

# **How Occupied France Financed its own Exploitation in World War II or Squeezing the Capital Market for the Nazis**

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Most studies of war finance have focused on how belligerent powers have funded hostilities by using their own resources. Although incurring huge expenses, warring governments are usually assumed to attempt some optimization of revenue generation on behalf of their population. However, war finance in France during World War II was quite different. The collapse of the Third Republic left Berlin in control of a nearly equally powerful industrial economy. To finance its continuing war on other fronts, the German government sought and secured a massive and, perhaps, unparalleled extraction of resources from France. But, unlike belligerent powers that raise funds from their own population; the Nazis were known to have little interest in the long-term welfare of the countries they occupied. This paper analyzes the policies employed by the German occupation and the collaborating government in Vichy to supply resources to the Nazi war machine.

French policy was framed by the nation's experience in World War I. Vichy's finance ministers, like their wartime Republican predecessors, were obsessed by a fear of inflation, raising taxes and employing extraordinary means to induce the public and financial institutions to absorb the massive bond issues required to pay the Germans and avoid printing money. In addition to wage and price controls and rationing, the regime used financial repression of institutions and markets to drive funds into the government bond market. Although the outlines of Vichy's fiscal and financial policies are generally known (Milward, 1970 and Margairaz and Bloch-Lainé, 1991), the effectiveness of these policies in transferring over a quarter of annual GDP is not well understood. Using a neoclassical growth model, we provide an assessment of the relative contribution of the various elements of Vichy policy. We find that the burden imposed on the French economy was unsustainable and contributed to the rapid shrinkage of the economy.

## I. The Magnitude of Vichy's Payments

During World War II, the French economy became a vital part of the German war machine. The systematic exploitation of occupied countries provided very important contributions to the Nazi state. Milward (1970) estimated that for the whole course of the war that Germany was able to extract revenue from all occupied countries equal to 40 percent of the revenue it generated by its own taxation, and of this 42 percent came from France.

Table 1 shows the total payments made to Germany during its occupation of France. As explained in the next section, these payments represent the actual financial transfers to German authorities, rather than their accumulated credits in the Banque de France. Seizures and requisitions, for which Vichy did not provide compensation to the victims, excluded.<sup>1</sup> Although the measure of GDP is fragile and there was a substantial black market, the total of resources extracted by the Nazis is stunning. Even in the partial first year of occupation, nearly 20 percent of GDP was transferred, rising to well over a third of GDP in 1941 and 1942. The switch from the limited war of Blitzkrieg to a completely mobilized economy led to a higher level of exploitation in 1943 and 1944, another partial year of occupation.

**Table 1**  
**French Payments to Germany, 1940-1944**

	French GDP (FF billions)	Occupation Costs (FF Billions)	Costs as a Share of GDP (percent)
1939	433		
1940	419	81.6	19.5
1941	392	144.3	36.8
1942	424	156.7	36.9
1943	493	273.6	55.5
1944	739	206.3	27.9

Source: Carré, Dubois and Malinvaud (1972) provide the GDP data, Milward (1970), p. 271 gives the French payments to Germany.

How should the size of these payments be viewed? Some idea of their magnitude can be assessed with two comparisons, the first relative to other war reparations and the

second relative to the cost of war for belligerents. Defeat in 1940 was the third French loss in a modern war where occupation costs or reparations were imposed. After Napoleon's defeat at Waterloo and after the Franco-Prussian war, France was forced to pay reparations for occupation and the cost of the war to the victorious allies in 1815 and to the German Empire in 1871. Table 2 shows White's (2001) calculations of the size and burden of these reparations. For the 1815 and 1871, the initial estimates of reparations are shown as percentage of one year's GDP and central government tax revenue. Another measure of the burden is to assume that reparations were financed wholly by foreign loans so that the burden would become the requirement to service this debt (Cohen 1985). Although the burdens in terms of one year's GDP are high, the payment of interest on a foreign debt imposes a more modest burden that would be optimal in the sense that it smoothed the path of consumption (Obstfeld and Rogoff, 1995). The 1815 and 1871 reparations were paid in full and ahead of schedule by the French government, borrowing partly from abroad. The postwar World War I German reparations were set much higher than earlier French reparations.<sup>2</sup> However, Germany did not meet its reparations obligations and defaulted. Given that Weimar Germany borrowed even more funds, the effect was to reverse reparations, raising income and consumption (Schuker, 1988).

**Table 2**  
**A Comparison of War Reparations**

	Indemnities (billions)	Percent of One Year's GDP	Percent of One Year's Tax Revenues	Share of Debt Service to GDP
France 1815-1819	FF 1.65 to 1.95	18 to 21	195 to 231	1.2 to 1.4
France 1871	FF 5.0	25	201	0.7
Germany 1923-1931	DM 50	83	350	2.5
Vichy 1940-44	FF 479	111	805	5.5

Source: White (2001), Klug (1990) and Table 1.

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<sup>1</sup> Milward (1970, pp. 82-3) estimates that German booty from France for 1940-1944 totaled 154 billion 1938 francs, of which 52.4 billion francs were military equipment. Most of this loot was seized in 1940, and more systematic policies of exploitation were deployed.

Unlike previous reparations, the occupation costs imposed on defeated France in 1940 were open-ended; Hitler was adamant that he would only consider a peace treaty once the war was over. For Vichy, the figure for French reparations is the total sum of reparations paid over the years of occupation; 479 billion French francs is the sum of the real value of the payments.<sup>3</sup> The base year for comparing the indemnity to GDP and tax revenues is 1939, a year of nearly full employment; its use reduces the burden compared to the war years when national income was lower. The extraordinarily high shares of GDP or one year's tax revenue are thus lower bounds. Unlike France in 1815 or 1871 or post-World War I Germany, Vichy had no access to outside capital markets and hence did not have the option to finance its obligations with foreign loans, but as a measure of size, it reveals it was nearly double the burden of Germany's reparations.<sup>4</sup> By these measures, France made a Herculean effort to pay. The burden was far greater than when she had paid in 1815-1819 and in 1871. Furthermore, though the Nazis compared imposition on Vichy to Germany's post-World War I reparations, France's payments were significantly greater and they produced a real transfer of resources.

German war reparations in Table 2 were largely financed by foreign loans, but Vichy did not have access to foreign capital markets. It had to finance its payments entirely by domestic taxation, bond issue and money creation like many belligerent powers. Thus, it is worthwhile to compare Vichy's methods of payment to French finance during World War I, when she had access to foreign markets and to American finance during both World Wars, which was dependent on domestic finance. The difference between Vichy and these other three examples is, of course, that Vichy was not engaged in a patriotic war but in financing a hostile occupying power. Occupation finance for 1940-1944 differs considerably from Republican France's financing of World War I, where most expenditure was covered by short and long-term debt issues.

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<sup>2</sup> The Allied Reparations Commission set German reparations at 132 billion gold marks in May 1921. Reparations bonds were divided into three segments A, B, and C. The A and B bonds were worth 50 billion marks, but most experts believed that the C bonds would never be issued. See Schuker (1988).

<sup>3</sup> INSEE's (1966, Tableaux XXVIII, p. 405) retail price index is used to deflate Vichy's indemnities. These are official prices and probably understate inflation, but given that German purchases were made at official prices, it should be close to an accurate measure. The official wholesale prices show even less sign of inflation and hence they were not used.

<sup>4</sup> The burden here is  $b = (r-n)D/(1+n)GDP$  where  $r$  is the interest rate,  $n$  is the growth rate and  $D$  is the total debt. France is assumed to grow at a slow rate of 1 percent and pay interest at 5 percent. The GDP level of 1939 is used.

Although the American participation in World War I only began in 1917 and her total expenditures relative to GDP were less, the pattern of financing resembles French finance in the Great War. The most important difference is a greater French dependence on debt relative to taxes. However, the strongest resemblance is between Vichy finance and the United States in World War II, although the United States was less reliant on money creation, utilizing taxes more heavily. Given the rapid decline in French economic activity, this difference is not surprising, but the ability of Vichy to sell bonds to finance its payments to the Nazi war machine certainly is. Did patriotic bond rallies in the United States really do not much more than coerced sales under a German gun?

**Table 3**  
**A Comparison of War Finance**

	U.S. World War I March 1917- May 1919	U. S. World War II	France World War I	Vichy France 1940- 1944
Total Expenditure as Share of Pre-War GDP	43	188	251	111
Share Financed by Taxes	21.5	48	3.7	29.7
Share Financed by Debt	70.6	31	83.3	36.4
Share Financed by Money	9.1	21	13	33.9

Sources: Friedman and Schwartz (1963), Fisk (1922), Ferguson (1998), Goldin (1980), INSEE (1966), Patat and Lutfalla (1990), Toutain (1997).

Was Vichy's policy the best response to German demands? The literature on optimal taxation and seigniorage suggests that if a government commits to raise a given amount of revenue and desires a minimum deadweight loss, it should set its instruments, present and future tax rates and inflation rates, to minimize the present discounted value of the distortions generated by these taxes (Mankiw, 1987; Walsh, 2003). Intertemporal

optimality requires that the marginal costs of each tax instrument be equated across time, that is, there should be “tax-smoothing” where the expected marginal distortionary costs in different periods are equated.<sup>5</sup> Accordingly, inflation and tax rates should move together and in response to permanent shifts in government expenditures, while temporary movements in expenditure should be covered by debt financing. In this basic model, consumers make labor supply and money demand decisions on the basis of expected inflation with variations in inflation producing distortions. But unanticipated inflation is a form of a lump-sum tax, as it has wealth but no substitution effects. If the public bases its holdings of money on anticipated inflation, the government could avoid distortionary tax costs by inducing surprise inflation. However, the public has an incentive to discover these plans and thus undermine the government’s efforts, with resulting distortionary effects. Nevertheless, if a government can commit to a path for anticipated inflation, it will be optimal to respond to unexpected revenue demands by allowing unanticipated inflation. Hence, inflation rates may not closely follow tax rates but unexpected deficits. Walsh (2003) argues that this model explains U.S. wartime finance better than the simple tax-smoothing model.

Vichy’s policy makers’ allergy to inflation suggests that they did not want to produce any monetary-inflationary surprises. They treated Germany’s financial demands as a temporary imposition---assuming, perhaps erroneously, that it would end with the war-----and responded by modestly raising tax rates and attempting to fund the occupation by bond sales. But, as will be seen, they did not allow the market to adjust but imposed rigorous and very distortionary controls to induce the public and financial institutions to buy more bonds.<sup>6</sup> Their policy appears thus to have veered substantially away from either optimal policy. Thus, to measure the costs of Vichy policy, a detailed examination of the policies pursued is required.

## **II. The Occupation and How the Germans Were Paid**

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<sup>5</sup> Also, see Barro (1987, 1989).

<sup>6</sup> These policies were not dissimilar to those employed by the United States in both world wars.

Blitzkrieg against France began on May 10, 1940. Its spectacular success led to the resignation of the French government and the appointment of Marshal Philippe Pétain, the War Minister as head of government. Pétain sued for peace and signed an Armistice on June 22, 1940. French prisoners of war, numbering one and half million, were held in captivity and the fleet disarmed. Under terms of the agreement, the Republic was carved up. France lost the departments of Bas-Rhin, Haut-Rhin and the Moselle to the Reich, while the departments of the Nord and the Pas-de-Calais were attached to occupied Belgium and a small zone around Mentone was given to Italy. The remainder was divided into the Occupied Zone, under direct German control, and the Free Zone. Pétain moved the government to Vichy in the Free Zone where the constitution was suspended and plenary powers were granted to the Marshal's government, which retained an army of 100,000. When Allied successes in North Africa revealed the military weakness of the Vichy regime, the Germans marched into the Free Zone in November 1942. However, the government in Vichy retained control of its economic policy and through the whole period taxation and monetary policy was uniform across both zones.

The extraction of resources from France was driven by the changing needs of the Nazi war machine. In the beginning, the policy of Blitzkrieg was designed for a rapid limited war that would not require a total mobilization of the German economy; thus integrating and mobilizing French industry was not essential to Hitler's plans. After an initial period of looting promoted by Hermann Göring, Nazi policy determined that France would be de-industrialized and only limited industries would supply German war needs. The return of France to an agricultural economy coincided with Pétain's atavistic view that the nation could be morally rejuvenated by a return to its true rural nature. Yet, there were policy differences in the Nazi regime and the German Foreign Office believed that France should provide more resources to the war effort and slowly engineered a shift in policy. The long struggle between visionary goals of a de-industrialized France and the practical need to pursue the war was answered decisively when the Blitzkrieg ground to a halt in the Russian winter of early 1942 and Hitler was forced to accept a total economic mobilization of Germany and its satellites for war (Milward, 1970).

German demands on the French economy followed these broad policy shifts. First to meet the financial needs of the German Army when it rolled through the Netherlands, Belgium and finally France, the Reichskreditkassen was created on May 3, 1940 to supply the armies of the Reich with an occupation currency, the Reichskreditkassenschein. The German authorities had no desire for this money to spawn inflation in Germany; to ensure that burden of inflation fell on occupied territories, strict controls were put in place. The occupation currency could not be spent in Germany or exchanged against the Reichsmark, hoping to bottle up any inflationary pressure in France. The Banque de France had to accept occupation notes and redeem them in francs, charging them as costs of occupation to the French government.

The essential question of what the exchange rate would be for the franc was settled on May 20, when the rate between the franc and the Reichskreditkassenschein was proclaimed to be 20 to one. This exchange rate was later decreed to be the official rate between the Reichsmark and the franc. It was a huge overvaluation for the Reichsmark. According to Milward (1970, p. 55), it was overvalued by 50 percent using the dollar-franc and dollar-Reichsmark rates of June 1940 or 54 to 63 percent using the exchange rates against the pound in 1939. French goods were therefore intended to be cheap for the occupying German army.

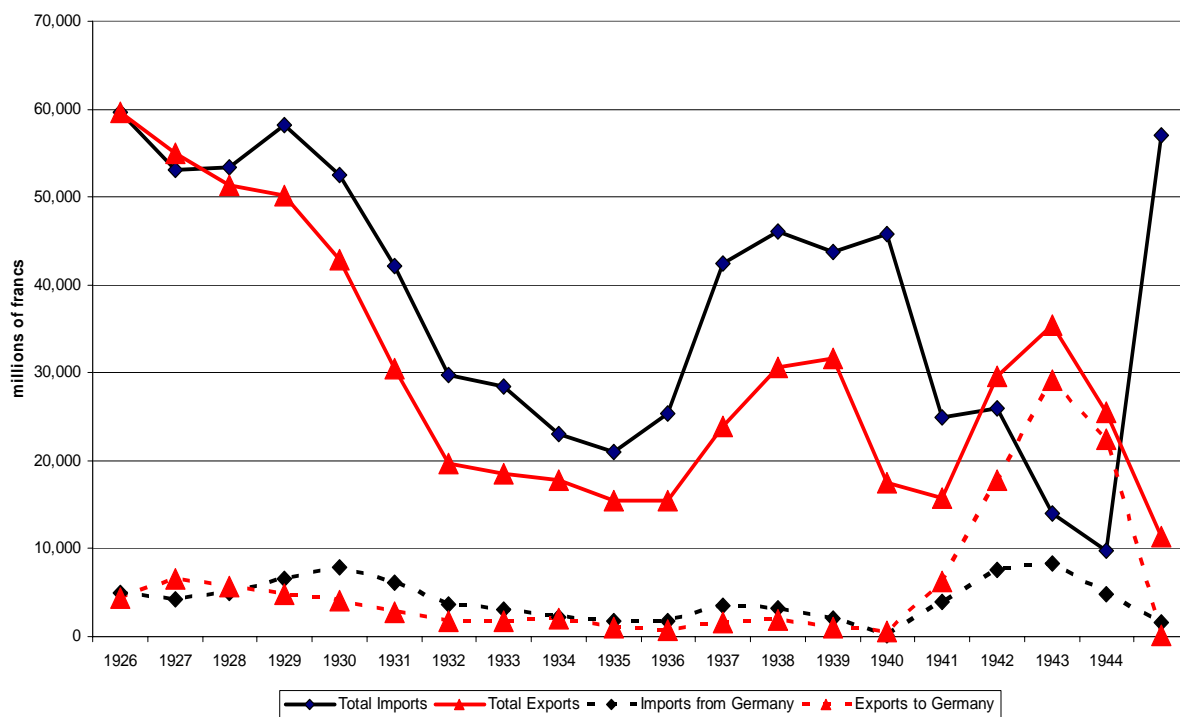
Once France was defeated, international trade between the Reich and the vanquished Republic were restructured with a bilateral clearing agreement based on the arrangements that Germany had engineered with Central and Southeastern European countries in the 1930s. Foreign exchange was strictly controlled and allocated for government-approved imports. In early thirties, the economies of these German trading partners were depressed. Neal (1979) argued that these countries could stimulate their economies using the bilateral clearing agreements to run export surpluses with Germany in blocked marks or Sperrmarks. If the central banks bought these marks from exporters, paying out domestic currency at the fixed rate of exchange, it would become an expansionary monetary policy. The greater the export surplus and the higher the exchange rate of the Sperrmarks, the more expansionary the policy. Although costly by transferring resources and offering trade credit to Germany, these costs might easily be outweighed by an expansionary policy in a depressed economy that made productivity



gains. Ultimately, rising domestic prices would decrease the competitiveness of domestic goods exported to the German market. Hungary, for example, used its bilateral agreement to reflate its economy; while in countries like Romania, central banks operated on a “waiting principle” and refused to buy blocked markets from exporters until requests for marks from domestic importers of German goods materialized. As there were more blocked marks earned by exporters than those demanded by importers, the shadow price of the blocked marks fell. In some of these countries even the official value of the blocked Sperrmarks declined, and there was no domestic stimulus gained. .

France followed the Hungarian example. Although France had clearing agreements with other countries in the orbit of the Third Reich, Germany became its dominant trading partner. At the end of 1943, France was a creditor to Germany, Norway and Italy for a total of 119.1 billion francs, with Germany accounting 118.8 billion francs. France had deficits with Luxembourg, the Netherlands, Belgium, Switzerland, Spain and Turkey for a total of 7.6 milliards, for a net surplus of 111.4 billion (Bettelheim, 1946). French imports and exports are graphed in Figure 1. Until 1941, Germany’s trade with France was a fraction of the total; the Nazi regime then reoriented France’s trade. But imports were discouraged by the overvalued exchange rate and controls, yielding a large trade surplus that was financed by payments of the Banque de France to exporters, stimulating the economy.

**Figure 1**  
**French International Trade**  
**1926-1944**



Source: INSEE (1966).

The transfer of resources under the bilateral clearing agreement paled before the occupation costs imposed on France. Following the precedents of earlier wars, the Germans required the French to pay for the costs of occupation. However, the charges were set far above the actual cost of occupation, providing the German authorities with considerable means to purchase war goods and other products in France. In the Armistice talks in late 1940, the French were stunned and protested when they were informed during the negotiations that they would be obliged to pay occupation costs of 20 million Reichsmarks or 400 million francs a day. Added to these were indemnities paid to owners of property occupied by the German army and compensation for requisitions (Patat and Lutfalla, 1990, p. 98).

According to the French negotiators contesting the occupation costs in 1940, the head of the German economic delegation Hans Hemmen “indicated that the French money payments would be spent in France: but with that money the Germans will be able to buy the whole of France.” He justified the reparations by reminding the French of those imposed on Germany in the treaty of Versailles. He acknowledged that:

The payment demanded is very heavy, and Germany knows by experience how ruinous such charges are. That is why the German government has seen this question from an economic point of view, since at the same time that it has demanded these payments from France, it has proposed to her an economic system which frees France from the anxiety of ruin. (quoted in Milward, 1970, p. 61).

What Hemmen envisioned and the French ultimately accepted was that occupation costs would be paid by the creation of money in the account of the Reichskassen in the Banque de France. If Vichy wished to contain the inflationary potential of this policy, the government could issue bonds to the French public and sterilize the creation of francs.<sup>7</sup>

The occupation charges initially proved greater than the Germans could spend and accumulated as unspent credits in the account of the Reichskreditkassen (Banque de France, *Comptes rendus*, 1941-1942), a consequence of the relatively limited war pursued by Hitler. The rising unused credits and French protests, combined with an offer to exchange French shares in Polish and Balkan firms desired by the Reich produced new agreement on occupation costs. In May 1941, they were lowered to 15 million Reichsmarks or 300 million francs per day (Milward, 1970). This moderation of German demands came to an abrupt end when Blitzkrieg failed to deliver the Soviet Union to the Reich, forcing Hitler to begin a complete mobilization of the Germany economy for war. The account of the Reichskreditkassen was quickly drained, and the occupation costs were raised to 25 million Reichsmarks or 500 million francs a day on December 15, 1942. In addition, the Italian occupation of the Southeastern departments was funded with a monthly payment of one billion French francs, which Germany demanded after the collapse of Italy in addition to arrears of 2.8 billion out of a special payment of 3 billion francs (Milward, 1970).

#### **Table 4**

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<sup>7</sup> Milward (1970) has argued that there was precedent for this policy, going back to 1911 secret agreements between the Banque and the government to provide rearmament credits. Du Parquet (2005) describes this operation. The Governor declared that the Banque was ready to make advances up to 200 million francs and signed a secret convention for 3 billion francs of credit if war broke out. This policy was renewed when the Second World War loomed. An agreement was signed on September 29, 1938, where the Banque would provide the government with advances of up to 25 billion francs in the event of war (Merigot and Coulbois, 1950).

**How France Financed Germany's Exploitation  
(billions of francs)**

	Conventional Expenditure	Occupation Costs	Total Expenditure	Taxes	Share of Taxes (percent)	Debt	Share of Debt (percent)	Money	Share of Money (percent)
1939	150.1		150.1	63.4	42.2	42.7	28.4	44.3	29.5
1940	203.6	81.6	285.2	72.0	25.2	77.7	27.2	124.3	43.6
1941	120.8	144.3	265.1	80.2	30.3	91.7	34.6	91.3	34.4
1942	133.2	156.7	289.9	97.3	35.6	75.8	26.1	117.2	40.4
1943	135.3	273.6	408.9	122.1	29.8	142.0	34.7	153.9	37.6
1944	212.8	206.3	419.1	123.5	29.5	220.4	52.6	62.6	14.9

Sources: INSEE (1966), Patat and Lutfalla (1990) and Milward (1970).

Occupation charges, presented in Table 4, quickly overshadowed ordinary government expenditures. Taxes almost covered conventional expenditures for Vichy. In spite of the shrinking economy and inflation, real tax revenue was nearly constant between 1938 and 1944, ranging from 55 to 59 billion 1938 francs. It constituted a rising burden on the smaller economy, accounting for 14 percent of GDP in 1938 and 1939, rising to 25 percent in 1943. Tax rates on labor rose from 12 to 20 percent and on capital from 11 to 24 percent. Debt and money creation covered all of the occupation costs and the remainder of conventional expenditures. This mix of financing was not accidental but the result of a very conscious policy of the Vichy regime.

Vichy---both the government and the public---acquiesced to the demands of the German war machine that was the master of continental Europe. Fearful of inflation and informed by their experience of the 1920s, the primary objective of Vichy's policy makers was to protect the value of the franc as best they could. Thus, while the overvalued exchange rate and potential inflationary impulse from the occupation charges might seem to have offered an opportunity to inflate and undermine exploitation of the French economy, it was regarded as an unacceptable alternative. Both Vichy finance ministers, Yves Bouthillier and Pierre Cathala, concurred and the later termed the defense of the franc a "national duty." (quoted in Milward, 1970, p. 62). Bouthillier, like many others, believed that an accommodating French government would be less onerous than direct German administration. Ultimately, by controlling inflation he would be able to preserve a healthy, stable economy by the end of the war so that France would have a

place in the new economic order of Europe. The governor of the Banque de France, Yves Bréart de Boisanger and a member of the French delegation to the armistice commission, conceded that “I constantly forced myself not to view the occupation charges from a purely financial point of view. If I had done so, I would have soon demanded that the government suspend payments. I did not do so because I was convinced of the need to reconcile the two countries and I believed that it would be necessary not just to think in terms of solely France’s interest but it would be tightly tied to the question of the economic organization of Europe.” (Magairaz, 2002, p. 51).

Vichy’s policy to hold back inflation was known as the “politique de circuit.” Following the Accord between the Banque de France and the French State of August 25, 1940, the bank consented to provide advances to cover the cost of occupation up to a maximum of 85 billion francs (Banque de France, Compte Rendu, 1941, p. 12), which were then provided as credits to the Occupation in the Reichskreditkassen. These limits were continually raised to meet the obligations of the government, as the Banque de France sought to “sauvegarder la monnaie” (Banque de France, Compte Rendu, p. 17). When the Nazis made payments to French suppliers, the Banque de France was obliged to issue banknotes. To prevent this growing volume of currency from having its full inflationary effect, the French State attempted to “close the circuit” by selling bonds to the public. The Banque de France and Treasury officials thus nervously watched any leakages from the circuit, and further macroeconomic policy was designed to prevent leaks from springing. The more that the public could be induced to hold bonds and money, the easier it would be to contain inflation. Faced with the exactions demanded by the Germans, Vichy policy makers planned to meet them by reducing and transferring the public’s purchasing power by limited tax increases and huge bond sales, keeping inflation to a minimum.

Complicating these developments, reducing France’s capacity to pay, was the extraction of labor from the French economy. After the failure of Blitzkrieg in Russia, the effort to increase the exploitation of France moved to include labor. The massive labor transfers were an intensification of existing policy (Milward, pp. 110-116). On May 6, 1942, Hitler ordered conscription to begin and insisted that the French would be paid less than German workers. Albert Speer, the new Minister of Munitions set up the

administrative machinery for controlling German production in France and to increase the utilization of labor. Believing that it would be most efficiently used in Germany, he pressured Vichy. Laval responded with a dramatic offer of a “relève” to exchange French workmen for prisoners of war in Germany, with the idea of returning a prisoner for every three workers and stave off compulsory drafting of labor force. The relève was announced by Laval on June 22, 1942 in a radio address, where he hinted at dreadful consequences if workers did not respond. Workers were to be combed out by special committees established for that purpose and sent off to Germany. On September 4, 1942, a compulsory labor decree established that all men 18 to 50 and all unmarried women, ages 21 to 35 who worked less than 30 hours were liable for conscription, although the families of those who left voluntarily would receive one-half their nominal wage plus remittances from Germany. These efforts did not satisfy the Germans and, in response, to pressure, Vichy established the Service du Travail obligatoire or compulsory labor service on February 16, 1943, where all men born between January 1, 1920 and December 31, 1922 were liable for two years service. According to Bettelheim, (1946 Annexe 1), there were 766,000 workers deported to Germany, to which should be added 198,000 prisoners of war who were drafted to work for a total of 964,000.<sup>8</sup>

### **III. The Consequences of the “Politique de Circuit”**

For the “politique de circuit” to succeed it had to ensure that there was a robust demand for government bonds and inflation did not erode the desirability of holding money. From the very beginning in 1939, the experience of the First World War worried the authorities who sought to control inflation. On November 10, 1939, a law was passed that ordered wages to be frozen at their September 1, 1939 level, although the government did not strictly enforce it because of rising uncontrolled prices (Merigot and Courbois, 1950). After the Armistice, a price and wage freeze was decreed on June 20. When in August 1940, the German Army stopped direct requisitions of food and raw

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<sup>8</sup> For 1939-1945, the French labor force was further depleted by deaths and invalids which were estimated to be respectively 200,000 and 230,000 for the military, 150,000 and 127,000 for the civilian population and for the deported 650,000 and 585,000 (Bettelheim, 1946).

materials, the French government sought to provide a system of rationing. Under the law of August, 16 1940, comités d'organisation were set up to oversee the production and distribution of raw materials and provide a buffer against German demands. General rationing began with decrees issued on September 12 and 13, 1940, centralizing control of raw materials, rationing gasoline and luxuries, and largely eradicating the boundary between the occupied and free zones. These policies naturally led to black market production and transactions and tax evasion, and a consequent increase in the demand for currency. As would be expected, price controls were less effective than wage controls, reducing consumption and allowing inflation via the market for uncontrolled goods and black markets.

Taxes on capital and on personal incomes were all increased and the collection methods were improved. For example, in January 1942, the tax on agricultural profits was revised and the revenues rose from some 30 million francs to over a billion for 1942 (Magairaz, 1991, p. 544). In contrast to World War I, war profits were taxed from the beginning. These higher taxes combined with the shock of defeat and the initial rigid geographical division of France sharply reduced output. There was a big incentive for producers to sell their goods to Germany where prices were higher and they would be paid in French francs at the overvalued rate. To reduce the inflationary effects, the French government wanted to impose a profits tax on these exports but Germany resisted and it was set very low rate (Milward, 1970, pp. 68-70.)

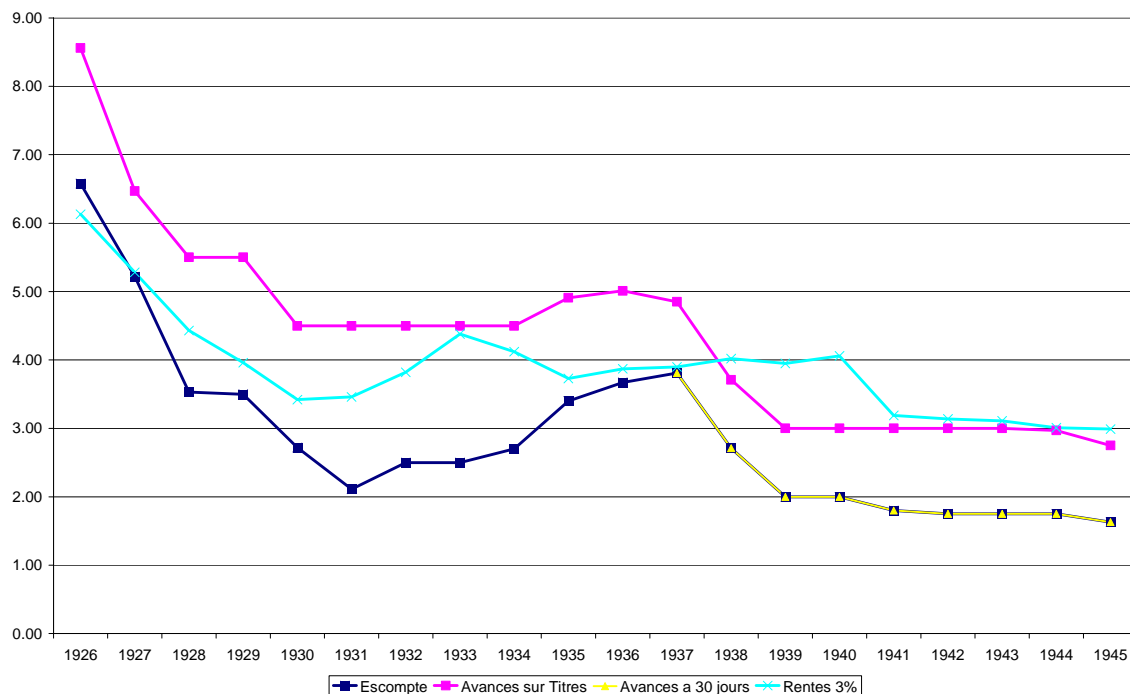
Adding to these expected difficulties, the German armed forces and administration paid higher wages than those permitted by regulations for French companies. (Milward, 1970, p. 63). Higher wages in Germany also led to a small emigration; but more importantly, German needs for labor and goods partly undermined Vichy's wage and price controls. Furthermore, the drive to sell bonds and channel savings into government securities reduced new capital formation and the ability to produce goods. Frustrated by their inability to meet both objectives, Vichy moved towards more of a command economy where scarce inputs and resources were allocated to specific industries. At the same time, the German's struggled with the question of where to location production---in the Reich or in France. While Vichy sought to provide the means for French manufacturers to supply the Nazi war machine, the Germans

eventually demanded a massive transfer of French labor across the Rhine, reducing France's productive capacity.

Central to Vichy's "politique de circuit" was its need to sell bonds---notably the bons du Trésor---and ensure that there was a buoyant demand so that yields remained low. Many of the tools employed by the Republic were taken over and employed by Vichy. Bonds were promoted with public campaigns, but perhaps more importantly a squeeze was put first on the credit markets and then on the capital markets. Like other wartime governments and its republican predecessor, Vichy was fearful of the cost of the new debt and wanted to keep interest rates low. As seen in Figure 2, the Banque de France reduced its key rates on January 3, 1939 as war loomed. The discount rate and the rate on 30 day advances were lowered to 2 percent and the rate on advances against securities was cut to 3 percent. The only other change occurred on March 15, 1941, when the rates were set at 1.75 and 3 percent, remaining unchanged for the remainder of the occupation. These three forms of credit did not play a significant role; discounts and advances in the Banque's balance sheet declined or stagnated. Only open market operations, which had been legalized in June 1938 increased significantly (Banque de France, Compte Rendu 1941 p.9). The government's goal, assisted by the Banque de France, appears to have been to keep the rentes at approximately 3 percent, a yield equal to the advances, as the supply of government securities mushroomed.

**Figure 2**  
**The 3 Percent Rentes and Banque de France Rates**  
**(percent)**



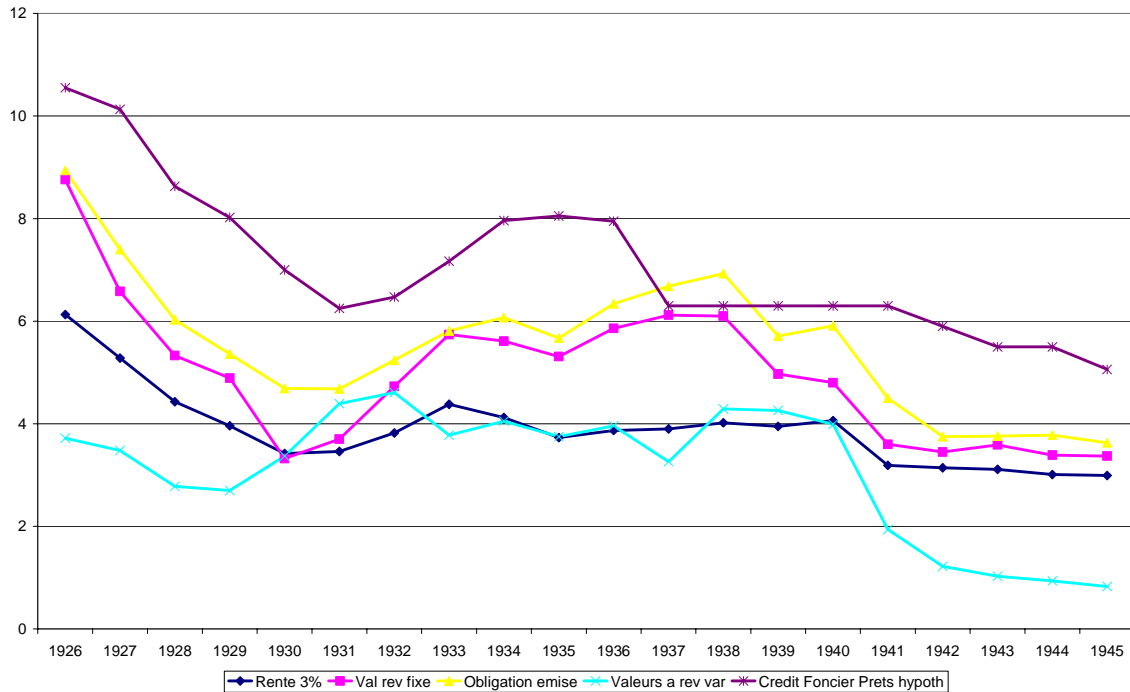


Source: INSEE (1966), Tableau VIII, p. 545

To ensure that yields and government financing costs remained low, credit provided by financial intermediaries was diverted to the purchase of government securities. The Banque de France aided this effort by using its network of branches to help sell subscriptions, while the banks, savings banks, and the Caisse de Dépôts were encouraged and pressured to buy bonds, with the result that their portfolios shifted away from commercial and mortgage credit to government bonds. Formal control of the banking sector was imposed by the law of June 13 and 14, 1941 that established the “organisation de la profession bancaire.” Banks were supposed to place their surplus funds in short-term bonds. In 1938, these had accounted for only a third of their portfolios; but by April 1942 bonds rose to four-fifths of assets and finally 90 percent at the end of 1943. Laws decreed on October 22, 1940, February 28, 1941, and November 17, 1941 required payments in excess of 3,000 francs to be made by checks, in order to increase banks potential investment funds and discourage tax evasion and the black market. Banks were also given an key role to encourage subscriptions to treasury bills and monitor the money market (Magairaz, 1991, p. 25, 545-546). To adjust to rising

prices, the Vichy twice raised the maximum deposits permitted on individual accounts in savings banks (Banque de France, Compte rendu 1941, p. 3).

**Figure 3**  
**Market Interest Rates**  
**(percent)**



Source: INSEE (1966), Tableau VIII, p. 545.

Rationed consumer goods and the lack of alternative investment opportunities encouraged the public to deposit funds in low interest bank and savings accounts. Efforts to raise deposits of financial intermediaries that would then absorb more bonds were threatened by the approach of the Allies. Magairaz (2002) identifies two “monetary crises” or perhaps more appropriately intermediation crises. First, in September 1942, bank deposits which had grown at same speed as currency slowed abruptly. The second “crisis” erupted in September-October 1943 after the Allies bombarded Nantes. Bank deposits shrank, as the stock and black market gold and foreign currency markets boomed. The Banque de France stepped in with open market operations to prevent a banking panic from starting. What the monetary authorities feared was that these crises

would raise velocity, thereby increasing inflation and undermining the “politique de circuit.”

In general, the low interest policy of the “circuit” was successful in that it kept the nominal yields for government bonds low, as seen in Figure 3. The yields on other bonds fell in line, including yields on fixed income securities, newly issued bonds, and mortgages from Crédit Foncier. But, real rates were considerably lower. Even at the official rates, which certainly are under-estimates, inflation ranged between 17 and 24 percent for 1940-1944, implying very low real rates of interest. Consequently, the capital market boomed. After languishing in the doldrums for all of the thirties, there was a surge of new issues beginning in 1941, evidenced in Table 5. Both private firms and the government took advantage of these circumstances to lower the rate on long-term debts and consolidate short-term debts. The government alone issued 46.4 billion francs, of which only 9.8 billion represented new medium and long term notes (Banque de France, Compte rendu, 1941).

This general low interest policy produced a boom in the stock market (much to the consternation of the Germans), which was controlled by a squeeze on equities. As seen in Figure 3, the yield on stocks plummeted below the yield on rentes. The equity premium became a substantial equity discount, reflecting the desire of the public to obtain assets with potential positive real returns. Consequently, there was a boom in new issues, visible in Table 5, which may have partly benefited Vichy’s financial plans. The largest banks augmented their capital, which enabled them to subscribe to government bonds, contributing to the efforts of the government to “fermer le circuit.”<sup>9</sup>

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<sup>9</sup>Crédit industriel et commercial increased its capital by the issue of new shares for cash, raising it from 100 to 200 million francs in May 1941. The Banque nationale pour le commerce et l’industrie (BNCI) which increased from 175 to 350 million francs, while the Société générale at the end of 1942 increased its capital

**Table 5**  
**New Issues in the Capital Market**  
**(millions of francs)**

	Equities	Total Bond Issue	New Bond Issues	Local and other government issues and other	Long and Medium Term Treasury Issues	New Treasury Issues
1926	5,566	2,984	Na	1,126	3,013	Na
1927	7,860	5,312	Na	1,420	3,249	Na
1928	14,060	5,518	Na	1,450	10,757	Na
1929	18,262	8,417	Na	1,246	-4,676	Na
1930	10,864	13,908	Na	1,437	425	Na
1931	5,386	8,644	Na	4,104	598	Na
1932	3,071	12,434	Na	4,159	5,184	Na
1933	2,517	7,339	Na	4,122	12,446	Na
1934	2,015	6,314	Na	2,975	13,785	Na
1935	2,048	3,970	Na	2,954	7,348	Na
1936	1,410	3,073	Na	1,301	722	Na
1937	2,004	2,832	Na	1,700	14,752	Na
1938	1,679	1,520	1,312	1,630	7,515	7,515
1939	1,728	3,952	3,260	0	5,000	5,000
1940	700	1,321	1,285	0	0	
1941	5,689	27,750	6,850	61	46,360	9,830
1942	7,399	24,118	6,188	1,560	54,344	14,106
1943	6,505	9,000	3,500	160	52,803	49,120
1944	5,557	6,284	5,239	1,722	137,050	137,050

Source: INSEE (1966), Tableau IA, p. 532.

With the boom in the stock market, a squeeze on equities was essential to bond finance (Oosterlinck, 2003). As inflation rose, investors attempted to escape the effects of inflation by investing in real assets and securities, which entitled them to hold real assets that presumably would not be diminished in value by the end of the war. Capital and stock market controls were thus an essential part of the fiscal regime of occupied France. At the outset the Paris stock market was shut down. At first the German authorities were reluctant to reopen the market, fearing that it would serve as a political barometer.<sup>10</sup> The French government countered that without a proper exchange to float bonds, payment of the occupation charges would be difficult.<sup>11</sup> While the exchange was allowed to open on October 14, 1940, the Germans set strict conditions. Trading in stocks and foreign

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from 650 to 750 million francs. In 1943 Crédit Lyonnais raised its capital from 400 million to a billion francs and augmented its reserves. Plessis, p. 20

<sup>10</sup> "Vortragsnotiz betreffende die Wiederoöffnung der Pariser Börse," August 18, 1940, AJ40 vol. 832 4b.

<sup>11</sup> Ministère des finances, "Note sur l'ouverture de la bourse," August 10, 1940, A140 Vol. 832 4b.

securities was forbidden as were all futures markets, leaving only the bond market open.<sup>12</sup> Furthermore, the curb market, where there were a large number of Jewish brokers, was suspect and

For five months, only the bond market was open in Paris, encouraging new investment in bonds and making it easier for the French government to float bonds. There may have been little enthusiasm in Vichy for the reopening of the stock market, but the growth of a black market in stocks and pressure by brokers persuaded the government to permit stock trading again on March 19, 1941. To prevent equities from detracting from the government bond market, the government controlled dividends, capital gains and new issues. In the February and March decrees of 1941, dividends were limited to a maximum of the three year pre-war high or six percent. Daily price increases were limited to 3 percent (decreases to 6 percent); in April, a tighter regime was imposed with a daily ceiling for price increases of 1 percent (decreases to 3 percent). A capital gains tax of 33 percent for equities and foreign bonds held less than one year was imposed and the basic tax on coupons and dividends was set at 30 percent. Initial public offerings were not initially suppressed, but they were allowed a maximum dividend rate of 8 percent. This loophole probably contributed to the increase in new offerings. The government could not suppress the equities market as new investment was required to re-equip French industry so that it could provide for the Nazi war machine. This problem became more acute when, after 1942, the French economy became integrated in Speer's economic plans.

#### **IV. Repression of Markets and Financing of the War**

Controls imposed on prices and wages, coupled with rationing and the regulation of money and capital markets, had a common goal of increasing the ease of Vichy's financial operations. If inflation was kept in check, revenue from seigniorage would not require increasingly rapid rates of growth of the money stock to capture real resources. Controlling prices and rationing should also have left the public with cash, which if interest rates were kept low, could be channeled to government bonds, especially if the stock and bond markets did not provide attractive alternatives for savings. This

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<sup>12</sup> The exchanges located in the Free Zone were not subject to these rules. The result was a shift of trading to the Free Zone exchanges, primarily Lyon and the emergence of a large black market in the Occupied

repression of markets by the imposition of controls should have operated generally by reducing velocity. Table 6 shows the behavior of velocity from the franc Poincaré stabilization until the end of the Fourth Republic. During the boom period in the late 1920s and early 1930s velocity was high and on average well above two. It declined some during the hard years after 1931, but what is remarkable is the collapse of velocity during World War II before the rapid return of velocity to the levels prevailing before the economic collapse.

**Table 6**  
**Income, Money and Velocity, 1927-1958**

	Nominal GDP	M2	Velocity
1927	318	132	2.42
1928	337	161	2.09
1929	393	162	2.43
1930	395	170	2.32
1931	361	165	2.19
1932	307	164	1.87
1933	295	153	1.93
1934	247	154	1.60
1935	245	146	1.68
1936	261	165	1.58
1937	338	176	1.92
1938	380	203	1.87
1939	433	256	1.69
1940	419	371	1.13
1941	392	447	0.88
1942	424	589	0.72
1943	493	742	0.66
1944	739	847	0.87
1945	1007	998	1.01
1946	1935	1363	1.42
1947	3395	1694	2.00
1948	5582	2191	2.55
1949	6728	2750	2.45
1950	7640	3189	2.40
1951	9200	3775	2.44
1952	10690	4287	2.49
1953	11180	4794	2.33
1954	11930	5465	2.18
1955	12960	6169	2.10
1956	14380	6817	2.11
1957	16080	7535	2.13

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Zone.

1958	18510	7927	2.34
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Source: Patat and Lutfalla (1990).

Note: Toutain (1997) provides a higher estimate of GDP of 415 billion francs for 1938..

This decline in velocity gives a rough measure of the effect of controls on the government's ability to raise funds. Rockoff (1981) proposed a simple method by examining how changes in the stock of money in year  $t$   $(dM/M)_t$  are affected by controls through the behavior of velocity ( $V$ ), defined as income ( $Y$ ) divided by money ( $M$ ).

The change in the stock of money may thus be written:

$$(1) \quad (dM/M)_t = (dM/Y)_t V_t$$

If controls reduce expected inflation and velocity, they will reduce  $(dM/M)_t$  provided that  $(dM/Y)_t$  is independently determined. Equation (1) can be rewritten as:

$$(2) \quad (dM/Y)_t = (G/Y)_t (dH/G)_t (dM/dH)_t$$

where  $G_t$  is government expenditure and  $dH$  is the change in high-powered money. Given that the Germans set occupation costs,  $G_t$  can be assumed to be independent; as may  $(G/Y)_t$  in the short-run. But the share of spending financed by high-powered money  $(dH/G)_t$  may not be independent. In the absence of controls, the government might have relied more on taxes and borrowing. However, this ratio will be assumed to be fixed, particularly as it may have been difficult to raise taxes given the fragile state of the economy. The ratio  $(dM/dH)_t$  is a function of the reserve-deposit and currency-deposit ratios. If controls stabilized expectations of inflation, they would tend to increase these ratios and reduce  $(dM/dH)_t$ . Thus, the key ratio,  $(dM/Y)_t$  was not strongly effected by controls and may have been reduced by them, lowering the need of more money creation. Holding this variable constant in Equation 1 may thus lead to an underestimate of the impact.

**Table 7**  
**Estimated Effects of Economic Controls**

Year	Actual $V_t$	First Counterfactual for $V_t$	Second Counterfactual for $V_t$	First Estimate of $dM/M$	Second Estimate of $dM/M$	Actual $dM/M$
1940	1.13	1.68	1.63	46.1	44.7	45.0
1941	0.88	1.67	1.57	32.7	30.8	20.7
1942	0.72	1.66	1.51	55.5	50.5	31.7
1943	0.66	1.65	1.45	51.0	44.8	25.8
1944	0.87	1.64	1.39	23.4	19.8	14.2

To calculate the effects of controls, an estimate of what velocity might have been in the absence of controls is required. The average velocity for the period 1927-1938 was 1.97 and for the bad years of 1932-1939, it was 1.77. However, as evident in Table 6, there was a downward drift in velocity before the fall of France. An ordinary least squares regressions of  $V_2$  on time for 1927-1939, gives a point estimate of this annual decrease of  $-0.061$  and for 1932-1938 of  $-0.008$ ; though the latter is not significant.<sup>13</sup> Table 7 shows the estimated increases in the money supply that would have resulted under either rate of decline. The procedure uses 1939's actual velocity as a starting point, which is low and hence increases the potential of an underestimate. Nevertheless, the differences are profound, particularly for 1942 to 1943, when Vichy would have apparently have needed to increase money stock growth by more than 50 percent to compensate for the absence of controls. While these regulations were central to the wartime regime and all countries adopted similar policy packages, this exercise provides some insights into the importance of these regulations to boost the "politique de circuit."

#### **IV. Measuring the Cost and Alternatives**

The rapid decline in French GDP, even with a substantial unmeasured black market, suggests that the economy could not have sustained the burden for long. What would have been a more optimal policy on the part of Vichy? Should Vichy have allowed interest rates to rise? Should it have pursued a policy like Weimar Germany of financing the occupation with money and generating inflation. What was the effect of the withdrawal of labor from France?

To assess the Vichy's policies and alternate strategies, we follow Ohanian's (1997) basic model of a wartime economy. However, he did not include the crucial monetary sector, and we expand our version of a neoclassical growth model to include one. In this model, there are a large number of identical, infinitely lived consumers with perfect foresight who have an initial endowment of  $k$  units of capital and one unit of time per period, which is divided between  $n_t$  hours of labor and  $l_t$  hours of leisure. These consumers earn income for labor, capital, and government debt and transfers. They use

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<sup>13</sup> The standard errors for the coefficient on time for the two regressions are 0.014 and 0.02 respectively.



this income to purchase goods, buy new capital (finance investment), obtain government bonds, and acquire money.

Individual maximize a lifetime utility function, where money directly enters the utility function:

$$(3) \quad V = \sum_{t=0} \beta^t u(c_t, m_t, l_t) \quad 0 < \beta < 1$$

with the time constraint of  $n_t = 1 - l_t$ . This formulation avoids the assumption of superneutrality and allows labor supply and consumption to be affected by inflation. An increase in inflation will lower real money balances, which will alter the marginal utility of leisure and the supply of labor, affecting the stock of capital, output and consumption (Walsh, 2003).

Specifically we assume a nested CES utility function:

$$(4) \quad u(c_t, m_t, l_t) = \frac{[a c_t^{1-b} + (1-a) m_t^{1-b}]^{1-\Phi/1-b}}{1-\Phi} + \frac{\Psi l_t^{1-\eta}}{1-\eta}$$

where  $0 < a, 1, b, \eta, \Phi, \Psi > 0$  and  $b, \eta$ , and  $\Phi$  are not equal to one. The term in brackets is a composite consumption good that depends on the level of consumption goods  $c$  and real money balances  $m$ . In the case where  $\Phi = b = 1$ , preferences over consumption and money are log linear, so that  $u = a \ln c_t + (1-a) \ln m_t + \Psi l_t^{1-\eta} / (1-\eta)$ .

The individuals maximize their utility subject to a wealth constraint. Upper case letters signify nominal quantities, while lower case are real quantities, normalized as  $m_t = M_t/P_{t-1}$ , for real balances. Bonds ( $B$ ) are one-period, where the principal and interest are repaid after one period.

$$(5) \quad T_t/P_t + (1 - \tau_{nt})(W_t/P_t)n_t + (1 - \tau_{kt})(D_t/P_t)k_t + [1 + R_t(1 - \tau_{bt})](B_t/P_{t-1})(P_{t-1}/P_t) = \\ (P_t/P_t)c_t + (P_t/P_t)[k_{t-1} - (1 - \delta)k_t] + X_t/P_t - M_t/P_t + (B_{t+1}/P_t) + (M_{t+1}/P_t) - \\ (M_t/P_{t-1})(P_{t-1}/P_t)$$

Equation states that income is composed of real transfers,  $T_t/P_t$ , after tax real income  $(1 - \tau_{nt})(W_t/P_t)n_t$ , after tax real capital income,  $(1 - \tau_{kt})(D_t/P_t)k_t$ , and the bond principal plus after tax real return on government bonds. This income is equal to real goods that are consumed, the increase in capital, less depreciation,  $\delta$ , (or investment net of depreciation), the new bonds that are purchased  $(B_{t+1}/P_t)$  plus real exports less real

imports. Given the extensive controls on trade, exports and imports are treated as exogenously determined. The last two terms represent the increased money balances less seigniorage, which may be rewritten as

$$(6) \quad m_{t+1} - m_t / (1 + \pi_t) \text{ or } (m_{t+1} - m_t) + (\pi_t m_t / 1 + \pi_t).$$

so that (5) becomes:

$$(7) \quad t_t + (1 - \tau_{nt})w_t n_t + (1 - \tau_{kt})d_t k_t + \{[1 + R_t(1 - \tau_{bt})]b_t\} / (1 + \pi_t) = \\ c_t + [k_{t+1} - (1 - \delta)k_t] + x_t - m_t + b_{t+1} + (m_{t+1} - m_t) + (\pi_t m_t / 1 + \pi_t)$$

The government's budget constraint for any given period has real expenditures on goods, real transfers and real payments on bonds (principal and interest) equal to new sales of bonds, labor tax revenues, capital tax revenues, bond tax revenues and the increase in the stock of money:

$$(8) \quad G_t/P_t + T_t/P_t + (B_t/P_t)(1 + R_t) = B_{t+1} + \tau_{nt}(W_t/P_t)n_t + \tau_{kt}(D_t/P_t)k_t + \\ \tau_{bt}(R_t/P_t)B_t + M_{t+1}/P_t - M_t/P_t,$$

which may be re-written as,

$$(9) \quad g_t + t_t + b_t(1 + R_t)/(1 + \pi_t) = b_{t+1} + \tau_{nt}w_t n_t + \tau_{kt}d_t k_t + (m_{t+1} - m_t) + \\ (\pi_t m_t / 1 + \pi_t)$$

A balanced budget policy here is defined where the present discounted value of all government payments is equal to the present discounted value of all government revenue.

Output in the economy is produced by competitive profit-maximizing firms using a Cobb-Douglas technology, where capital letters signify per capita quantities:

$$(10) \quad Y_t = K_t^\theta L_t^{1-\theta}, \quad 0 < \theta < 1$$

and income is

$$(11) \quad Y_t = C_t + I_t + G_t + X_t - M_t.$$

For a competitive equilibrium, given individual endowments of capital, bonds, and the government budget, there are a sequence of interest rates, factor prices, capital, bonds, labor, leisure and consumption where factor prices equal their marginal products, and the net rate of return on government debt and capital is equated so that bonds are held.

The objective behind this neoclassical model is to determine what the relative cost of various Vichy policies and some potential alternatives. Following Ohanian (1997), the perfect foresight competitive equilibrium is computed by numerically solving the system of nonlinear equations that includes the first-order conditions and budget constraints. To conduct the welfare measurement, the initial prewar equilibrium first needs to be solved, then the war values are used to calibrate the model, and finally a postwar calibration is performed. For the first, data from 1938 are used as it is the closest to a prewar full employment year and it is one of the few benchmark years that economic historians have chosen to assemble national income accounts. The war years are from 1940-1944, and the postwar period, 1945-1958, covers the era of the Fourth Republic. The length of a period in the model is one year, while the discount factor  $\beta$  is set equal to .96, for a real rate of interest of 4 percent.

There are three sources for the basic data for the French economy are available from several sources for the initial prewar conditions. First INSEE (1966, p. 553) estimated that GNP was 446 billion current francs in 1938, with consumption accounting for 74.2 percent, government consumption 12.7 percent, gross fixed capital formation 13.2 percent, and exports and imports at 10.8 and 11.0 percent. Among the most widely used figures are those of Carré, Dubois and Malinvaud (1975) who place GDP at 444 billion francs in 1938 and their estimates are used in Pattat and Lutfalla's (1990) monetary study. More recently, in a reexamination of the data, Toutain (1997, p.15, 58 85) estimated that prewar GDP for 1935-1938 to be an average of 304 billion current francs, although there was a huge variation in output in current values rising from 205 to 247, 348, and finally 415 billion francs. On average, Toutain apportions 74.3 percent of national income to consumption, 12.9 percent to government consumption, 15.6 percent to gross domestic capital formation, and 1.3 percent to government capital formation, with exports and imports accounting for 7.0 and 11.1 percent respectively. Local government expenditure is ignored here and central government expenditure for 1938 of 82.3 billion francs is used, and no transfers are assumed, as these were relatively small in peacetime. For wartime and later years, only Carré, Dubois and Malinvaud (1975) provide annual GDP data, which are used, but there is no information on aggregate consumption or investment for the war years or the late 1940s. INSEE's retail price

index is used as a measure of inflation. As mentioned previously, transfers here are treated only as the transfers that occurred when labor was drafted into Germany and families were given one half their nominal wage. To obtain this transfer,  $T$ , labor income is divided by the labor force to obtain the annual wage and one half of that times the number of labor draftees provides an estimate of  $T$ .

Although it would be preferable to have the marginal tax rates, average tax rates are developed here in the absence of a thorough study of the tax structure and its incidence. Tax rates on labor and capital are imputed by taking the total tax revenues levied on each factor divided by their share of national income. The factor shares for 1938 and 1949-1958 are provided by INSEE (1966). For 1938 labor earned 67.7 percent of national income and for 1949-1958 it ranged between 66 and 68 percent. However, there were large changes during World War II, as documented by Piketty (2001). His factor shares closely match INSEE's for the overlapping years, but labor's share rose from 70 percent in 1940 to 87 percent in 1943 before drifting back to approximately 68 percent. Piketty (2001a) provides a decomposition of the state's revenue into taxes levied on capital, labor and mixed sources for 1938 (16.0%, 64.4%, and 19.6%), 1943 (9.3%, 55.1%, and 35.6%) and 1956 (6.2%, 74.4%, and 19.4%). Following his procedure and using the data provided by INSEE (1966) and splitting the mixed revenue between capital and labor produced a series on the tax revenue from these two factors. The combined effects of the rise in wartime tax rates and the fall in capital's share of income led the tax rate on capital to rise from 11.8 percent in 1938 to a peak of 59.8 percent in 1943, while the tax rate on labor increased from 12.2 to 16.0 percent.

In 1938, Carré, Dubois and Malinvaud (1975, p. 59) put the total population of France at 42.0 million with a labor force of 19.5 million of which 16.4 million were employed in productive sectors, which excluded the unemployed, draftees, and government officials. The workers employed in the productive sectors had slowly grown between 1935 and 1938 at a rate of 0.7 percent a year. For our purposes, we assume that 16.4 million represents the effective prewar labor force. The war gradually reduced the labor force. First, there was the loss of Alsace-Lorraine, which had population of 1.9 million (Milward, p. 39). Assuming the same rate of labor force participation as the rest of France in 1938, the loss of Alsace-Lorraine would have reduced the labor force by .75

million. Some of this population fled or was driven into France as Hitler moved to “Germanize” the region, but this reduction will suffice as it will also cover the other small regions that were lost. Defeat also brought 300,000 deaths (Bettelheim, 1946) and the internment of 1.2 million French prisoners-of-war. The POWs are assumed to have been called up to duty and hence were previously productive and should thus be subtracted from the labor force in 1940, leaving a total of 14.1 million workers. According to Carré, Dubois and Malinvaud (1975) the population continued to shrink by perhaps 100,000 per year, and the work force is thus reduced for 1941 and 1942. The last great shock was the relève, which occurred in 1943-1944 and reduced the labor force by a further 800,000 until Liberation. By 1946, the labor force had recovered to 16.8 million but it then declined to 16.4 million by 1957.

The outstanding debt of the government stood at 423.5 billion francs on January 1, 1939, growing to 1333.5 billion francs by 1944 (INSEE, 1966). The estimates of M2 are provided by Patat and Lutfalla (1990), while INSEE gives the total nominal debt of the central government. On January 1, 1939, it stood at 423.5 billion francs, climbing to 1333.5 billion by the end of the war. There are no estimates of the capital stock for the late 1930s. Carré, Dubois and Malinvaud (1975, p. 120) estimate the total capital-output ratio in 1949 to be 3.06 and for productive capital 1.93, which then slowly declined in the 1950s, reaching 2.47 and 1.61 by 1959.<sup>14</sup> Thus, for our purposes we use the rough estimates of 2 to provide an estimate of productive capital in 1938. However we do know that the occupation took its toll on capital, just as it did on labor. Carré, Dubois and Malinvaud (1975, p. 534), set the value of gross productive capital on average at 56 billion francs in 1956 prices in 1921-1930, 59 billion for 1931-1940 and only 15 billion for 1941-1945.<sup>15</sup> Depreciation is estimated by INSEE (1966) to be 10.6 percent.

The panels in Figure 4 represent the calibrated time path of key variables in our baseline model, where they are initially set at their steady-state levels. They are

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<sup>14</sup> In 1913, they estimate the capital-output ratio to be 2.81 and the productive capital-output ratio to be 1.61.

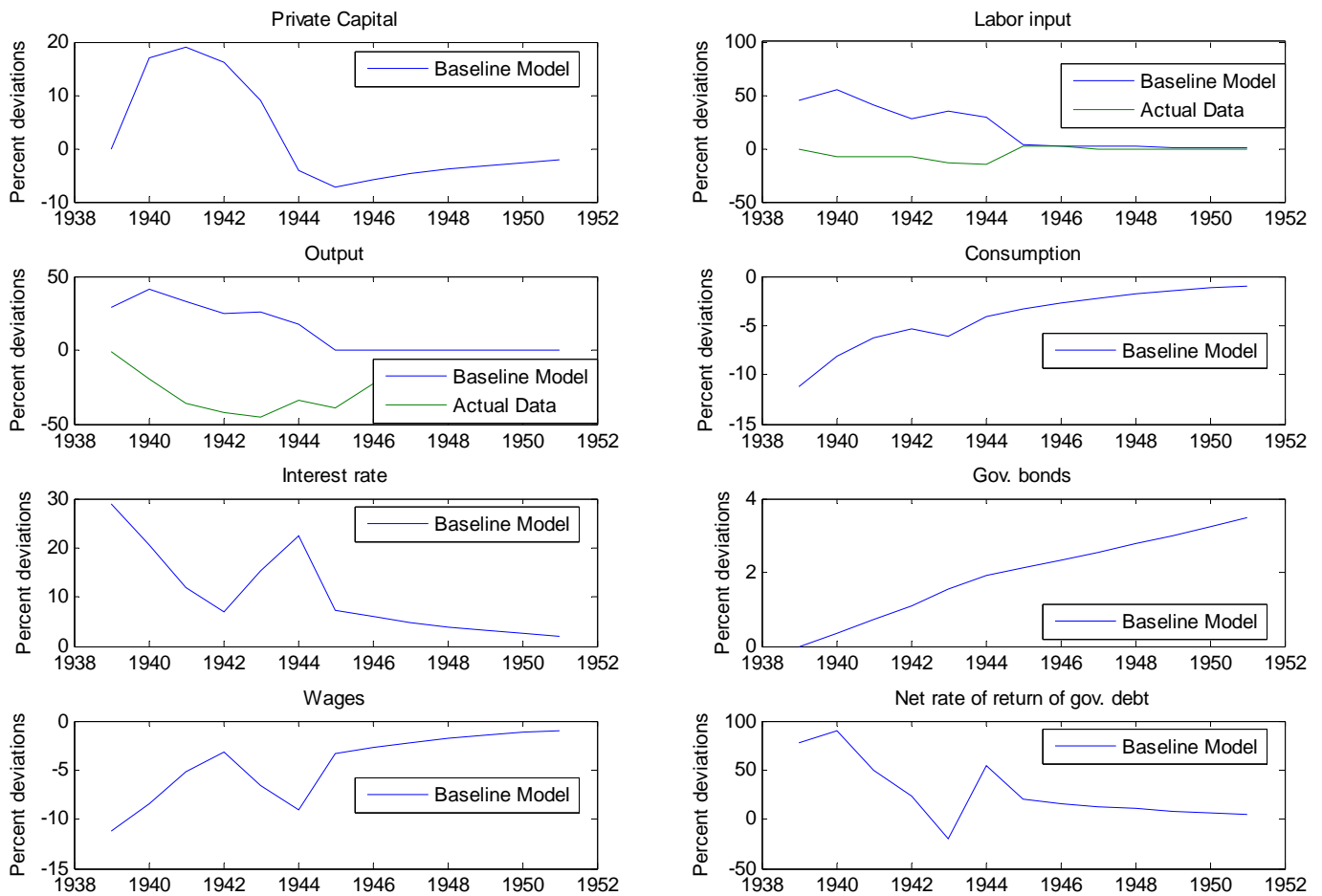
<sup>15</sup> In addition, Carré, Dubois and Malinvaud report (p. 151) an estimate of 137.7 billion current francs for fixed reproducible capital in 1913. Taken with Toutain’s estimate of GDP of 49.6 billion francs for 1913, there is an implied capital output ratio of 2.78.

compared to their actual values when available.<sup>16</sup> Movements are measured in terms of the percentage deviations from the steady state. The perfect foresight model moves in a fashion very similar to Ohanian's (1997) model of the U.S. It is important to remember that the model is a perfectly competitive economy with no distortions except for the taxes on labor and capital. In this simplest or baseline model, the Occupation forces a reduction in the labor force and an increase in government expenditure. The higher government expenditures are financed partly by the government raising tax rates, leaving the remainder to be financed by bond issues. Higher taxes reduce the incentive of labor and capital to work, but the borrowing demands of the government raise the interest rate. Consumption falls and there is an increased labor input to smooth the path of consumption and increase savings, which in turn, increases capital and output. As the economy begins to adjust and there is a reduction in occupation charges; the failure at Stalingrad and the Allied landings in North Africa then increase occupation costs and force the relève on the French economy, which cause further shocks, before the economy slides back to its equilibrium values.

#### **Figure 4**

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<sup>16</sup> In this initial calibration, the monetary sector is excluded and bonds and money are lumped together as in Ohanian's (1997) model. This constraint will be released in the next draft of this paper.



It is important to remember that there are no controls in this baseline model. Without wage and prices controls, rationing and the Banque de France's interest rate policy, factor prices are free to move, leading the baseline variables to shoot far from the actual values. Nevertheless, there is a high cost in terms of the fall in consumption, which totals approximately 40 percent of one year's steady state consumption, which is not recovered. The potentially extreme movements of factor prices suggest why the masters of Vichy, like their Republican predecessors and most modern governments at war in the twentieth century intervened. Thus, output, capital and labor input rise sharply as the interest rate increases.

[Further analysis to follow]

## V. Conclusion

The extraordinary extraction of resources from the French economy was successful, though ultimately unsustainable. Concerned, perhaps paranoid, about the inflationary potential of the payments demanded by the Nazi occupation, Vichy France's policy makers raised taxes and tried to induce the public and financial institutions to absorb the stream of new bond issues. In addition to wage and price controls imposed at the war's outset, the new regime soon added rationing and an intervention in the financial sector to redirect the flow of funds. While moderately successful in limiting inflation, the economy steadily contracted. Our preliminary estimates emphasize the costliness of these policies, casting doubt on whether they could have endured if the war had continued.

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