeld and Rogoff, 1995), would have been an international loan. France would have borrowed the whole sum of reparations abroad and reduced consumption by the amount needed to finance the interest owed on the permanent increase in the debt. However, this consumption smoothing policy was not what Louis XVIII's ministers first tried. Instead, they initially attempted to make the reparations payments out of the current budget.

The treaty had been signed on November 20, 1815, and the French were obligated to make the 180 million franc payment for the Hundred Days before the end of the year. In spite of the war, the Crown had managed to collect substantial taxes as seen in Table 2, which reports the government's revenues, expenditures and borrowing for 1815 to 1820. If there had been no reparations and no forced loans, the budget would have been roughly in balance with revenues of 615.3 million francs and expenditures of 618.6 million francs.

The latter rose to 798.6 million by the 180 million franc indemnity. Borrowing to finance this deficit was expensive as the collapse of the Empire threatened the credibility of government borrowing. Napoleon had reestablished France's credit after the Revolution's default in 1797 by balancing the budget, returning to the bimetallic standard, and establishing the Banque de France. These reforms permitted the resumption of payments

Table 2
Government Budgets
(millions of francs)

	1815	1816	1817	1818	1819	1820
Revenues						
Total	708	742.7	765.5	920.2	868.3	744.2
Direct Contributions	320	346.6	358.3	363	342	311.8
Indirect Contributions	89.1	95.2	101.5	176.5	190	140
Customs	70.6	70.5	86.4	114.5	113	85.3
Registration and Domain Lands	107	168.8	154.2	169.7	165.3	147
Forced Loan	92.7					
Land Sales			25.6	23.4	18.3	14
Other	28.6	61.6	39.5	73.1	39.7	46.1
Expenditures						
Total	798.6	895.6	1036.8	1414.4	863.9	742.6
Regular Expenditures	426.3	386.6	467.9	451.7	424.9	425.4
Pensions	43.4	44.4	44.4	63.7	66.9	66.5
Total Interest	148.9	165.7	171.5	174.6	202.8	210.7
Consolidated Debt Interest	130.9	133.8	133.1	149.5	184.8	184.7
Short-term Debt Interest	18	31.9	38.4	25.1	18	26
Amortization	0	20	40	40	40	40
Occupation Troops	180	138.1	173	141.9		
War Reparations	0	140.8	140	405		
Other Reparations Payments				137.5	129.3	
Loan Receipts	35.8	69.8	353	462.9		
Security Bonds		65.1				
Surplus/Deficit	-90.6	-152.9	-271.3	-494.2	4.4	1.6

Source: Mallez (1927), Séguin (1824).

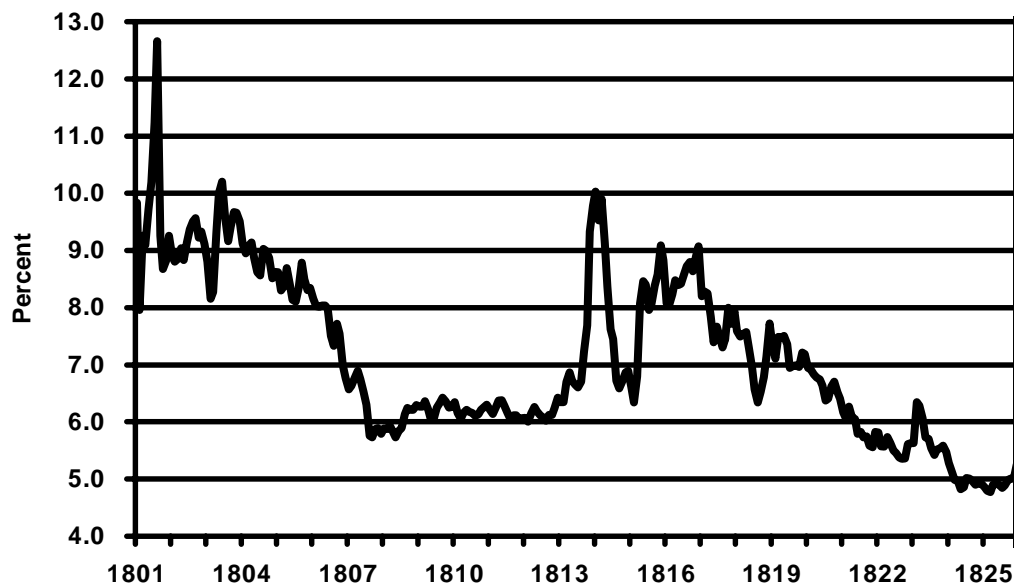
Notes: The forced loan is treated as a tax. The 320.8 million payment to Allied nationals was an off budget issue of rentes. Other payment of obligations in rentes were off budget. The budgets are not easily compared. For 1818 and 1819, the expenses of the Ministry of Finance were combined with some interest payments and some reparations payments. The other reparations payments were imputed by subtracting the expected payments on surety bonds and 26 million representing the typical expenditures of the ministry in other years, including the Empire. This method of imputation probably results in an underestimate of the short-term interest costs.

on the debt in 1800, which were faithfully maintained for the duration of his reign (White, 1995). The market's confidence was reflected in the decline in the yield on the rentes (5 percent consols) in Figure 1. Military failure in Russia, funded by unpaid bills drove up the yield from 6 to 10 percent. The yield declined briefly during the First Restoration and then remained above 8 percent after the Hundred Days and the return of the Bourbons. Facing huge budgetary arrears, certain reparation claims, demands by the émigrés, and disputes over what debts to honor, the Crown sold rentes in 1815 . At 51.23 francs on a face value of 100, the loan produced 35.8 million francs with a yield of 9.8 percent (Calmon, 1870). In addition, the government to impose a forced loan of 100 million francs on the wealthiest taxpayers that yielded revenues of 92.7 million. There remained a deficit of 54.8 million on the books, reflecting expenditures whose payment was in arrears and to be made at some future date.

The following year, 1816, the French were expected to pay 150 million francs to maintain the occupation forces and 140 million francs, representing the first of five annual payments on the 700 million franc reparations. Expenditures for most government departments were cut, the king returned 10 million on his civil list, officials salaries were cut, and taxes, especially indirect taxes, were raised (Mallez, 1927). With revenues at 742.7 million, there would have been huge surplus in the absence of reparations, with other expenditures totaling a mere 605.6 million. The first two payments of 46,666,666 francs due on March 31 and July 31 were paid on time (Vuhner, 1886). Yet, the French Treasury experienced great difficulty in maintaining payments. The situation was aggravated by an exceptionally bad harvest in 1816 that lowered the yield on taxes and forced the

government to subsidize the price of bread (Bertier de Sauvigny, 1955; Mallez, 1927).

Figure 1
Yield on the French 5 Percent Rentes



Source: Bourse de Paris, Cotes officielles.

The Crown recognized the importance of foreign credit and obtained a small loan from bankers in London and Hamburg in April 1816, raising 69.8 million. But, the market was not receptive to any large loans. When an emissary was sent to Alexander Baring in London to investigate the possibility of a major loan, he was rebuffed. The British were alarmed by the extremist behavior of the ultra-royalist Chamber of Deputies, which threatened default on some debts as part of its reactionary program. Baring dismissed the “crazy ideas” of the Chamber (Mallez, 1927, p. 157). The government turned to expensive short term borrowing in the form of treasury bonds (bonds du Trésor) at 12 percent

(Nicolle, 1929). Advances were also demanded from the tax collection agents (the receveurs généraux), and the interest paying security bonds posted by these officials were increased by 65.1 million. In spite of these measures, there were still budgetary arrears to be carried into future years.

Frustrated by the Intransigent (“Introuvable”) Chamber, Louis XVIII dissolved it on September 5. A new election brought a more liberal legislature and one more favorable to the Crown’s plans (Jardin and Tudesq, 1983; Bertier de Sauvigny, 1955). But, the impasse ended too late. The third payment was due at the end of November. Missing the deadline, the Crown announced on December 7, 1816 that it would suspend payment and issue notes that would be paid off by the end of the year with 5 percent interest. Pleading poverty, the French government then asked for a reduction in the occupation forces to lower costs but was refused. When the Army of Occupation was unable to buy sufficient forage, it was forced to cancel some maneuvers. Pressure on the French increased. Wellington allowed the number of troops to rise to 157,000, while the more militant Allies demanded a rapid increase.

The theoretically less than optimal policy of paying as you go proved to be politically infeasible as taxation and expenditure could not be adjusted enough to generate the requisite budget surplus. The government began a search for new credits. French investors did not seem like a source, as it was assumed that they had been impoverished by the Revolution and Empire, and French bankers ridiculed the idea of a loan. The banker Jacques Laffitte told the Russian ambassador that France would not find a single écu to borrow anywhere in Europe (Nicolle, 1929). The finance minister, Louis-Emmanuel

comte de Corvetto considered a forced loan or notes backed by land, but a solution only appeared when the French financial entrepreneur, Gabriel-Julien Ouvrard offered to arrange a large foreign loan (Nicolle, 1929; Wolff, 1962). Ouvrard found out that Baring Brothers and the Dutch firm of Hope & Company were now interested in underwriting a reparations loan. Alexander Baring held extensive meetings with Castlereagh and other British cabinet ministers about his consortium's plans. They were pleased that the loan would be underwritten by a strong bank. The Duke of Wellington was convinced of the soundness of this plan and agreed to persuade the other Allies that there should be an early reduction of troops, something he had only recently dismissed.

On February 9, 1817 Baring and the head of Hope & Company, Pierre-César Labouchère presented their proposal to a special conference of ministers and received the Allies' approval. The accord would permit the timely payment of the indemnity, and in an annex to the protocol a reduction of 30,000 troops was ordered on April 1, 1817. The first loan was for 9,090,909 rentes (5 percent consols), which at the then market price of 55 francs for each coupon of 5 francs would raise a capital sum of 100 million. The bankers would receive a commission of 2 ½ percent on the nominal value (181.8 million) of the loan or 4,545,454 francs deducted from the 100 million owed to the government. When the Chamber of Deputies and Chamber of Peers were informed of the accord, they received the news with an ovation (Nicolle, 1929). On February 10, 1817, the first tranche of the loan was issued. By April, approximately 93 million francs of the 100 million franc loan had been purchased in London, Amsterdam, and Paris. The rentes were sold at an average price of 57.97 francs for 100 francs face value, with an implicit yield of 8.625 percent, very

close to the market price on existing debt. Although the distribution of later loans is unknown, the placement of most of this first issue is preserved in the records of Hope & Company (Gemeetearchief Amsterdam). This information is presented in Table 3.

Table 3
First Reparation Loan 100 Million Francs

	<i>Sales February to April 1817 (French francs)</i>	<i>Share of Total</i>	<i>Yield</i>
Total	93,495,877	100.0	8.62
Total Sold in Paris	53,888,032	57.6	8.41
On the Bourse	46,412,382	49.6	8.40
Off the Bourse	7,475,650	8.0	8.49
Sold in London	27,477,845	29.4	8.84
Sold in Amsterdam	12,130,000	13.0	9.07

Source: Hope & Company, Amsterdam Gemeenteschiv Archiv, 1er Emprunt de 100 Millions pour 1817.

Opened in February, the 100 million franc loan had almost sold out by April 1817. Most of the debt, nearly 58 percent, was taken by the French market. The remainder was sold by Baring Brothers in London (29 percent) and Hope and Company in Amsterdam (13 percent). Although there may have been some repatriation of the debt, a considerable fraction did remain in foreign hands. One sliver of evidence is the probate records of one very savvy English investor, David Ricardo, who held 128,350 rentes or approximately 11.7 million francs at his death.⁵

The bankers made out handsomely, selling the whole issue eventually for 108.3

⁵ The 128,350 rentes were sold in October and November 1823 when the rente averaged 90.90 francs on a nominal capital of 100 francs. Such a sale would have yielded 11,668,182 francs. Sales of the 128,350 rentes and 450 shares in the Banque de France yielded the estate of Ricardo 117,159 pounds sterling. I am indebted to Peter Lindert for this extraordinary bit of sleuthing.

million francs for a total profit of 12.7 million francs (Hope & Company, Gemeentearchief Amsterdam). The market became sanguine following this successful loan enabling the reparations payments, and the price of the rentes on the bourse rose. Barings and Hope quickly followed up this success and obtained new contracts for further debt issues to continue reparations payments. On March 11, 1817, an agreement was signed to issue another 100 million francs; followed by 115.2 million on July 22, 1817. The opposition by French bankers was tamed by including selected French houses in the new syndicates. Payment of reparations now appeared to be easy. As seen in Table 2, tax receipts for 1817 rose slightly, but loan receipts at 353 million francs exceeded the deficit of 271 million, even though non-reparations expenditures had increased. By 1818, higher indirect taxes, land sales and other income pushed up revenues, which combined with loans of 462.9 million francs, covered the substantial reparations payments. The government felt so confident that the market was hospitable that it bypassed the foreign banking houses to borrow directly. On May 9, 1818, the government opened its own subscription for 292 million francs. When closed on May 27, it had been oversubscribed (Nicolle, 1929). The merit of funding reparations by debt issue was now widely appreciated. One financial observer (Séguin, 1818) wrote: "our liberation by the issue of rentes was of all methods the most desirable and convenient."

The success of these issues allowed for the quick settlement of reparations and a final peace settlement at the Congress of Aix-la-Chapelle in September 1818. At this point, France owed the Allies a remainder of 280 million francs, which was reduced to 265 million. After negotiations, it was agreed that the Barings and Hope would deliver 165

million francs in bills of exchange in nine monthly installments beginning January 6, 1819; and the French government would complete the payment by giving one hundred million francs in rentes to the Allies (Wolff, 1962; Jardin and Tudesq, 1983). This arrangement permitted the complete withdrawal of Allied troops from French soil on November 30, 1818, finishing the occupation in three instead of five years. However, the final agreement almost fell apart. The Banque de France had abetted the rise in the rentes, by offering discounts of 100 million francs. The sharp fall in the yield is seen in Figure 1. The high price of the rentes encouraged a speedy conclusion to the conference.⁶ But, when the Banque tightened credit, the price collapsed, provoking widespread losses. Negotiated at a high price, Barings and Hope could not sell their bonds on the market. Angry at possible delay in payment, the Prussians argued that occupation already underway should be halted. Instead, the bankers were given 18 months to deliver the proceeds from the sales of the rentes with a 5 percent interest penalty. The market recovered and payments were completed by June 1820 (Mallez, 1927).

The budget for 1820, shown in Table 2 reveals that long term rise in taxes plus reduction in expenditures were sufficient to cover the total rise in interest from the loans acquired to pay for reparations. The additions to debt were substantial and reparations only represented part of the total financial clean-up. Table 4 sets out the increases to the funded French debt---the inscriptions in the Grand Livre de la Dette Publique. At the end

⁶ Once the obligation to pay 100 million in rentes was determined, there was an incentive to push up the price to lower the future interest cost to the Treasury. A savvy Dutch speculator attempted to corner the market for the future delivery of rentes. To thwart the corner, the Banque tightened credit. The corner failed to the ruin of many market participants, in spite of the Treasury's efforts at a bailout (Nicolle, 1929;

of the Empire, the total debt had stood at 1,266 million francs, costing the Treasury 63.6 million francs annually. Between 1815 and 1821, new rentes were issued to pay for reparations to Allied governments and indemnities to Allied subjects and for previous and current budget deficits. According to Vuhrer (1886), this borrowing raised the total debt to 4,173.9 million francs which cost the Treasury 238.8 million francs each year.

Table 4
French Funded Debt

	<i>Debt</i>	<i>Interest Cost</i>
Funded Debt April 1, 1814	1,266,152,740	63,307,637
Reparations	1,216,430,322	67,341,021
Indemnities to Allied Subjects	469,115,760	24,255,822
Budget Arrears Before 1816	580,772,653	31,275,130
Budget Deficits 1816-1818	641,388,095	52,600,000
Funded Debt 1821	4,173,859,570	238,779,610

Source: Vuhrer (1886), pp. 151ff.

Although large foreign loans were employed, France's management of its post 1815 reparations only approximated the simple optimal policy of borrowing the whole sum abroad. The final total cost of reparations was 1863.5 million francs. Borrowing reported in Table 2, plus the subsequent Barings and Hope Loan of 165 million, the payment of 100 million francs in rentes, plus the compensation to Allied nationals of 320.8 million francs in rentes totalled 1507.3 million. Taxes for 1817 to 1819 in excess of non-reparation years' revenues (740 million) provided another 308 million francs, yielding total funds of 1815 million francs. Additional off budget items hidden by the primitive state of financial records

Nervo, 1865).

covered the remainder. Thus, all but 17 to 20 percent was provided by borrowing. However, apparently about half of the loans were purchased by French investors. This portion of the debt did not act to smooth consumption over time, as a large macroeconomic adjustment in savings and investment was required to generate the requisite export surplus to make the reparations payments. Consequently, France's payment of reparations after 1815 was a combination of large-scale immediate payment and borrowing to smooth consumption. As such it differed from other episodes of reparations, and comparisons of the relative magnitudes need to take the means of payment into account.

The Burden of Reparations

The first serious debate on the burden that a large transfer would have on an economy grew out of the struggle over the post World War I German reparations. Discussion of the "transfer problem" became focused on the misleading claim that the primary burden of reparations would create a calamitous secondary burden when the paying nation suffered a deterioration in the terms of trade when attempting to make payment of its obligations. John Maynard Keynes (1929) and others, including A.C. Pigou, D. H. Robertson, Frank Taussig and Jacob Viner (see Chacholiades, 1978) subscribed to this "orthodox position." They held that there would be a severe deterioration in the terms of trade for Germany that would make reparations unpayable.

In contrast, Bertil Ohlin (1929) and his supporters, who declared their position to be the "modern position," argued that there was no a priori reason for the terms of trade to deteriorate. The lack of a unified technical analysis led to a confusing and inconclusive

debate until Paul Samuelson's (1952, 1954) reformulation of the problem, where he concluded that there was no presumption for the orthodox position. His work and subsequent research showed that in a two country, two good model, assuming that the equilibrium is unique and stable, the terms of trade will improve or deteriorate for the transferor depending on whether the sum of the marginal propensities to import are greater or less than one.⁷ Identical tastes result in no change in the terms of trade, but a bias in tastes towards imports will improve the terms of trade for the transferor.

The Keynesian revolution cast the transfer problem in a Keynesian macroeconomic model with unemployment and constant prices. Here, the current account of the payer moves into deficit while the transfer is effected and the recipient's moves into surplus. No longer did a transfer lead to equal changes in aggregate expenditure in the two countries. There were now multiplier effects that could produce a surplus in the transferor's balance of trade smaller, larger or equal to the transfer, depending on the consumption and import propensities with consequent changes in national income (see Chacholiades, 1978). Once the transfer is complete the trade balance and current account should return to their original levels. More recently, this macroeconomic analysis has been superseded by the intertemporal approach (Obstfeld and Rogoff, 1995) that emphasizes the changes in permanent consumption by forward-looking individuals. In a model based on the permanent income hypothesis, with infinite-horizon consumers with a constant rate of time preference and no borrowing constraints, a transfer financed wholly by borrowing will

⁷The presence of tariffs creates a presumption in favor of the orthodox view, while transport costs do not favor it (Chacholiades, 1978). In a two good, multi-country setting, Dixit (1983) has shown that there is no strong

reduce consumption by the amount needed to finance the interest owed on the permanent increase in the debt. Temporary terms of trade shocks cause a current account deficit, but a permanent shock produces an immediate shift to a lower consumption level consistent with external balance.⁸

The general theoretical view is that the secondary burden is minor. Consequently, this section will thus only focus on the size of the primary burden of reparations as determined by treaty, that is the expected not the actual reparations paid, as this was the source of debate. How big was the post-Napoleonic reparations burden and how does this burden compare with that placed on Germany after World War I or other reparations? The surprising answer is that they were among the largest reparations imposed in the nineteenth and twentieth centuries, and they were of a similar order of magnitude in terms of the burden imposed on the economy to those levied on Germany. Table 5 offers a comparison of the Napoleonic reparations with other important episodes.

France's post-Napoleonic obligations depended on the speed of payment. If foreign troops departed in three years, the reparations would be 1.65 billion francs. If the occupation were to endure the full five years, reparations would be 1.95 billion francs. There are some recent estimates of GDP that permit a measurement of this burden relative to national income. Lévy-Léboyer and Bourguignon (1985, Table 7.6) calculated

reason to presume that there would be a severe deterioration.

⁸Surveying the literature, Gavin (1997) found that relaxation of the strong assumptions required by the model produces ambiguous results. Obstfeld and Rogoff (1995, pp. 1758-9) provide an example where a transfer produces a deterioration in the terms of trade because the receiving country spends some of its windfall on leisure, reducing the output of its exportable and producing a rise in its relative price.

GDP for the 1820s averaged 9,119 million francs per year.⁹ Toutain (1997, Tables 1 and 17b) estimated that GDP averaged 9,233 million francs for the period 1815-1824. As these figures are very close, a value of 9.2 billion francs is used as a measure of GDP.

Depending on the speed of payment, reparations represented 18 to 21 percent of one year's GDP. Spread evenly over three years, they would require an annual transfer of 6 to 7 percent of national income or over five years a transfer of 3.6 to 4.3 percent per year.

The government's tax revenues for the 1815-1825 averaged 845 million francs (Mallez, 1927), so reparations were the equivalent of 195 to 231 percent of annual government revenues. Spread over three or five years reparations would have represented 65 to 77 percent or 39 to 46 percent of yearly taxes. Levy-Leboyer and Bourguignon estimate that French exports in 1820s average 449 million francs (Table A-III). Reparations were thus approximately 367 to 434 percent of one year's exports. Over three years, payments would have been equal to 122 to 145 percent of exports and over five years, 73 to 87 percent.

Table 5

⁹ GDP for 1820 was 9011 million francs and showed no trend for the decade.

A Comparison of Reparations

	<i>Reparations Costs Low to High (millions)</i>	<i>Percent of One Year's GDP or GNP</i>	<i>Percent of One Year's Taxes</i>	<i>Percent of One Year's Exports</i>	<i>Share of Debt Service to GDP</i>	<i>Share of Debt Service to Exports</i>
France 1815-1819	1650 to 1950 FF	18 to 21	195 to 231	367 to 434	1.2 to 1.4	24 to 28
France 1871	5000 FF	25	201	167	0.7	6.3
Germany 1923-1931	50000 DM	83	350	500	2.5	14
Germany 1953-1965	5227 US\$	7.7	39.0	32.9	0.1	0.4
Italy 1947-1965	366 US\$	1.1	7.9	13.3	0.0	0.4
Japan 1955-1965	1486 US\$	3.0	10.6	34.6	0.1	0.8

Sources: See text.

Obviously, a total transfer of this magnitude in three or five years would have placed an extraordinary burden on the economy, and it was smoothed by some borrowing from abroad. If reparations loans were financed wholly by loans purchased abroad, reparations would have become a foreign debt and the burden of reparations would have been the requirement to service this debt. A country's capacity to pay or solvency may be measured as the fraction of a country's income or exports that must be devoted to service the debt, where the country simply pays interest on the debt and rolls over the principal or the debt is in the form of consols (Cohen, 1985). The burden, or the share of GNP or exports required to service the reparation debt is:

$$(1) \quad b = (r - n)D/(1+n)X$$

where r is the real rate of interest, n is the growth rate of GNP, D is the debt, and X is the

GNP or exports. The growth rate estimated by O'Brien and Keyder (1978) for the eighteenth century was about 1 percent and for the early nineteenth century about 1.4 percent. Toutain (1997, Table 4) found a growth rate for GDP of 1.4 percent for 1815-1824, and this higher figure is used.¹⁰ A rate of 7.9 percent, the weighted average of the yields on the reparations loans, adjusted for commissions and fees (Nicolle, 1929; Wolff 1962) is used as the interest rate. Employing the data selected above for income, exports and the two measures of debt, b is calculated to be 1.2 to 1.4 percent of GDP and 24 to 28 percent of exports. The burden of Napoleonic reparations, if funded this way, is high because of the low growth rate, high interest rate, and small ratio of exports to GDP.¹¹ Actual funding of 1.8 billion francs of reparations was made by a mix of direct payment over three years and issuing consols, sold at home and abroad.

This accomplishment needs to be compared to other reparations. France incurred reparations a second time, following her defeat in the Franco-Prussian War in 1871. The 1871 indemnity paid to Germany was set at 5 billion francs. Reparations were funded by issuing two loans that enabled France to finish payments six months ahead of schedule in 1873. Approximately, half of the loans were purchased by foreign subscriptions.¹² French reparations were the equivalent of about 25 percent of France's 1871 GNP, two years of government revenue, or 1 and 2/3 times her annual exports (Gavin, 1992, 1997). By these measures, the burden seems very similar to 1815, except for exports, as the

¹⁰ Toutain's growth rate averaged 1.4 percent for the first half of the century, 1803-1854.

¹¹ Cohen (1985) calculated the index to be 13 percent of exports for Latin American countries in 1984.

¹² Machlup reports that (1976) reports that most of the bonds were repurchased by French investors in subsequent years.

share of exports in the economy had risen. France experienced low growth in the late nineteenth century, estimated at 0.8 percent by Lévy-Léboyer and Bourguignon (1985, p. 6) and 1.2 percent by Toutain (1997, Table 4), while the consol rate averaged 4.4 percent for the decade of the 1870s (Homer and Sylla, 1996, Table 25). Even though growth was low, the low interest rate, puts the share of GDP needed to service the reparations debt at 0.7 percent and 6.3 percent of exports. The expected primary burden when funded by foreign borrowing is thus significantly smaller than for the post 1815 reparations. The French again chose less than full consumption smoothing, as half of the bonds were purchased domestically, requiring a large immediate transfer. Shortly after reparations began, the French trade surplus swung into surplus by approximately one billion francs per year for the period 1872-1877 before returning to a deficit. This surplus was sufficient to finance the immediate required transfer.

Germany's post-World War I reparations are usually assumed to have been the largest ever levied on a defeated nation. The Allies' Reparations Commission set German reparations at 132 billion gold marks or \$33 billion dollars in May 1921. However, this figure was the maximum that was expected and most experts held that the actual obligation would be lower. The reparations bonds were divided into three categories, A, B and C, with A and B worth 50 billion having priority. The C bonds imposed no immediate cost, as the Reparations Commission was empowered only to issue these securities when Germany was deemed sufficiently prosperous. The consensus was that the C bonds would not be issued. The London Schedule of payments of 2 billion marks a year plus 26 percent of exports was approximately what was required to pay the interest on the A and

B bonds (Shucker, 1988).

Table 5 presents estimates of the burden for the lower de facto figure for reparations. Using German national income, tax revenue and exports for 1925-26, reparations were equal to 83 percent of one year's national income, 350 percent of tax revenues, and 500 percent of exports. No immediate transfer of this kind was attempted and instead the obligation was financed by foreign borrowing, with apparently little if any purchased by Germans.¹³ The burden was therefore entirely one of financing the interest and amortization of the debt. As reported in Table 5, Klug (1990) measured this burden and found that the country would have had to devote 2.5 percent of GNP or 14 percent of exports to service the reparations debt.¹⁴ In contrast to the French of 1815 and 1871, the Germans chose to smooth consumption by borrowing the whole sum abroad. Given this choice, it is difficult to compare episodes. But, if the French had not made their early large transfers and opted for long term payment, the German reparations would be larger than the French reparations of 1871 in terms of both income and exports. They would have been larger than the French obligations of 1815 in terms of GDP but smaller in terms of exports. However, the Germans never made such a substantial transfer. Weimar Germany borrowed considerably more than it was obliged to pay (see Machlup 1976 and Schucker, 1988), and upon default effected a reverse reparations, raising not lower consumption.

¹³ The hyperinflation had virtually eliminated all domestic and foreign debts (Holtfrerich, 1986), in contrast to the two French cases where there was already a substantial national debt.

¹⁴ Klug (1990) used the average actual interest rate of 4.4 percent and growth rate of 2.4 percent. The burden would obviously be higher in earlier years. Thus, this figure is consistent with the Reparations

After World War II, reparations payments were imposed on the Axis powers. Cohen (1968) surveyed the size and timing of payments. The Federal Republic of Germany paid US\$ 5,277 million in reparations, indemnities and restitutions, of which US\$ 839 million was paid to Israel.¹⁵ Italy paid reparations of US\$ 366 million, principally to Greece, Yugoslavia, France, and Ethiopia. Originally, Japan was scheduled to deliver reparations and economic aid of US\$ 1,486 million to Burma, the Philippines, Indonesia, South Vietnam, Laos, Cambodia, Thailand and South Korea, but only made total payments of US\$606 million.¹⁶ None of these post-World War II reparations imposed a significant burden. As seen in Table 5, reparations were considerably lower than previous reparations when measured as a percentage of one year's GNP or GDP, central government's taxes or exports.¹⁷ One year is, of course, not the appropriate measure as these payments were made over a period of a decade at minimum. Furthermore, Germany, Italy and Japan all benefited considerably from American economic and military assistance, mitigating if not eliminating the effects of the transfer. For Germany, these remittances were a small fraction of total reparations; but in the case of Japan, the receipts roughly equaled its obligations. Aid to Italy exceeded its reparations payments by nearly 10 times. These reparations were not financed by borrowing, however, for purposes of comparison, if instead of paying the reparations directly, the former Axis powers had followed their predecessors and had financed the payment of reparations by borrowing internationally the

Commission's estimate that financing would require 5.37 percent of 1921 national income (Schuker, 1988, p. 17-18).

¹⁵ The original estimates for payments were lower and some programs were still in operation when Cohen wrote. Cohen (1968). Pp. 271-2.

cost of the debt service would have been minimal, as seen in Table 5.¹⁸ Rapid economic growth and relatively low interest rates made the burden a light one, especially when compensated by foreign aid. The payment of reparations by the French in 1815 and 1871 thus appear even more impressive compared to the failure of Germany to pay after World War I and the minimal reparations after World War II.

How the French Were Induced to Pay in 1815

The post 1815 French reparations were the largest reparations, in terms of the burden on the economy, that were actually paid. These reparations were a key part of the program engineered principally by Castlereagh and Metternich to establish a balance of power that would guarantee European peace. To create this “just equilibrium,” France had to be readmitted to the concert of great powers, with the qualification that she was not too weak or aggrieved nor too strong. As a great power, France would have a say in international affairs again, which was apparent when Britain and Austria temporarily allied with her in January 1815. On the other hand, there had to be limits to France’s exercise of power. Reparations were a punishment for transgressing those limits in 1815 and an incentive to quickly complete internal reforms under the vigilance of Allied occupation.

The Second Treaty of Paris created a contract that offered two incentives to produce timely payment of reparations. First, there was the military threat and its cost. The Allied troops stationed in France were a guarantee that there would be no new

¹⁶ By 1965, Japan had only paid \$606 million of its reparations.

¹⁷ Data on GDP, Exports and Taxes were supplied by Mitchell (1978, 1998) and Maddison (1991).

remobilization of French troops and reoccupation could be accomplished quickly if there was a breach of the contract. This threat was exercised once when troops increased to 157,000, raising occupation costs. Particularly sensitive to any French resistance, the Prussians demanded increases in troops or delays in withdrawals on several occasions. There was an inducement for the French to pay quickly to reduce the period of occupation from five to three years, regaining territory and lowering the cost of reparations by at least 300 million francs. Secondly, there was a financial threat in the form of 7 million 5 percent rentes, which had a nominal value of 140 million francs, in the hands of the Allied commissioners. If the French failed to make a payment, these bonds were to be sold at the market price to cover the shortage. At the outset, this would have been a substantial addition of more than 10 percent to the funded debt.

Of these two incentives, the military threat was probably sufficient to guarantee compliance given the penalty that it imposed. Excluding any costs that the occupation imposed on the French state (damage by troops or injured national pride), the cost of 150 million francs per year was substantial. We may think of this yearly transfer to foreign forces as a deadweight loss imposed on the French with no real benefit to the occupiers (Bulow, 1992). The 150 million francs was modest but the correct penalty, considering the alternative: if the French immediately borrowed the whole sum of reparations and made annual payments of the interest, the interest cost would have been less. If the French borrowed 1650 million francs at the outset at 8 percent, then the costs would have been an annual payment of 132 million francs and they would be free of the occupation. The

18 Interest rate data was obtained from Homer and Sylla (1996).

Allies may have calculated the cost carefully and were watchful not to alter the incentives.

One threat came from the claims from Allied nationals, which had to be kept reasonable---320.8 million not 1.5 billion francs. If this higher sum were used, it would have added an additional annual charge at 8 percent of 120 million francs. The French would have had less reason to settle in a timely fashion when they could suffer an occupation for 150 million per year or incur an annual interest charge of 252 million francs.

Once the French borrowed to repay and foreign troops departed, the question arises why didn't the French then default after occupation ended---excluding the possibility that there could be a re-occupation. Most of the literature on sovereign debt does not have a lot to say about this subject. Much of the literature (Bulow, 1992) treats countries that have borrowed to their limit, which France had not, and it assumes that the debt is totally held abroad, which was not the case for France. A default that hit domestic holders of the rentes would not only have compromised future borrowing by the government and the government itself. The rentiers formed an influential sector of the public and they are very concerned that the inscriptions in the Grand Livre de la Dette Publique were honored. Whatever its financial weaknesses had been, the Empire had faithfully paid interest on the rentes since 1800, a record that the ancien régime might have envied. Defaulting on the widely held rentes would have undermined support for the new Bourbon regime. They were the senior government debt and the restored monarchy always promised to faithfully pay the rentes, as did all opposition groups.

Would it have been possible for the French to discriminate between domestic and foreign lenders in a default? It appears that a selective default was feasible as the rentes

were not bearer bonds. When a bond was transferred, the buyer's name had to be inscribed in the Grand Livre de la Dette Publique---usually carried out by an agent de change (stock broker) who was held accountable.¹⁹ Maintaining a good reputation as a borrower was probably the driving factor blocking a default. As suggested by Grossman and van Huyck (1988), sovereign debt is a contingent debt and payments are maintained because the Crown wants to borrow in the future and it will only partially default in well known bad states of the world. There was no such state of the world, there was a new European peace, and there was no major crisis the Crown could use to justify a default. While the French thus paid to the pleasure of the Allies and the bond holders---foreign and domestic, payment had important consequences for the French economy.

The Consequences of Paying Reparations

Measuring the effects of reparations on the early nineteenth century French economy presents a special challenge, owing the absence of key macroeconomic variables for the period. The earliest data that is available was produced by Lévy-Léboyer and Bourguignon (1985), but their series begin only in 1820. It is also hard to discern the effects of reparations from narrative histories of the period because of the disastrous harvest of 1816 and the poor harvest of 1817. The focus of this literature is not on the consequences of the reparations but on the agricultural disaster. This concentration would suggest that either the effects of reparations were minimal or they were hidden from the

¹⁸. Manual des agents de change, Lois 17 mai 1799 and Lois 27 Prairial An X.

public by the more visible agricultural shortages. If the latter is true, then monarchy may have been spared some blame for accepting costly reparations.

In spite of the postwar dislocations, the period from 1814 until March 1816 has been characterized (Chabert, 1949) as a time of rapid economic recovery in agriculture and industry. There was a good harvest in 1814, followed by a mediocre one, and the initial expectations for 1816 were favorable. But a cold wet spring proved disastrous for France and for the rest of Europe. This bad harvest was followed by another in 1817. The price of most major foodstuffs doubled at minimum, provoking speculation and riots (Bertier de Sauvigny, 1955). Chabert's (1949, p. 264) cost of living index rose from 102.2 in 1814 to 163.7 in 1817 before declining to 100 in 1820. Chabert laid the blame for the industrial crisis on the rise in the price of grain. Throughout France, manufacturers fired workers or cut salaries and hours of work. The government responded to this crisis by importing grain from abroad, subsidizing the price of bread and providing some public works. Good harvests in 1817 and 1818 checked the rise in prices, but the depression continued through 1820. Part of the depression is be attributed to the restriction of credit by the Banque de France in response to a rapid drain in reserves, after the expansion of discounts in 1818, a part of the reparations funding. Discounts had risen 420 million francs in 1816 to 616 million in 1818, only to be reduced to 254 million by 1820 (Courtois, 1881).

During this period, France ran a balance of payments surplus in the reparations years as would be required to effect its transfers. There is a useful comparison offered by Gavin's (1992, 1997) research. He used the balance of payments surplus to examine the effects of the Franco-Prussian war reparations on the French economy. This indemnity

closely resembles the Napoleonic reparations, with borrowing to complete payment in a few years. Gavin pointed out that during the transfer, the French trade account swung into surplus by approximately one billion francs per year for the period 1872-1877 before returning to a deficit---an amount equal to the reparations. Contrary to some optimizing consumption smoothing, there were changes in investment and savings that generated this current account surplus. Using a very simple counterfactual, Gavin found that investment fell by 11 percent from its trend, enough to cover one-third of the reparations with savings by assumption rising to cover the remainder.²⁰ However, he gave the French credit for the whole resource transfer in a few years, in spite of the fact that only half the debt was initially taken by the French. Unless all the debt was immediately repatriated, the current account surplus thus appears to have been too large.

During the payment of the Napoleonic reparations, the balance of payments was also in surplus. The ancien régime had borrowed heavily in foreign markets, and the French had run a trade deficit in the 1780s and in the years 1803-1812 (O'Brien and Keyder, 1978).²¹ However, between 1815 and 1820, the current account swung into surplus, as would be expected from the reparations payments France made. The cumulative surplus was 676 million francs. The immediate transfer made during these years should have been equal to the direct payments (356.2 million) plus the value of the debt purchased by the French less any direct expenditures in France. The three years of

²⁰ Gavin also estimates that the current account surplus was sufficient to restore the net foreign asset position that was depleted by the reparations.

²¹ France had a brief surplus between 1811 and 1814, due primarily to a huge drop in imports. After 1820, France continued to run surpluses until the late 1860s (O'Brien and Keyder, 1978).

occupation, costing 453 million francs, would not have imposed a transfer if all the food and forage had been bought in France and all the pay had been spent there. If it is assumed that half the debt sold (1507.3 million) was acquired by the French and all the occupation payments were spent in France, then a cumulative surplus of 656 million francs would have been required. This figure is very close to the actual cumulative surplus of 676 million. This rough match of these statistics, suggests a substantial short-term adjustment for the economy, in addition to the long term interest payments to foreigners.

Table 6
Balance of Trade

<i>Year</i>	<i>Balance of Trade (million francs)</i>
1815	218
1816	191
1817	34
1818	65
1819	76
1820	92

Source: Chabert (1949) and Lévy-Léboyer and Bourguignon (1985).
Note: The balance includes merchandise and invisibles.

To analyze the potential effects on the French economy from reparations payments I employed a simple neoclassical growth model (King, Plosser and Rebelo, 1988). Here, a representative household maximizes lifetime utility, choosing between work to produce goods and leisure, subject to a wealth constraint where current wealth of bonds plus goods is less than or equal to next period's bonds and the earnings from labor less taxes. The production function has constant returns to scale and smooth substitution between capital and labor. Output is consumed or saved to increase the capital stock, which is subject to

depreciation. The representative household selects consumption, savings and leisure to maximize the present discounted value of utility. The basic parameters for this model are the ones employed in the section on the burden of reparations. The 9.2 billion franc GDP economy faced reparations payments over a three to five year period. The growth rate of the economy was about 1.4 percent, where it is assumed that there is an AR(1) process with a coefficient of 0.9 driving productivity. The interest rate was 8 percent, and the shares of taxes and exports to GDP were approximately 10 and 5 percent. Depreciation was set at 10 percent per year. Labor's share of GDP is assumed to be about 60 percent (Williamson and Taylor, 1994), and the elasticity of labor supply was assumed to be 0.5.

This model is only used to estimate the primary effects of reparations, not any potential secondary, terms of trade effects. Although there may have been some terms of trade effects, the direction is unclear and the size is second order. The effects probably would have been small because of the small size of the foreign sector, where exports accounted for only 5 percent of GDP. To obtain terms of trade effects, different preferences would have to be imposed on France and the rest of the world. International real business cycle models (Backus, Kehoe and Kydland, 1992 and 1994) assume that preferences between countries are the same. Thus, a transfer between countries will have no effects on the terms of trade. Consequently, only primary effects will be examined. The model here is used to examine the actual method of payment and the policy choices available. The actual method of payment of reparation combined the two polar policy choices: taxation to effect an immediate payment by the French taxpayers and borrowing.

At one extreme, all of the reparations might have been financed by a foreign loan sold entirely abroad. This is arguably the superior policy as it would impose the smallest burden on the economy. At 8 percent, the French would have incurred a total annual interest burden of 150 million burden to pay reparations of 1.86 billion francs. This policy would have required perpetual annual taxes and transfers of this sum. This permanent shock would have reduced consumption by 150 million, the result of consumption smoothing. As already seen in Table 5, the consumption cost of this permanent shock would have been equal to 1.2 to 1.4 percent of annual GDP.

The other extreme policy choice would have been for France to pay off reparations in three to five years by levying taxes for the total sum. To ascertain the maximum potential loss, I assume that none of the reparations 1.86 billion francs of reparations were spent on French forage or rations. In addition to a lump sum tax that would have

Table 7

**The Cost of Reparations
Measured as the Percentage Change from the
Steady State Value over 5 Years**

	Capital	GDP	Consumption	Labor
Lump Sum Taxes				
Three Years	-37.8	-8.7	-24.7	10.6
Five Years	-28.5	-6.6	-18.6	8.0
Income Taxes				
Three Years	-26.5	-20.5	-17.3	-16.4
Five Years	-20.0	-19.0	-13.1	-18.3
Estimated Actual Policy				
Five Years	-8.5	-8.4	-5.6	-8.3

produced the least distortions, the case of an income tax is also examined. The cost of

these policies are presented in Table 7. It is measured as the total percentage loss in the steady state GDP over five years. In the case where there are no secondary effects, the less distorting lump sum tax would lower GDP by 6.6 to 8.7 percent of its steady state value, depending on whether the taxes were levied over three or five years. Both investment and consumption would decline and the capital stock would contract dramatically, while labor effort would increase. Imposing an income tax would impose an even greater burden on the economy, and GDP would decline between 19 and 20 percent, with labor effort, consumption, and the capital stock shrinking.²² The Crown initially tried a policy of taxation. Apart from the political and technical difficulties of quickly raising tax rates, the policy had the potential for a rapid and substantial contraction of output and consumption. Early evidence of these problems helped to impel the government to switch towards borrowing.

Table 7 also showed an estimated of the actual effects of policy, where it is assumed that the occupation forces' expenditures were made entirely in France. This policy consisted of an immediate transfer of 656 million francs effected by increased taxes, which for simplicity was allocated equally over the five years. Borrowing over the five years added to the transfer to the amount that interest payments had to be made to foreigners. Assuming they held half the debt and the debt was incurred smoothly over the five years, the five years of transfers were 143, 155, 167, 178 and 191 million francs. Beyond the five year horizon of this estimated, the annual transfer to foreign rentiers

²² If labor supply was less elastic, the loss in GDP would be greater in the lump sum case and lower in the income tax case.

amounted to 60 million.²³ In this scenario, the cumulative GDP loss would have 8.4 percent, with similar reductions in consumption, capital and labor. This policy was more costly than borrowing the whole sum, but it was certainly more tolerable than paying wholly by taxation. If borrowing with lump sum taxation would have imposed at most a cost of 1.4 percent of GDP, the actual policy forced a loss of only about 1.7 percent for each the first five years. The sketchy data and the narrative histories of this period in France indicate a prolonged period of distress, which is in accord with these estimates. Although some of its effects may have been cloaked by the bad harvest, the reparations were a significant but tolerable drag on the economy.

Conclusion

Although the reparations France paid after 1815 were in most dimensions somewhat smaller than the post World War I German reparations, they were larger than any other nineteenth and twentieth century indemnities. The imposition of this penalty was part of the overall peace settlement, designed to bring France back in the ranks of the great powers, after domestic reforms, so that she could play her role in the balance of power. The incentives were appropriately set to induce payment and cooperation, although the French would have avoided them if possible. The financial transfers to the Allied Powers were not optimally effected. Instead of borrowing the whole sum of reparations abroad, a part was raised by taxation and domestic borrowing, imposing a cost on consumption, investment and economic growth. However, this cost was moderately

²³ It might be reasonably assumed that at this point, the French consumption smoothed and simply reduced consumption by 60 million francs.

more than the optimal policy, suggesting why it was politically sustainable. Overall the Napoleonic reparations show the usefulness of financial indemnities as part of postwar settlements, in contrast to the post-World War I case.

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