THE ROLE OF THE ASSIGNATS DURING THE
FRENCH REVOLUTION: EVIL OR RESCUER?

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> The Government cannot introduce a sound money
> because in the absence of other revenue, the printing
> of an unsound money is the only way by which it can
> live. (J. M. Keynes, *A Treatise on Money*)

Hyperinflation during the French Revolution, like the German hyperinflation of the 1920's, has left a lasting imprint on collective memory, most likely because it was associated with momentous political and social developments. Indeed, the era of the French Revolution was disastrous from the economic point of view. Not only did the revolutionary period have the dubious honor of being the first hyperinflation in modern times, but it also witnessed a substantial decrease in output and a severe disruption in the operation of most markets.

Since this period corresponded to the existence of the assignats, it was easy to accuse the assignats of being at the root of the economic problems. French historians have not only blamed the assignats for the inflation, but also for many of the disasters of the period. They have been accused of causing a substantial decrease in output, of disrupting markets, of causing famine, and of rendering the "Reign of Terror" inevitable. Marion (1914) writes: "Among all the causes of the problem of subsistence and famine. . . the paper money was the principal."[1] Chaunu (1989), from the liberal school of historians, emphasized that: "Between two evils, the National Assembly has always chosen the worst,"[2] in particular, the decision of issuing assignats. Aftalion (1987), analyzing the economic role of the assignats, writes: "No other explanation is needed in order to understand the rapid degradation of the economic conditions and the alimentary situation."[3] Already during the French Revolution, the assignats were accused of evil. Marat wrote "The worst disaster is the misery which will increase with time. The cause of it is in the huge amount of assignats." On the other hand, Jaurès, from the socialist school considered the assignats desirable. For him: "The assignats saved the French Revolution."[4]

What was the role of the assignats during the French Revolution: an evil, as claimed by most historians, or a rescuer, as depicted by Jaurès? The purpose of this paper is to analyze the effect of the assignats during the French Revolution.

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[1] Marion (1914), p.170 v.II.
[2] Chaunu (1989), pp.178.
[3] Aftalion (1987), p.173.
[4] Jaurès (1923), p.131

The two main economic problems during this era were the inflation developing into a hyperinflation during 1795, and a disruption of markets accompanied by a reduction of output during the years 1793-1795. Accusing the assignats of causing inflation and supply shortages is to find a scapegoat instead of the true factors: the war and the "dirigist" economy.

The revolutionary wars and the dirigist-interventionist policy are an intrinsic part of the revolutionary message. Therefore, on one hand, there are those who did not want to accuse these factors for the economic disasters and have preferred to accuse the assignats. On the other hand, for liberal historians disliking the Jacobin message of the revolution, to accuse the assignats was to find one more wrong doing of the National Assembly.

In this paper we show that the inflation was related to the war that erupted in 1792. In the first part of the paper we provide a brief sketch of the history of the assignats, highlighting the fact that they played several roles. In the second part, we analyze the relation between the assignats and inflation. We construct a new series for the price index. We show that the beginning of the inflation coincides with the war in 1792, and not with the issue of assignats in 1789-90.[5]

In part three we estimate the effects of a war budget deficit on inflation. The 1792 war led to a high budget deficit financed by the issue of fiat money -the assignats. The consequences of financing a deficit by printing money have been studied at length in the case of modern hyperinflations.[6] In particular, Cagan (1956) has shown that one can estimate the maximum government deficit that can be financed through seigniorage without lapsing into runaway inflation. Estimating the money demand, as in Cagan, allows us to find this maximum level of seigniorage. Our estimation shows that the French hyperinflation unwound in a similar way to the European hyperinflation of the 1920's.

In part four, we briefly analyze the relation between the assignats and the reduction in output. We show that the transition from a liberal economy to a "dirigist" economy was accompanied by deleterious effects on the supply side. Part five concludes.

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[5] Since the government deficit did not markedly increase during 1792, the inflation rate was not high in that year. In 1793, on the other hand, government deficit tripled.

[6] See Cagan (1956), Cukierman (1988), Dornbusch and Fischer (1986) and Sargent (1986).

1. The Role of the Assignats.

The decision to issue the assignats was a consequence of the budgetary problems of the Ancien Régime, problems which eventually triggered the Revolution. Louis XVI faced the daunting task of financing the budget deficit that resulted from a debt service, standing at 230 million livres in 1789, imposed by a public debt of 4.5 billion livres.[7] Since the public was becoming reluctant to increase its holding of debt, there was no way to finance the deficit by issuing more debt. Moreover, the government could not increase taxes, since Frenchmen were sincerely, though mistakenly, convinced that they were overtaxed, and they would resist new taxation.[8]

Eventually, the convening of a representative body, the States General, became the only way out of the impasse (the States had last been summoned in 1614). They convened in May 1789 with the purpose of solving the budgetary crisis, but the Third Estate was soon steering things towards political and social revolution. By June 1789 the Third Estate had constituted itself into a National Assembly, taking power into its own hands. And in turn, the National Assembly faced the same budgetary crisis.

The Assembly had declared existing taxes to be "illegal" and had ruled that there would be no repudiation of the debt. One suggestion to solve the budgetary problem was to expropriate and sell church property. The resulting revenue would then be used either to finance the debt service or to buy back the entire public debt. Since the deficit was increasing at an alarming pace, and the sale of land could not be arranged on short notice, the National Assembly chose to solve the problem by issuing a new financial instrument -- the assignats. The budget deficit would be financed first by issuing assignats. Once church property had been disposed of, the assignats would be withdrawn. The assignats would thus be interest-bearing promissory notes guarantied by church land and would be redeemable as the land would be sold.

There was much debate in the Assembly as to what form the assignats should take. The different possibilities available to solve the budgetary problem were: (i) to repudiate part of the debt, (ii) to print money, (iii) to forcibly borrow money equivalent to a partial

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[7] White (1989) argues that the debt problem was not so acute and could have been solved years before. However he does not deny that in 1789 the budget crisis was unavoidable. The data on the budget deficit presented in Table 1 is different than White's data since we use the data presented by Harris (1930) and Braesch (1934).

[8] See Weir (1989)

rescheduling of the debt, or (iv) to offer better terms on debt so as to increase its attractiveness.[9]

The *Constituants* were divided over whether the assignats should become money. Some claimed that an increase in money would lead to inflation. Some others claimed that the reduction in the money stock led to a "scarcity of money" in the economy, so an increase in money would have a positive effect on supply.[10]   Some *Constituants* did not enter the economic debate and saw the printing of *fiat* money as a political act, a manifestation of national sovereignty: "Every nation has the right to manufacture money, to substitute territorial specie for metallic specie."[11]

The result of the Assembly's debates was that the exact role to be played by the assignats was left ambiguous. During their existence, from 1790 to 1796, the assignats played all the roles enumerated above. At the time of their issue they constituted debt. For some, this new asset was viewed as a partial rescheduling, for others, as a new attractive asset. They later became the most liquid asset in the economy, money. Finally, and despite the original aversion to debt repudiation, they were the vehicle by which inflation temporarily erased the government's debt.

The exact type of financial instrument that the assignats were must be clear in order to understand their consequence on inflation. There is no clear cut rule in monetary theory as to which asset should be considered money and affect inflation. Money, M1, is defined as the most liquid asset, the medium of exchange in the economy. However, since many other assets that are not the medium of exchange have also some degree of liquidity, they can have inflationary effects as money does. Therefore, monetary aggregates, M2 and M3, that include assets ranked by their liquidity, are other ways of measuring money in the economy. Nowadays M1 includes currency and checking accounts; M2 includes M1, saving deposits and money market accounts; M3 includes M2, mutual funds and time deposits. L is an aggregate of liquid assets which includes M3, short term securities, commercial paper bonds and banker's acceptances; it is not a monetary aggregate.

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[9] The financing of the government deficit is determined by the expression

$$(G + rB) - T = (\Delta B + \Delta M)/P$$

where B is the public debt, M is money printed by the government, the amount of G is real public expenditures (debt service excluded), rB is debt service and T are taxes in real terms.

[10] The "scarcity" of money (i.e., a lack of liquidity in the economy) was caused by a decrease in the stock of specie, due to a current account deficit and capital flights: "Toutes les maisons de banques et de commerce, tous les hommes dans les affaires éprouvent une gêne alarmante par le défaut absolu de numéraire." Gazette de France, 24.9.1789.

[11] Anson quoted in Harris (1930), p.15.

Using these definitions for the period of the Revolution, we define M1 as specie and notes of the Caisse d'Escompte; M2 includes M1, bills and commercial paper. In which aggregate should the assignats be included? Since the role of the assignats evolved over time from a non-monetary asset, L to money, M1, we analyze the different roles during the period 1789-1796.

December 1789-March 1792.

A decree passed by the Assembly in December 1789 established that the assignats would be a financial security to be exchanged for land, and that they would not be a medium of exchange. They were issued only in large denominations, were interest-bearing, and were not legal tender. The notes were confined to the 1000 livres denomination until August 1790, 200 until October, and 50 until December, as shown in Table 2.

The assignats constituted a new type of debt, attractive enough to be accepted by the public since they allowed it to purchase land from the government.[12] Preparations were lengthy, and the first assignats were issued only in August 1790, ten months after the decision to issue them was made (see Table 2). In this interval, instead of assignats *per se,* the public held "promesses d'assignats" issued by the Caisse d'Escompte.[13]

In April 1790, the Assembly passed a decree which lowered the interest rate on the assignats, reduced the denominations in which they were issued, and made them legal tender. The direction in which things were moving was clear: the assignats were increasing in liquidity and becoming a medium of exchange.[14] In this development, September 29, 1790, should be considered a turning point. The Constituants then decreed another large issue of 800 million, abolished interest on assignats, and started to lower the minimum denomination. Thus, they opened up the way to uncontrolled issues, and therefore, to the creation of an unsound money.

In 1791, the liquidity of the assignats was greatly enhanced: From May 1791 they were issued in the denomination of 5 livres, and reached as low as 10 sols in December

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[12] The first decision of the Assembly with an eye to solving the budget deficit problem was the nationalization of church land in November 1789. The *Constituants* were not always aware that an increase in the stock of wealth would not increase the stream of national saving. The decree was a means of appropriating part of private saving by selling the land or by indexing the assignats to land in order to increase their attractiveness.

[13] Assignats began to be issued in exchange for Caisse d'Escompte notes on 16 August 1790: 360m Livres' worth of assignats were issued in this manner.

[14] Despite the fact that from April they became legal tender, they were still issued in large denominations and therefore, could not be used easily as a medium of exchange, M1. The Caisses Patriotiques played the role of private banks issuing small denominations of paper instead of assignats. However, the amount emitted by the Caisses was not more than 140 millions of Livres. See White (1990).

1791.[15] Over time, they became *de facto* the only medium of exchange. This was particularly true after April 1793 when, despite the depreciation of the assignats relative to specie, the use of two different prices was prohibited.[16]

During this period, as shown in Table 1, the role of the assignats was not to finance the current deficit but to redeem the debt and finance the debt service. The reason for this swap was the National Assembly's wish to reduce the budget deficit by reducing the debt service.[17] The exchange of the floating debt for assignats --decided in September 1790-- was a monetization of part of the debt. This role was to disappear after the declaration of war.

April 1792-February 1796.

War was declared against Austria on April 20, 1792. Because of military expenditures, the government deficit increased greatly, and the repayment of debt was therefore suspended. In 1793, the government tried to finance these expenditures by floating two loans, but this attempt met with little success (they issued two loans of 2 billion Livres: only 10 percent was subscribed), since the plebs did not save and the bourgeois and nobles, who did, were not likely to buy debt issued by a revolutionary government.[18] Printing assignats was, therefore the only possible way of financing the budget. An inflationary process began at the same time.[19] In order to put an end to the inflation, price controls --"les lois du maximum"-- were passed, largely because of pressure exerted by the "sans-culottes."

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[15] The decree of October 8, 1790 allowed for the L50 denomination. The L0.5 denomination was created by the decree of May 6, 1791; the 10 sols denomination was created by the decree of December 23, 1791.

[16] The decree of April 8, 1793 ordered prices in contracts to be posted in terms of assignats and forbade that prices be posted in terms of specie. This effectively prohibited the use of two prices. This was reinforced by the decree of April 11, 1793 that provided for severe penalties for anyone "qui arrête ou propose différents prix d'après le paiement en numéraire ou en assignats." One is, therefore, justified in supposing that the circulation of specie effectively ceased with the promulgation of these decrees, even more so following passage of the decree of September 5, 1793 that specified: " trafficking of assignats would be punished by penalties up to death." Harris goes so far as to state that "[T]he Government prohibited payments in gold and silver in fulfilment of private contracts and prohibited the sale of numéraire on April 8,1793" (Harris (1930), p.177-8).

[17] The debt was divided into three categories. The 'Dette Perpétuelle' and the 'Dette Viagère' paid annuities but no capital; the third category, the 'exigible debt,' was debt that paid interest and capital and which was "on demand." This type of debt had to be bought back.

[18] It is known that a portion of military expenses --imports of raw materials, wheat and some payments to the soldiery-- had to be paid in specie.

[19] An increase in prices occured also before: in 1789 and again in late 1791, prices of wheat had surged due to poor harvests. Yet, the inflationary process started only in 1792.

The price controls or laws of maximum were in effect from May 1793 until December 1794.[20] This was the period of the "terreur économique." The first set of controls, which only dealt with grain and varied from area to area, were a failure. They were based on the average price of grain in each locality from January to April 1793. As a result of the failure of the first set of measures, a new law was passed in September 1793, forcibly reducing the prices of forty basic commodities.[21]

The consequence of the price freeze was that the peasants were no longer interested in selling their crops at the fixed prices: "The day the laws of maximum came into effect, good deliveries ceased instantly."[22] The revolutionary government was forced to commandeer and seize whatever was found to nourish the army and the city of Paris, while the peasants tried to hoard. Markets were badly disrupted and the autumn of 1794 was characterized by a poor harvest which led to a severe famine: "If you don't pay the wheat at its price, the farmer will not sow."[23]

By the end of 1794, peasants and merchants were pressuring authorities to end the "dirigisme," and on 24 December 1794 the laws of maximum were abolished. As a consequence of the terror and war, output had decreased in 1794. The council responsible for the enforcement of the maximum laws was informed: "the maximum system was the greatest simple cause of the deficiency of subsistence."[24] Although agricultural output increased in 1795, industrial output decreased in some regions by 30 percent.[25] When price controls and requisitions were abolished, inflation surged upwards.[26] In 1795, the rate of inflation and the rate of increase in money were both spiralling upward. The rate of inflation reached 3500 percent, erasing *de facto* a sizable portion of the public debt.[27] Thus, the *Directoire* decided to destroy the plates used to print the assignats on February 18, 1796.

They then tried a new instrument, the *mandats territoriaux*. They were, de facto, not different from the early assignats: they would be exchanged against land. The first mistake

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[20] Robespierre fell from power in July 1794.

[21] What, in fact, was done was not only to peg prices, but to lower them to their 1790 values plus one third. In the next section we will analyze the consequences of this measure.

[22] Extraits des mémoires de la Tour du Pin, cited in Aftalion (1987), p.379.

[23] Speech on the maximum, at the Convention, April 27,1793.

[24] Correspondence de Carnot, cited in Harris p.149.

[25] See Harris, p.144.

[26] "But at least the abrogation of the maximum laws saved the country from famine in 1795", Taine.

[27] In 1796, France had returned to the use of specie at the same parity as before the inflation. Therefore, the government continued to face the same budgetary problems as in 1789. The debt burden was resolved only in 1797 by the "bankruptcy of two-thirds," which is de facto a repudiation of two-third of the debt.

was to fix a far too high rate for the exchange of assignats into mandats. The second was, again, to issue too many of them. Therefore, they depreciated as much in six months as the assignats did in six years. At the end of 1796, France returned to specie.

This short historical survey underlines the fact that the assignats were not always money. The assignats, when first issued, were an asset that should be included in the L aggregate.They were an asset that permitted one to avoid repudiation of the debt. From the economic point of view, it would have been wiser to repudiate the debt; however, it was against the revolutionary ideology. From 1790 they should be included in M2 and from the end of 1791 in M1. The effect of the issue of assignats on inflation was, therefore, not steady during the whole period.

2. Budget Deficit, Money, and Inflation.

Assignats were accused of being at the root of inflation. Empirical work analyzing the effects of the issue of assignats on inflation has been seldom. Aftalion (1987), using the simple equation of the quantity theory of money, has found a particularly close relationship between the issue of assignats and inflation.[28] However, his estimation is biased. First, he estimates an equation that does not incorporate the effect of inflation on the demand of money. Second, the data he uses are not appropriate, the serious problem being with the price index. The proxy for inflation which is commonly used is the series that gives the depreciation of the assignats relative to specie.[29] During this period, however, specie ceased to be a medium of exchange for domestic payments and was confined to the role of a foreign asset. The data on the depreciation of the assignats toward specie, therefore, reflect the depreciation of the exchange rate.

Since the depreciation of the exchange rate is, in the long run, linked closely to the inflation rate by the Purchasing Power Parity equation (PPP), the exchange rate first seems a good proxy for inflation. However, recent work in international economics has shown that, in the short run, depreciation can behave differently from prices, especially during periods of acceleration of inflation. Dornbusch (1988) wrote: "The evidence on deviations from PPP leaves little doubt that they have been large and persistent."[30]

The difference between inflation and depreciation during the French Revolution can be largely explained by speculation, capital flight and uncertainty about the political stability of France. This difference between inflation and depreciation of the exchange rate was

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[28] Aftalion(1987), p.256-260.
[29] According to the purchase price of specie on the part of the Treasury.
[30] p.1080.

already noted by Lavoisier at the beginning of 1792: "If one consults the price of wheat, of meat. . . or of daily wages, it will be seen that the increase of their prices is not nearly in proportion to what one calls the loss of the assignats."[31]

Another proxy possible for the inflation rate is the local tables of depreciation of the assignats. Would they have included only commodities, these tables would have displayed the inflation rate. However, they incorporate the depreciation of assignats relative to gold and silver, due to the weight given to silver and gold quotations in Paris.[32] They are therefore an average of the "true" price index and the foreign exchange rate, and they cannot be a good proxy for the price index.

Data on the price of some goods, in particular food, are available for some of the period, but they are particularly scarce for the period during which the laws of maximum were enforced (1793-94) --not surprising since markets functioned poorly.[33]   We have found one good on which we have daily data, produced largely with domestic inputs and not influenced by seasonal movements. Its price increase should, therefore, provide a good indicator of the inflation. The good in question is newspapers. We have gathered data on the price of five newspapers printed in Paris: the *Gazette de France*, the *Journal de France*, the *Mercure Universel*, the *Annales Républicaines Françaises* and the *Annales Patriotiques et Littéraires* (See Table 4).

A priori, the series of the price of newspapers cannot be a proxy for the price index since it is only the price of one good in one city. However, Cecchetti (1986), analyzing the optimal price setting rule, has examined the behavior of the price of newspapers in the US during the 1970's, and from his work we can conclude that the prices of newspapers are well correlated with the price index. However, since these prices are set in a discontinuous way, one gets a better proxy for the price index through smoothing.[34] Moreover, the price series we gathered is not a daily spot price, but one for a monthly subscription. This difference is negligible, as shown on similar data during the hyperinflation in Germany.[35] Therefore, in order to build a price index, we average the price indices of newspapers, food

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[31] Lavoisier(1792), pp.501-2. Harris (1930) asks the same question: "Does not the higher apparent depreciation exhibited by the Treasury tables once more warn us of the fictitiousness of the depreciation reflected by the prices of gold and silver?", p.105.

[32] Harris (1930) writes: "The price of gold and silver and the price of land had too much weight in the construction of the local tables, the price of commodities and raw materials had too little weight." p.119.

[33] The data available on commodity prices are summarized in Table 3. There is no data available for food transactions during the terror period.

[34] Cechetti (1986) examines the optimality of the price setting rule called [s,S], in which the price is fixed until its real value reaches the floor, s.

[35] Brezis and Boboth (1992) have collected data on newspapers during the German hyperinflation. The data include daily spot prices as well as prices for subscription. The two series behave in the same manner.

and the local table index. The local table index is incorporated with a low weight, since it is mostly representing the exchange rate. Table 5 presents the various price increases. In column 2, we present an average of the newspaper data. Column 5 is the price index we adopt. Figure 1 shows that, indeed, this series behaves differently than the foreign exchange rate.

In his money demand estimation, Aftalion's series of money is the stock of assignats. It is more appropriate to use some monetary aggregate.[36] The data on the monetary aggregates are presented in Table 6. During 1790, we have shown that the assignats constituted a type of debt and should therefore be included in the aggregate L. During the years 1790-92, the increase in the circulation of assignats was accompanied by a withdrawal from circulation of specie.[37] After April 1793, the circulation of specie had, for all practical purposes, come to an end. Despite the issue of assignats, however, the money, M1, only began to increase in nominal terms after 1792.

In Table 6 we present the data on inflation, M1, and the assignats. The data show that despite some increase in prices in 1789, the inflation rate picked up only in 1792. This is not surprising, since assignats were not money, M1, until the end of 1791. In 1792, there was an increase in money as well as in the inflation rate. In 1793 and 1794, the inflation rate was much lower than the increase in money due to the maximum laws. At the end of 1795, we have a typical case of hyperinflation: prices were changed as often as three times a month (See Table 4).

Figure 2 displays that there is not a close relation between assignats and inflation, which is not surprising since assignats were not liquid in the first period. However there is a close relation between M1 and the price index until the promulgation of the laws of maximum in 1793 (See Figure 3). To accuse the assignats of being the cause of inflation is therefore not accurate. Until 1792, the assignats did not cause inflation. However, there is no doubt that the huge increase in assignats from 1792 on, is correlated with the inflation starting then. We should go one step further and question why there is an increase in assignats. As shown in Table 1, from 1792 on, the only role of the assignats was to finance the budget deficit.

Since the deficit could not be financed by new debt or taxes, printing money was the only option. Without assignats, the French government could not have, at short notice, increased its expenditures by 150%. Therefore, by creating a new asset, the assignats, the Constituants had paved the way to an unsound money that permitted the financing of the

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[36] However, since his estimation period starts in 1792, this is not a serious problem.

[37] This resulted from exporting specie to finance the current account deficit, from capital flight and from hoarding, since under Gresham's Law bad money drives out good money.

deficit. We do not question the political choice of waging a war; given the political choice, the assignats were a necessity. It is, therefore, not the assignats, but the political decision of waging a war, which should be accused of having caused inflation.

3. Budget Deficit and Inflation.

The government deficit during the French Revolution was six times larger than that in 1789. In 1792, the increase in the government deficit, G-T, is due to a reduction in taxes. However due to the declaration of war, government expenditures increased by 150% in 1793 (See Table 1).

The relation between large government deficits financed by printing money and hyperinflation was first analyzed by Cagan (1956). We adapt Cagan's model to the French Revolution period.

The government budget constraint during the French Revolution can be written as:[38]

$$GD = \Delta M/P \tag{1}$$

Where GD is government deficit. Equation (1) can be rewritten as:

$$GD = \Delta M/P = (\Delta M/M)M/P = \mu\sigma \tag{2}$$

where $\mu = \Delta M/M$ and $\sigma = M/P$.

Cagan (1956) has shown that the demand for money during an inflationary episode, can be written as:

$$M_t/P_t = e^{\alpha\pi^e_t + \gamma} \quad \text{or} \quad m_t - p_t = \alpha\pi^e_t + \gamma \tag{3}$$

Where m_t and p_t are the natural logarithms of the money stock and π^e_t is the expected inflation rate.

From equation (3) it follows that:

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[38] In fact, we have $GD = \Delta M/P + \Delta L/P + \Delta B/P$. $\Delta M/P$ is the part financed by the issue of assignats and is known as seigniorage; $\Delta B/P$ is the part financed by issue of debt; $\Delta L/P$ is the amount financed by the sale of church land. The public buys land, paying with assignats. This corresponds to an increase in ΔL and a decrease in ΔM. As shown in Table 1, ΔL and ΔB are small compared to ΔM, therefore, equation (1) is used during this period.

$$GD = \mu e^{\alpha \pi^e_t + \gamma} \qquad (4)$$

Thus for every government deficit, GD, we get the locus of μ and π as can be seen in Figure 4. Steady state situations are defined by the inflationary expectations being equal to the inflation rate as well as to the money increase. Steady states are represented in Figure 4 as the 45° line. The curve GD* represents the maximum government expenditure level that can be financed by a steady state inflation. For deficit greater than GD*, there will be no steady state (such that $\mu = \pi$) and, therefore, there will be a process of runaway inflation. The inflation rate that maximizes GD is $\pi^* = -1/\alpha$.

In order to estimates GD*, we have to estimate the money demand equation. We follow Cagan's work in the estimation of the money demand. As in Cagan (1956), we assume adaptive expectations that can be expressed as:[39]

$$\pi^e_t = \beta \pi_t + (1-\beta)\pi^e_{t-1} \qquad (5)$$

By substituting (5) into (3) and by writing (3) for period t-1, we obtain:

$$m_t - p_t = \alpha\beta\pi_t + (1-\beta)(m_{t-1} - p_{t-1}) + \beta\gamma. \qquad (6)$$

We therefore estimate the following equation for the 1788-96 period:

$$m_t - p_t = a\pi_t + b(m_{t-1} - p_{t-1}) + c + u_t \qquad (7)$$

The results are presented in Table 7. Since prices cannot be considered exogenous, the estimations are in 2SLS. We try three different specifications: we add a dummy for the terror period, and we also test the specification with a restriction on γ, such that the money stock in 1788 is 2000m livres. On the right hand side of Table 7, we present the derived estimates of the parameters of equations (3) and (5). β being close to zero, means that expectations are adapting slowly. We calculate GD*, the maximum government deficit level that can be financed by a steady state inflation, and π^*, the corresponding inflation.

We find that, depending on the specification, π^* moves between 2 to 6 percent per month. This optimal rate is lower than the inflation rate obtained during the second half of 1795. Cagan's results on the German's hyperinflation have underlined the same paradox,

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[39] Sargent (1981) shows that during hyperinflations adaptive expectations are not a big culprit since "Cagan's adaptive expectations scheme is compatible with rational expectations" p.435.

that the inflation de facto was higher than the optimal rate. However, Sargent (1981) has shown that, when estimating Cagan's equation in a consistent manner, "the estimates are so loose" that he cannot reject that "the creators of money were inflating at rates that maximized their command over real resources."[40]

Our estimation of the French hyperinflation tends to show that the French hyperinflation has similarities with the hyperinflation studied by Cagan. The point estimate of the optimal inflation is much lower than the de facto one. The point estimates for GD*, the optimal government deficit, are also low, around 7 million per month. During the French Revolution, the highest deficit was 130m livres per month in 1793 at 1789 prices (see Table 1).[41] Therefore, it seems from this estimation that a steady inflation could not allow seigniorage high enough for financing the huge deficit. Runaway inflation was a necessity. However, since the confidence interval is very broad, we find that with a confidence coefficient of 95 percent, we also cannot reject that 130m livres per month could have been financed by a stable inflation of 6 percent per month. A stable inflation would have allowed enough revenues to finance the deficit.

Cukierman (1988) has solved this paradox of a de facto inflation higher than the optimal one, in a different way. Cukierman explains why it is not irrational for a government to have a higher inflation rate than the optimal one. The optimal inflation rate is one that maximizes revenue in a steady state. However, during short periods, higher revenues can be obtained in a non-steady state situation, by increasing the rate of money all the time. The consequence is that the inflation rate is higher than the optimal inflation, π^*. "A government with a strong desire for immediate seigniorage does not necessarily act irrationally when it increases current seigniorage at the cost of higher inflation and lower future seigniorage."[42]

This explanation of the paradox can apply also to the hyperinflation during the French Revolution. If, despite the loose estimates, they are not too far from reality, it means that the French government had higher inflation than the optimal one, but also higher revenues by constantly increasing the printing and the inflation rates. This policy was rational during the Revolutionary Wars.

The estimates presented in Table 7 do not allow us to differentiate between Cukierman and Sargent's argument. If our point estimates are strongly biased downward, a steady state inflation could have allowed the amount of seigniorage needed. On the other hand, it could be that an unsteady and runaway inflation was needed to get these high

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[40] p.452.

[41] In 1794, the deficit in 1789 prices was 1554 million livres; it corresponds to 130m livres a month.

[42] p.28

revenues collected during the years 1792-95. However, during the French Revolution, under pressure from the *sans culottes*, the "lois du maximum" were passed to stop the inflationary process. In the next section we analyze their effect on output and inflation.

4. Price Controls, Output, and Inflation.

As printing money comes with high budget deficits, price controls come with major war preparations. Their effectiveness as well as their negative consequences were the subject of long debate after the two world wars.[43] Regarding the terror period, it is not surprising that the controls were proved effective in stabilizing prices. During this period, transgressors were subject to exactions by the *armées révolutionnaires* and could be subject to capital punishment in extreme cases.

As to their consequences, "at a minimum, the effect must be some malfunctioning of the economy; at a maximum, it might be chaos."[44] Price controls throw markets into disequilibrium: money in excess supply, and goods in excess demand. They are accompanied by rationing rules and requisitions. These measures were necessary during the terror period to feed the army and the city of Paris: "all the newly harvested crops were submitted to the requisition of the government for the use of the army."[45]

The disrupting effects of price controls lie in their effects on the supply side: price controls necessarily decrease the efficiency of the economy compared to the corresponding laissez-faire system.[46] On the other hand, in terms of its effects on consumption, an interventionist system is no different from laissez-faire. In both cases, consumption must decrease by the amount of the increase in government expenditures.[47] Under a system of laissez-faire, the decrease in consumption is brought about through an increase in prices (which reduces wealth). On the other hand, with fixed prices, consumption can only be decreased through direct intervention.

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[43] See Galbraith (1952), Pohlman (1972), and Rockoff (1984)

[44] Galbraith(1952), p.3.

[45] Harris (1930), p.152.

[46] Data on the reduction of output is unavailable. Harris underlines that, in some sectors, the reduction in output was of 30%.

[47] $Y + IM = C + G$, since output (Y) did not increase and imports (IM) were limited, an increase in government expenditures (G) leads to a reduction in consumption (C).

The ability to ruin commercial links and to disrupt supply is not a necessary consequence of price controls.[48] In the course of history, and more precisely during World War II, these experiences were not always a failure.[49] Nevertheless, during the terror period, within one year of their promulgation, the dire consequences of the "lois du maximum" on output became evident: "With requisitions, and maximum prices below market prices, supplies of commodities were increasingly withheld from the market."[50] This is probably because the "lois du maximum" were put into effect in a particularly unfortunate manner: (i) prices were not merely frozen, but were actually reduced, often below cost, leading to a contraction in supply; (ii) prices were fixed on a local basis, and disparities were such that certain regions remained without a viable source of supply.[51] Pressure to lift them began to mount. They were lifted in December 1794, while government deficits were still financed by the issue of assignats.

The effect of the price controls on inflation was ambiguous. On one hand, they enabled the inflation rate to be low during 1793-94.[52] On the other hand, two additional sources of inflationary pressure caused by price controls were added to the seigniorage effect on inflation:

- i) Capacity had been cut back because of the "lois du maximum."

- ii) The economy was plagued by suppressed inflation caused by the price controls, rationing, and the excess supply in the money market.

The combined effect was probably to make the post-"lois du maximum" inflation rate higher than it would have been in the absence of controls.[53]

· The price controls and associated interventionist policies wrought havoc on the French economy, disrupting markets and resulting in long term losses in output and

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[48] We do not claim a general proposition that the cost of controls always outweighs the benefits. We show that this is the case during the French Revolution. Rockoff (1984) shows that it was also the case in the US during this period.

[49] However, price controls on food and clothing were always inefficient and had negative effects. These were exactly the two main commodity markets during the French Revolution (See Rockoff (1984)).

[50] Harris (1930), p.160.

[51] The convention was probably aware of their negative effects on the supply, since one of the article of law was: "Les fabricants et les marchands en gros qui, depuis la loi du maximum, auraient cessé ou cesseraient leur fabrication et leur commerce seront traité comme personnes supsectes." Art7, project de decret, October 1793.

[52] The data on the inflation rate during the price controls period are biased, since we know that there existed transactions on the black market that were not recorded. On the other hand, newspapers were not under control and their prices, nonetheless, did not increase.

[53] During 1795-96, the inflation rate could be higher or lower than in the absence of controls, depending on the inflation and expected inflation path, that can be derived from the money demand.

growth. However, they were a political necessity. When faced with a choice between dirigisme, queues, and the disruption of markets on the one hand, and the market mechanism on the other, revolutionary movements have opted for the former solution to please the popular class.

5. Conclusion.

Ideology has biased history's verdict on the effects of the assignats. We have shown in this paper that inflation was inevitable, given the large increase in government expenditures during the war. Once it had been decided to go to war, to carry out the Revolutionary program that included no debt redemption and no new taxes, and to pursue a policy of autarky, economic choices were limited.[54] The only choice left for the government to escape its fiscal ills was the printing of paper-money.

We have also shown that the increase in the supply of assignats was not the cause of either the reduction in output, or the disruption in markets that were obtained during the Revolution. Most of the harm was caused by interventionist policies such as price controls. The delegates at the Convention made a political choice by bowing to the demands of the "sans culottes" for a *moral economy* divorced from market principles. Though harmful, the decision is understandable, given the Montagnards' need for the support of the Parisian "sans culottes."[55] Revolution and "dirigisme" went hand-in-hand because the former needed the latter to enlist the support of the poor.

To accuse the assignats of being at the root of all that was wrong with the French economy is to evade the real issues, namely the decision to levy an army of 1.5 million men in a country where financial institutions, that should ease the process of channelling domestic savings, were inefficient or nonexistent. Credible financial institutions capable of tapping foreign sources of finance would have eased the burden of providing, simultaneously, for consumption and for financing military adventures.[56] Part of the solution to high deficits lay in foreign countries carrying a portion of the burden through foreign debt or transfers.[57]

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[54] The strong revolutionary government of 1793-4 made no real attempt to increase taxation and to make tax collection more efficient.

[55] At the beginning, during 1793, they needed the support of the sans culottes in their conflict for power against the Girondins. While later on, they feared to be outflanked on the left by the rebels.

[56] Bordo and White (1991) underlines the importance of credible institutions for tapping foreign ressources.
57 Napoleon understood this full well and therefore he solved the debt and deficit problems of the French State. This was also understood to some extent by revolutionary leaders at the beginning of the wars. The

It was fundamental structural changes, not stopgap measures, that were needed to solve the deficit problem. Had the system of the debt and taxation been skillfully revamped, there would have been no need for the assignats. Had such schemes been in place before the Revolution erupted, there would probably not have been a debt problem or a Revolution. However, in the economic environment of this period, the assignats permitted the Revolutionary program to continue. If this program necessarily included war, is beyond the scope of this economic research.

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Figure 1. Inflation and Depreciation of the exchange rate


Figure 2. Inflation and Assignats, 1788-1793.
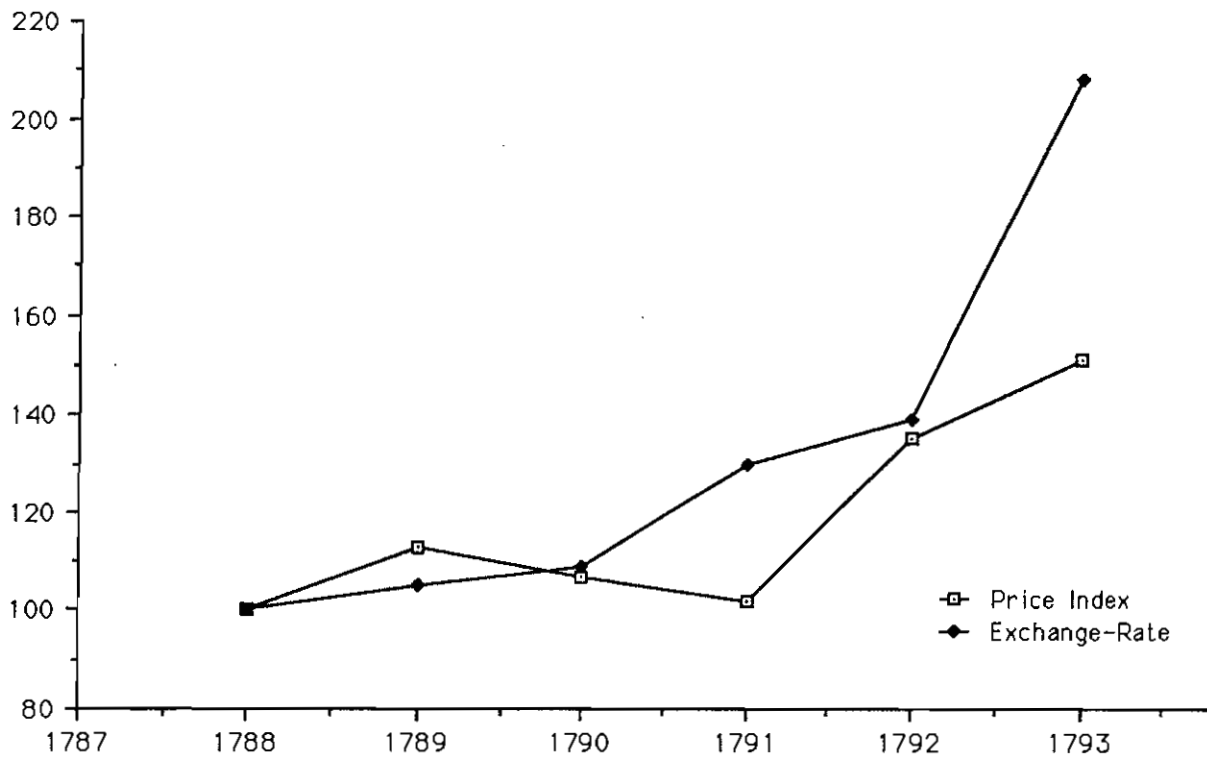
Figure 2. Inflation and Assignats, 1788-1793.
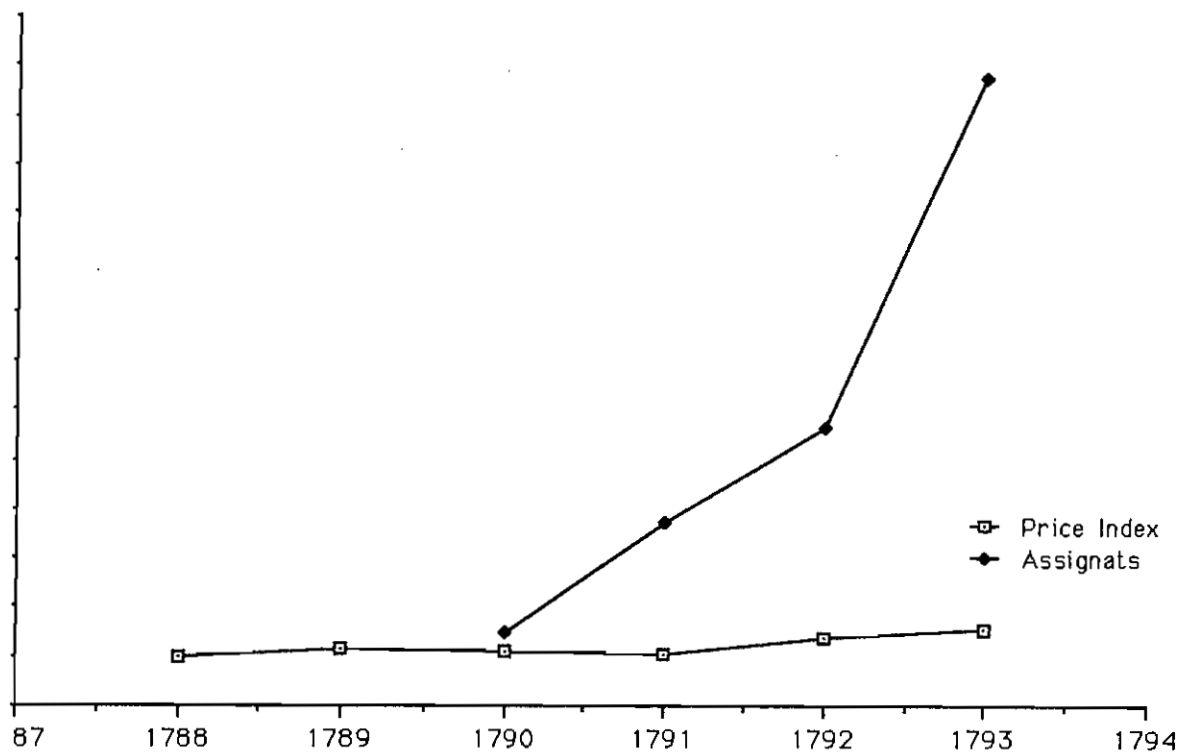
Figure 3. Inflation and Money, 1788-1793.
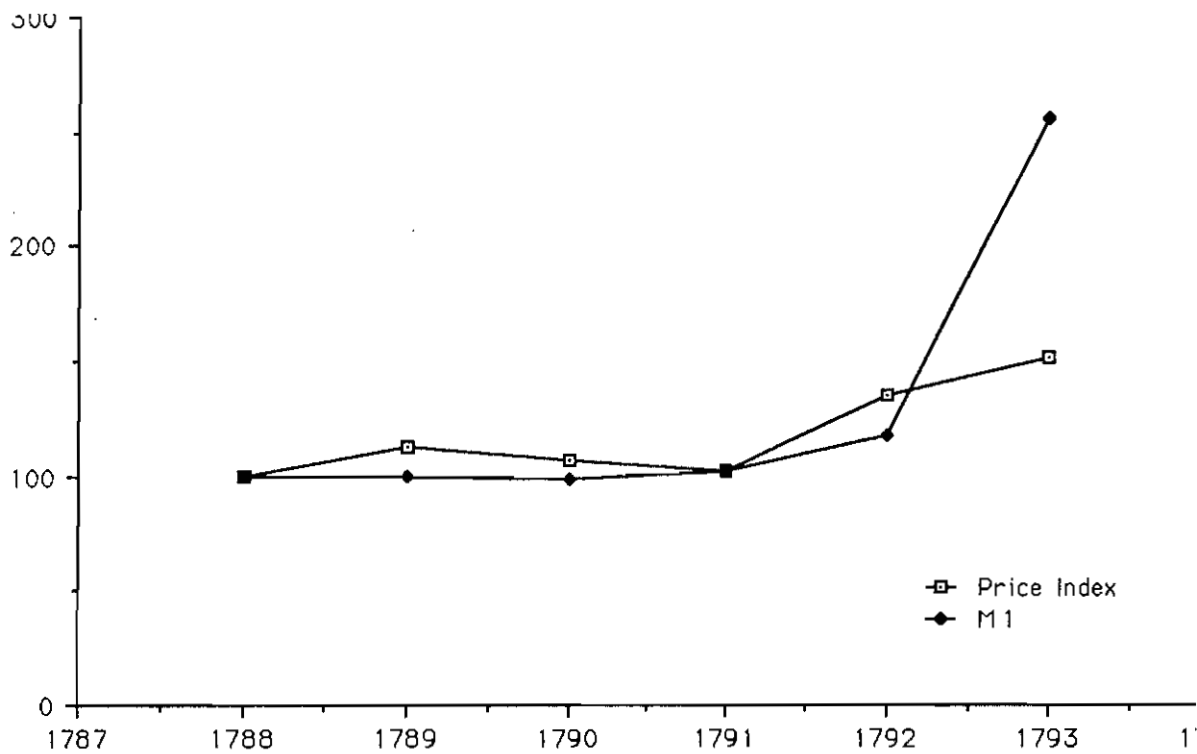
Figure 4. The Inflationary Process
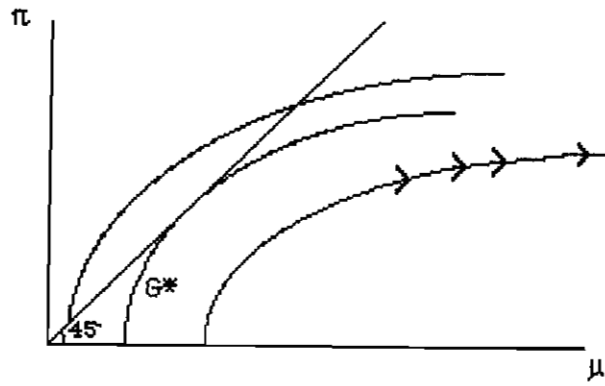
Table 1.

Expenditures, Deficit and Debt of the French Government: 1789-1795.

(current prices, millions of Livres)

Year	[1] Government Expenditures G	[2] Debt Services rB	[3] Taxes T	[4] Government Deficit G-T	[5] Debt Financing ΔB	[6] Money Financing ΔM	[7] Land Financing ΔL	[8] Total Debt B	[9] Gov. Deficit ratio of GNP G-T/Y
1789	656	230	396	260				4500	0.08
1790	657	281	160	497	-93	590			0.16
1791	823	241	234	589	-637	900	326		0.19
1792	1250	204	412	838	-200	760	278	4000	0.20
1793	3532		341	3191		2850	341		0.70
1794	3180		490	2690		2144	546		0.51
1795	16380		1416	14964		14309	655		0.12

Sources: Col. 1 from Harris (1930), p.51. For the years 1790 and 1791 from Braesch (1934). Braesch's estimate are better since his data on government expenditures do not include the change in the stock of debt. Col 2-4, Harris p.51. Col. 7, Harris p.86. Col.6 is the same as in Table 2 except for 1794 and 1795, where the discrepancy is of 1 billion Livres.

Notes: Government expenditures, Column 1, include debt services.

Col. 5 + col. 6 + col. 7 = col.4.

Table 2. The Issue of Assignats during the French Revolution
(millions of Livres)

Year	Month	Assignats decreed [1]	Potential Notes emitted [2]	Notes emitted [3]	Assignats burned [4]	Assignats in circulation [5]	interest rate on assignats [6]	smallest denomination [7]
1788								
1789								
	19-Dec	400					5%	1000
1790								
	17-Apr	400	400				3%	
	16-Aug							200
	29-Sep	800	1200					
	8-Oct						0%	50
	31-Dec			590		590		
1791								
	17-Apr							
	6-May							5
	5-Jun	600	1800	1150	170	980		
	17-Dec	300	2100					
	31-Dec			1860	370	1490		0.5
1792								
	27-Apr	300	2400					
	31-May			2200		1660		
	31-Jul	300	2700					
	24-Oct	400	3100					
	31-Dec			2900	650	2250		
1793								
	1-Feb	800	3900	3100	700	2400		
	7-May	1200	5100					
	31-Aug			4950	950	4050		
1794								
	19-Jun	1200	8000					
	27-Jul			8450		7200		
	31-Aug					7600		
	27-Sep		9978					
	30-Nov		11000			8000		
1795								
	28-Feb					8800		
	15-Apr	3200						
	30-May					11400		
	20-Aug					16400		
	30-Nov					19700		
	21-Dec			22800				
1796								
	28-Jan	16000		38800				
	19-Feb			45600		34100		

Sources: Harris (1930) and Marion (1914).

Notes: Col. 1 is the flow of assignats decreed. The second decree is equivalent to the first one. Col. 2 is the maximum notes that can be emitted. Until 1794, it is the cumulative sum of col.1 (the second decree is not a new one, it is a reinforcement of the first one). From 1794 on, the issue of assignats remain secret. The notes emitted, col.3, are the stock of assignats emitted de facto. Col.4 are assignats burned when exchanged for land as well as damaged assignats.

Table 3.a
Prices of Food during the French Revolution.

year	Prices: in Livres					Price increase %				
	Wheat Château-Goutier [1]	Rye Goutier [2]	Wheat Buis [3]	Rye Romans [4]	Wheat Nat. mean [5]	Wheat Château [1]	Rye Goutier [2]	Wheat Buis [3]	Rye Romans [4]	Wheat Nat. mean [5]
1788	120	81	77	52	1609					
1789	126	102	109	55	2192	5.00	25.93	41.56	5.77	36.23
1790	140	112	118	45	1945	11.11	9.80	8.26	-18.18	-11.27
1791	125	103	105	63	1622	-10.71	-8.04	-11.02	40.00	-16.61
1792	156	111	122	92	2209	24.80	7.77	16.19	46.03	36.19
1793	168	112	150	108		7.69	0.90	22.95	17.39	
1794	233	187				38.69	66.96			
1795										
1796	120	139								
1797		95			1948					

Sources: Hauser (1936), p.342.

Table 3.b
Prices during the Hyperinflation.

	Price index of a commodity basket	Price of gold
1795		
January	580	555
February	510	588
March	720	714
April	900	866
May		1333
June	1310	2575
July	2180	3150
August	2710	3237
September	3100	4420
October		5616
November	5340	12025
December	12990	16475
1796		
January	11320	24060
February	19100	
March	38850	

Source: Harris, p.108.
Note: Col.1: base of 1790. Col.2: average of daily quotations from Bailleul.

Table 4. The price of newspapers during the French Revolution.

Year	Date of the change in prices	The prices for a 3 months subscription				
		Gazette de France	Journal de France	Mercure de France	Annales de la Republique Francaise	Annales Patriotiques
1787		5				
1789						9
1791						
	1-Mar			15		
1792						
	1-May	8.33				
	17-Aug	12				
	21-Sep		9			
	26-Sep		10		10	
1793						
	14-Jan		9	17.5		
	1-Feb		10			
	1-Sep		12			
	18-Sep		12			
	1-Dec			18		10.8
1794						
	20-Jan	13				
	1-May				12	
	5-Dec			21		
	17-Dec	13.5				
	22-Dec			25.8		
1795						
	1-Jan		15		13.8	15
	22-Jan				15	
	20-Feb	16				16
	19-Mar				17	
	17-Apr	21				20
	21-May		21	37.8	25	
	8-Jun	30				
	19-Jun				30	
	12-Jul		31	60		27
	30-Jul	50			50	50
	2-Aug		50			
	11-Oct	75				80
	15-Oct		80	75	80	
	24-Oct			100		
	2-Nov	100	120		100	
	22-Nov	125		150		125
	26-Nov	150				
		7 specie	13	25		
	3-Dec		200			
	11-Dec	300	300		150	
	16-Dec		500	375		500
			9 specie	12 specie		
	22-Dec	500		500	500	
1796						
	10-Jan		600			
	10-Mar		7 specie	9 specie		
	2-Apr		600	600		
	27-May		1000			
	6-Jun		1500			
	30-Jun		9 specie			
	22-Sep	9 specie				

Table 5.

Price Indices during the French Revolution.

year	Price Indices					Price Increase %(per year)				
	Treasury Figures	newspaper	local table	Food	Commodity basket	Treasury Figures	newspaper	local table	Food	Commodity basket
	[1]	[2]	[3]	[4]	[5]	[1]	[2]	[3]	[4]	[5]
1788	100	100	100	100	100					
1789	105	100	100	122	113	5	0	0	22	13
1790	109	100	100	110	107	3	0	0	-10	-5
1791	130	100	116	100	102	19	0	16	-9	-5
1792	139	144	133	130	135	7	44	15	30	32
1793	208	169	185	144	151	50	17	39	11	12
1794	500	192	347		173	140	14	88		15
1795	12500	7388	12499		6233	2400	3746	3502		3495

Sources: Col. 1 and 3 are from Harris (1930).

Notes: Col. 1 is the depreciation of assignats. It is in fact the exchange rate. Col.2 is derived from Table 4. Col. 4 is derived from Table 3. Col.5 is our price index.

Table 6.

Money and Depreciation

during the French Revolution.

(millions of Livres)

Year	Specie in circulation [1]	Notes by the Caisse d'Escompte [2]	Assignats [3]	Money Stock M1 [4]	Monetary Aggregate M2 [5]	Real Money Stock M1/P [6]
1788	2000			2000	2000	2000
1789	1900	100		2000	2000	1770
1790	1600	360	590	1960	2550	1832
1791	500	50	1490	2040	2040	2000
1792	100		2250	2350	2250	1741
1793			5100	5100	5100	3377
1794			8260	8260	8260	4775
1795			21500	21500	21500	345
1795						
January			8500	8500		4678
February			8800	8800		4659
March			9660	9660		4261
April			10520	10520		3868
May			11400	11400		3353
June			13060	13060		3048
July			14720	14720		2217
August			16400	16400		2024
September			17500	17500		1846
October			18600	18600		1453
November			19700	19700		1013
December			21500	21500		345

Notes: Until 1791, M1 includes specie in circulation and notes by the Caisse d'Escompte; from 1792, it includes also assignats.

Table 7.

Money Demand Equation: 1789-1796.

1789-96	π	m-p	Constant	Dummy	R2	SEE	DW	Alpha	Beta	Gama	π^*	G*	Max G*
2SLS	-1.09 [0.84]	0.94 [.12]	0.33 [0.57]		0.97	0.16	1.90	-17.79	0.06	5.41	0.06	4.62	inf
2SLS & Restricted	-1.09 [0.18]	0.96 [0.014]	0.27 [0.1]		0.97	0.16	1.93	-27.25	0.04	6.75	0.04	11.53	140.46
2SLS, Rest & Dummy	-1.00 [0.1]	0.98 [0.008]	0.15 [0.06]	0.43 [0.07]	0.99	0.09	2.40	-47.57	0.02	7.14	0.02	9.78	170.34

Notes: The equation estimated is: $m_t - p_t = a\pi_t + b(m_{t-1} - p_{t-1}) + c + u_t$. Our first estimation is a two stage least squares. In the second one, we have a restriction on the initial demand for money in 1789: we restrict Gama to be 7. In the third estimation, we add a dummy during the terror period. We use annual data for 1789-94 and monthly data for 1795-96. We translate the annual data to monthly terms in order to have consistent series.
The last column is the superior limit of the confidence interval for G*. inf represents a number with five digits.