

The Sterling Trap
Foreign reserves management at the Bank of France, 1928 – 1936

Olivier Accominotti*

Sciences Po, Paris, and University of California, Berkeley

November 2008

* E-mail: olivier.accominotti@berkeley.edu. I am especially grateful to Marc Flandreau for his strong encouragement and continuous support. I also thank Jorge Braga de Macedo, Barry Eichengreen, Rui Esteves, Giovanni Federico, Harold James, Pierre Sicsic, Stefano Ugolini, seminar participants at the European University Institute in Florence and participants at the Past, Present and Policy 3 Conference in Genoa for comments on an earlier draft. Archivists at the Bank of France and Bank of England provided helpful support. Hospitality from the European University Institute and the University of California, Berkeley and funding from the CEPR's Research Training Network "Unifying the European Experience" are gratefully acknowledged. All errors are mine.

Abstract

French reserves policy during the interwar years has been heavily criticised because of its consequences on other countries. This paper presents new monthly data on the Bank of France's foreign reserves currency composition between 1928 and 1936, and identifies the motivations behind reserves policy. The Bank of France's aim was to limit the risk of capital loss on its foreign portfolio. The determining factor in its portfolio allocation decisions was the credibility of reserves currencies on the exchange market. Credibility issues explain both the sale of pounds against dollars during 1929 and 1930 and the massive conversion of foreign holdings into gold from 1931 on. However, due to the huge volume of its reserves, the Bank also had to consider the effects of its own actions on the market. Its cooperative attitude towards sterling in the months before British devaluation can be explained through its market position. The Bank of France's portfolio choice was those of a large player in a low-credibility international monetary system.

Keywords: Foreign reserves management, gold exchange standard, Bank of France.

JEL classification: E58; F31; F33; N24.

1. Introduction

How can we explain the destabilising monetary policies of the interwar years? In 1922, at the Genoa Conference, international experts pondered on how to reconstruct an international monetary system based on gold. They proposed to generalise the gold exchange standard, a mechanism that allowed central banks to hold, as part of their cover reserves, foreign assets denominated in gold convertible currencies. The new system intended to prevent world deflation by reducing the risk of monetary gold scarcity (Bank for International Settlements, 1932; Hawtrey, 1922). Looking back, however, what we notice is the huge gap between target and achievement. The policies adopted within the gold exchange standard were strong transmission channels for the Great Depression (Bernanke, 2000; Eichengreen, 1992; Temin, 1989, 1993).

This paper looks at the foreign reserves policy of one of the important players in the fall of the gold exchange standard: France. French monetary policy in the late twenties aroused widespread criticism because it was uncooperative. Many authors have highlighted the deflationary backlash of French policy and its role in the Great Depression (Bernanke & Mihov, 2000; Eichengreen, 1992; Johnson, 1997; Nurkse, 1944).

This paper proposes a new interpretation of French actions during this period. It provides a detailed description of exchange reserves policy, based on original monthly data on the Bank of France's foreign portfolio composition between 1928 and 1936. Using historical literature and new archival documents, it identifies the motivations behind reserves decisions.

The Bank of France's foreign reserves policy can be interpreted as the portfolio choice of a large player on the foreign exchange market. Its international reserves were allocated between sterling, dollar and gold. Reserves policy was guided by the desire to limit the risk of capital loss. From 1929 to 1931, when Britain's commitment to the gold standard was considered doubtful, the Bank of France rebalanced its portfolio in favour of gold and the dollar. After 1931, the dollar's gold adherence was in turn questioned. The Bank's policy thus turned to complete liquidation of foreign holdings. However, given its sheer volume of holdings, the Bank of France was also subject to the backlash of its own actions on the exchange market. As the pound's weakness worsened at the end of 1930, the Bank was in a trap: it could not continue liquidating its pounds without precipitating a sterling collapse and a huge exchange loss for itself. The Bank therefore started supporting sterling. The loss it endured as a consequence of British devaluation in September 1931 gravely endangered its financial health and independence from French government.

The remainder of the paper is structured as follows. Part 2 is a survey of literature on French reserves policy in the gold exchange standard. Part 3 describes Bank of France portfolio choices in detail. Part 4 is a pound and dollar credibility test. Part 5 proposes a new interpretation of Bank of France actions considering its position as a large player on the market. Finally, part 6 gives conclusions and policy implications.

2. Foreign Reserves, France, and the Great Depression: a survey

2.1. Reserves policies in the Genoa system

Accounts of the interwar years' gold standard often describe an unstable system, with little credibility, undermined by non-cooperative, deflation-inducing reserves policies (Bernanke, 2000; Eichengreen, 1990, 1992; Eichengreen & Sachs, 1985; Temin, 1989, 1993). Most countries that stabilized their currencies during the 1920s adopted the gold exchange standard: they allowed their central banks to hold part of their backing reserves in gold convertible currencies. As a consequence, the global volume of foreign reserves, held mainly in sterling and dollars, increased (Eichengreen & Flandreau, 2008; Bank for International Settlements, 1932; Mlynarski, 1929; Nurkse, 1944). The system aimed to avoid the worldwide lack of gold then feared by the Genoa experts (Hawtrey, 1922).

But the international monetary system soon became a transmission channel for monetary contraction. One of the problems arose from parity choices made during the stabilisation years. The pound, which had been stabilised at its pre-war gold parity, was considered overvalued compared to other currencies like the franc and reichsmark (Keynes, 1925). A second problem was that gold holdings worldwide were very unequally distributed, due to gold accumulation by France and the US (League of Nations, 1932, Eichengreen, 1990).¹ On top of all this, difficulties in the international monetary system were worsened by non-cooperative monetary policies aimed at attracting gold (Eichengreen, 1992). The gold exchange standard suffered from a deflation bias (Eichengreen, 1984).

To what extent did these factors undermine confidence? A recent literature addresses this question by testing the credibility of gold adherence for sterling and the dollar (Hallwood, MacDonald, & Marsh, 1996, 1997, 2000; Hallwood & Marsh, 2004). This literature concludes that both currencies, even sterling, retained credibility until the very last minute (July 1931).

¹ Sicsic (1993) explores the causes of French gold accumulation.

2.2 French reserves policy in the gold exchange standard

French reserves policy played an important role in gold exchange standard developments. When the franc was de facto stabilized in 1926, the French government mandated the Bank of France to buy foreign exchange on the market, so as to avoid excessive currency appreciation (Blancheton, 2001).² As a result, France accumulated a bulging portfolio of foreign holdings between 1926 and 1928. When gold convertibility was re-established on 25 June 1928, the country held more than half of the world's volume of foreign reserves (Nurkse, 1944).³

Over subsequent years, French policy was severely criticised by its contemporaries. Before the 1931 sterling crisis, France was criticised for hoarding gold, causing the pound's difficulties on the exchange market. Hawtrey (1932) reproached the Bank of France for its insufficient monetary expansion. Einzig (1932) even accused it of destabilising the pound through direct market sales. Recent literature also highlights the deflationary consequences of French gold policy between 1926 and 1932. In particular, many authors have shown that the Bank of France's international reserves rebalancing in favour of gold had drastic consequences on global economy (Nurkse, 1944, Kindleberger, 1986, Eichengreen, 1992, Bernanke & Mihov, 2000).⁴ Johnson (1997) goes so far as to consider France's reserves strategy as the main cause of the Great Depression.

2.3. Motivations at the Bank of France level

Why would an important player in the international monetary system engage in a policy that had such dramatic consequences? Bank of France's motivations have been investigated by various authors. Paul Einzig (1932) stated that French monetary authorities were using reserves as "a fighting fund" in their financial war against Britain. This vision of a deliberately aggressive Bank of France is, however, extreme and several authors have proposed other explanations. For Bouvier (1989), the Bank wanted to re-constitute large gold reserves as part of an overall strategy, which aimed at making Paris a major financial centre.⁵ According to Mouré (1991; 2002), Bank of France officials were reluctant to accept the gold exchange standard principles, because they believed in the virtues of the classical gold

² These operations were regulated by the 7 August 1926 law and 16 September 1926 Convention with the State.

³ 25 June 1928 monetary law did not allow foreign holdings to be included in the minimum legal reserves for monetary circulation coverage, so that, officially, France was on the strict gold bullion standard.

⁴ According to Nurkse (1944, p. 39) "the fate of the gold exchange standard was sealed" when France adopted the gold bullion standard. Kindleberger (1986) notes that "French gold conversions put great pressure on the system." For Eichengreen (1992, p. 291), "the liquidation of reserves ... intensified worldwide pressure on money supplies." Last, Bernanke & Mihov (2000, p. 150) argue that French "conversion of foreign exchange... put major pressure on other gold standard countries to tighten their monetary policies."

⁵ Einzig (1931, p. 104) also evokes this motive.

standard as an adjustment mechanism. They were prey to a “gold standard illusion” (Mouré, 2002).

But historians have also noted that putting the reserves policy into practice was complex. If the goal was gold accumulation, various secondary objectives and institutional constraints also had to be considered. Bouvier (1989) and Mouré (1991, 2002) both point out that the Bank of France delayed its foreign reserves conversions until British devaluation in 1931. Two reasons would explain this conduct. First, the Bank was concerned by foreign criticism of its actions, and did not wish to shaken the international monetary system too brusquely. Second, foreign reserves were a substantial source of income. As a private institution, the Bank of France was constantly concerned with its financial situation. When ownership of its foreign portfolio was transferred from the State to the Bank in 1928, the dividend paid to its shareholders was substantially increased (graph 1).⁶ So profit considerations may explain the Bank’s initial passivity about its foreign portfolio.

3. Description of Portfolio Choice

3.1. Currency composition of the French foreign reserves: evolution

These statements are based on observation of the total amounts of reserves. Movements *within* the reserves, in contrast, have never been precisely documented. Therefore, I combined several documents from the Bank of France’s archives and constructed a monthly dataset on the foreign reserves currency composition between June 1928 and December 1936.⁷ Graph 2 shows the composition of international reserves (gold and foreign reserves). Graphs 3 and 4 show the evolution of the sterling and dollar portfolios. The Bank of France held almost all of its foreign reserves in dollars and pounds. Although the global volume of foreign assets remained stable before 1931, the Bank’s policy was far from passive during this period: from June 1929 onwards, the Bank clearly rebalanced its portfolio from sterling to dollar. Pound sales were then halted from October 1930 to July 1931. After the sterling crisis, the Bank’s policy turned to complete liquidation of its foreign assets.⁸

⁶ Before 1928, the Treasury was assuming the risks on all assets acquired under the regime of the 7 August 1926 law, while returns were deposited in an account used to amortise advances made by the Bank to the State. With the stabilization law of 25 June 1928, these holdings were swapped with the State’s debts to the Bank.

⁷ The main source consists of monthly reports sent by the Foreign Banking Service to the Accounting and Portfolio Committee as of October 1930. The Governor himself had requested these reports in order to keep track of portfolio risks (PVCG, 25 September 1930). Other sources are described in Appendix A.1.

⁸ Sterling assets were liquidated from December 1931 to March 1932, and then from July 1933 onwards. Liquidation of dollar assets started in October 1931 and picked up speed between April and July 1932. The small peak in May 1935 for the dollar portfolio corresponds to a credit granted by the Guaranty Trust Company and Federal Reserve Bank of New York.

3.2. *Were the sterling sales politically motivated?*

The evidence validates Einzig's (1932) views that the Bank of France was selling pounds in the years before the sterling crisis. But Einzig's hypothesis that these sales were motivated by a deliberate attempt to weaken the pound neglects the impact of the sterling crisis on the Bank of France itself. As a consequence of the pound's devaluation, the Bank had to register a capital loss of 2.35 billion francs on its sterling holdings. This amount represented twice the available capital and reserves.⁹ The loss put the Bank of France into a very difficult situation. At the Bank of England, an observer noted that it might have come close to a "technical act of bankruptcy". Support from the state was certainly obtainable, but at the price of painful concessions, and the Bank surely would have had to cut its dividend.¹⁰ In the end, the French Treasury agreed to cover the loss (Mouré, 1991, pp. 65-79).¹¹ But the Bank paid dearly for this rescue operation. The dividends were substantially reduced over subsequent years (Graph 1), and the Bank had to give up its foreign reserves policy independence.¹² Thus, the impact of the sterling crisis on the Bank of France was dramatic. This makes us sceptical as to any deliberately pound-weakening actions.

3.3. *Risk management at the Bank of France*

Another possibility is that the Bank liquidated its pounds to reduce risk exposure. Several archival documents show that exchange risk was a determining factor in reserves management. In December 1928, the Bank's General Council decided to create an insurance fund against foreign portfolio risks. According to the Governor, Emile Moreau, allocating resources to this fund was "one of the most important tasks"¹³ that the Bank of France had to tackle. Moreau's successor Clément Moret seems to have shared these concerns over exchange risk. In the detailed speech he gave to the Council in September 1930 on foreign

⁹ In the 1931 *Bilan*, capital and reserves reached a total of 0.48 billion francs ("Capital", "Profits added to capital", "Legal non real-estate reserves" and "Real estate reserves"). However, the Bank had accumulated extra reserves and provisions, noted in the "Other" entry of its balance sheet. An internal note dated 22 September, 1931, speaks of a total amount of capital and reserves as high as 1.64 billion francs, of which 1.13 billion were effectively available (Archives BdF, 1060200103/17, "Réserves de la Banque").

¹⁰ Archives, BoE, OV45/82, 16 October 1931, "Bank of France's loss on its sterling holding." The *Financial News* commented on 30 November 1931 on the fall of the Bank's Stock Exchange value.

¹¹ The Treasury gave the Bank a bond covering the amount of the loss. The bond's value was to be re-evaluated each semester according to exchange rate variations.

¹² In a letter dated 9 December 1931, Finance Minister Flandin expressed his wish "that realisations of pounds sterling placed under the regime of the new convention, and any operations concerning them, directly or indirectly, would, from now on, be made solely in agreement with the Minister for Finance." Governor Moret replied on 10 December 1931 for notifying his agreement. Archives BdF, 1069198810/23, "Livres sterling. Etats adressés au Ministre des Finances".

¹³ PVCG, 13 December 1928. The sum allocated to this fund represented 1.15% of the foreign portfolio in June 1929 (PVCG, 13 June 1929), 1.8% in June 1930 (PVCG, 12 June 1930) and 1.2% in September 1931 (calculation based on Archives BdF, 1060200103/17, "Réserves de la Banque", 22 September 1931).

portfolio management, the new Governor emphasised that the Bank bore “the entire risks of this whole mass of exchange” even if “it did, on the other hand, receive all of its income.” According to Moret, risk management was the determining factor in choosing the reserves currency composition.¹⁴ There is also strong evidence of a growing concern at the Bank of France over a sterling collapse. A note to the Finance Minister on 17 October 1929 mentioned “world-wide concern about the future of British currency” According to the note, “people [were] even wondering if the Bank of England’s metallic reserves [were] sufficient to durably guarantee the sterling pound’s gold convertibility.”¹⁵ In view of these statements, the observed allocation strategy seems very coherent. As of 1929, the Bank of France feared that Britain would devalue. So to avoid an exchange loss, it sold its pounds, and bought dollars.

4. Credibility of the gold exchange standard’s reserve currencies: a test

4.1. Pound and dollar devaluation expectations: simple measurements

However, the Bank of France concerns over the pound’s future are in sharp contrast with findings from the recent literature. Indeed, Hallwood, MacDonald & Marsh (1997) and Hallwood & Marsh (2004) have tested the credibility of sterling’s gold adherence, using alternatively interest rate differential between London and New York and dollar/sterling forward exchange rates. They conclude that the pound remained credible until July 1931.¹⁶ Was the Bank of France, therefore, going against the market?

The pound’s credibility has always been assessed according to the dollar/sterling market. However, simple observation of private discount rates in Paris, London and New York show that the Paris rate from January 1928 to January 1930 was consistently weaker than the other two rates (graph 5).¹⁷ The reference currency for evaluating exchange risks over this period might therefore be the franc, and not the dollar. Private interest rate data in Paris are sporadic and we cannot use them to get a more precise indicator of dollar and pound exchange risks. However, the “Cours des Changes” registers conserved in the Bank of France’s archives contain weekly quotations of the franc/sterling and franc/dollar forward exchange rates on the Paris market. Assuming covered interest parity, we can use them to construct simple indicators, similar to those presented in the literature, of the expected depreciation of each of these two currencies relative to the franc. I rely here on two different measures. The first one

¹⁴ PVCG 25 September 1930.

¹⁵ Archives BdF, 1060200401/308, “Le marché français et le crédit international”, 17 October 1929.

¹⁶ Officer (1996, p. 249) also points out: “the absence of gold point violations by spot and forward exchange rates” on the sterling/dollar exchange market between November 1925 and June 1931.

¹⁷ A similar graph was published in Banque Française d’Acceptation (non dated).

is the (annualised) spread between the forward and spot exchange rates (“simple method”). The second one is Svensson’s (1993) “drift adjusted” indicator of devaluation expectations, which corrects for mean-reversion of the exchange rate (see Appendix A.2).¹⁸

Graph 6 and 7 show the evolution of these two indicators, for the pound and dollar, from June 1928 to March 1933. The drift-adjusted indicator plotted in Graph 7 can be compared precisely to the measure presented by Hallwood & Marsh (2004), to evaluate the pound’s credibility, except that here, it is calculated on the franc/sterling rather than on the dollar/sterling market. But the message remains the same. Devaluation expectations seem very slight for both currencies over the 1928 to 1931 period. Neither of the two indicators allows discerning between pound and dollar until the summer of 1931.¹⁹

4.2. Sterling and dollar in a mean-variance framework

Present-day central banks also manage risks and profits on their reserves, and for this purpose, they usually rely on mean variance optimisations (Fischer & Lie, 2004; Papaioannou, Portes, & Siourounis, 2006). Could the Bank of France’s decision to hold more dollars and fewer pounds also be explained through a portfolio model calibrated on historical data? To answer this question, appendix A.3 presents a simple mean variance framework. The model is a simple version of the CAPM, in which an investor (the Bank of France) allocates its portfolio between a risk-free asset, gold, and two risky assets, the pound and the dollar. The Bank is assumed to minimise portfolio variance for a certain desired level of return. The model allows predicting the unique optimal combination of the risky assets in the portfolio: the market portfolio. Optimisations are run for four different dates: December 1928, 1929 and 1930, and August 1931. The model is calibrated using historical variances (two-year time window) of weekly returns (in francs) on prime bankers’ acceptances in London and New York. As in Papaioannou, Portes & Siourounis (2006), expected returns are set according to three alternative hypotheses: firstly, the exchange rate is assumed to follow a random walk; second, expectations are assumed to be forward-looking; and lastly, the Bank of France is assumed to enjoy perfect foresight.

Tables 1.1 and 1.2 present the calibration parameters. Variances of returns on sterling and dollar assets are both weak and close to each other. Returns in both currencies are also

¹⁸ The “drift-adjustment method” has been used previously in the literature on the gold exchange standard by Hallwood, MacDonald & Marsh (1996, 1997, 2000), Eichengreen & Jeanne (2000), Hallwood & Marsh (2004), and Hsieh & Romer (2006).

¹⁹ The graphs show that the dollar liquidation period, between October 1931 and June 1932, corresponds with a higher dollar exchange risk. Similarly, Hallwood, MacDonald & Marsh (1997, 2000) and Hsieh & Romer (2006) find a rise in dollar realignment expectations between the months of October 1931 and June 1932.

strongly correlated. Table 2 presents the market portfolio's characteristics at each date. Optimal sterling and dollar portfolio shares are presented. The results are again in contradiction with the Bank of France's actions. Unless we assume that the Bank had perfect knowledge of future exchange rate movements, it should have held more pounds and fewer dollars in its portfolio. This is because the two currencies appeared as almost substitutes, and the expected return on sterling was slightly higher.

4.3. Are we sure that the pound was credible before 1931? A new view

So, neither forward-looking measures of devaluation expectations nor mean variance portfolio optimisations calibrated on historical data justify the Bank of France's preference for the dollar from 1929 to 1931. In that case, how can we explain the fears expressed about the pound? Recent literature has shown that exchange rate movements in a gold standard system can be modelled as in a target zone (Hallwood et al., 1996). The exchange rate between two gold-convertible currencies can be considered to fluctuate around its parity (defined by the official price of gold in each of the two currencies) and within a band defined by gold import and export points. Target zone theory has several implications. First, under the null hypothesis of perfect credibility of the target zone, the market should never expect the exchange rate to leave the band, and the forward rate should always stay within it (Svensson, 1991). Also, expectations within the band should be stabilising. When the spot exchange rate comes close to the upper limit, the market should expect it to fall. Inversely, if the exchange rate comes close to the lower limit, the market should expect it to rise. This is *the honeymoon effect* (Krugman, 1987).

Pound Credibility

Were these conditions respected for sterling and dollar during the gold exchange standard years? Graphs 8 and 9 present weekly Paris quotations of the franc/sterling and franc/dollar spot and forward exchange rates (in francs per unit of foreign currency), in relation with official parities and gold points. Let's look at the franc/sterling market first. Graph 8 does not validate Svensson's "100% credibility test". The forward rate crossed the lower limit defined by gold export point towards France for the first time in July 1929. In June 1930, gold points were altered by the Bank of England's decision to only deliver gold at a standard fineness of $0.916 \frac{2}{3}$. Since the Bank of France did not accept gold beneath a 0.995 degree of fineness, arbitrageurs had to pay refining costs and the gold export point was brought down (Einzig, 1937, p. 259). In January 1931, the Bank of France finally decided to accept gold at a 0.900 degree of fineness, and the fluctuation band shrank again. The spot pound appreciated, but the

forward rate crossed the band's lower limit in February again.²⁰ Most importantly, expectations of exchange rates movements were not mean-reverting. Graph 10 represents sterling depreciation expectations ("simple method") as a function of the spot exchange rate deviation from its parity. Circles correspond to the June 1928-July 1931 period, lozenges to the August-September 1931 period. Under the credibility hypothesis, a weak pound (relative to parity) should be associated with an appreciation expectation, and a strong pound with a depreciation expectation. The points should thus be situated either in the upper right hand window, or in the lower left hand window of the graph. In graph 10, however, most of the points are situated in the graph's upper left window, indicating that no *honeymoon effect* was at play. The pound was usually quoted below parity without the market expecting its future appreciation. The target zone was therefore not credible.

Dollar Credibility

Graph 9 shows that the dollar didn't suffer from that type of credibility issue. The franc/dollar spot rate did cross the band's lower limit several times between the Wall Street crash and January 1930. But the market considered this situation to be transitory, and the forward rate remained within the band throughout the whole June 1928 to September 1931 period. The mean reversion condition was also much better respected for the dollar than for the pound. On graph 11, a pendant of graph 10 for the franc/dollar market, small circles correspond to the months from June 1928 to September 1931. Most of them are distributed in line with the predictions of target zone theory. It was only after the sterling crisis that dollar credibility was, in turn, questioned, as shown by the distribution of the lozenges on the graph, which correspond to the months from October 1931 to February 1933.

Dollar and pound credibility in the French financial press

Contemporaries seem to have been very aware of this pound-dollar hierarchy. In the financial weekly *L'Economiste Français*, there were frequent references to the pound's poor credibility. The weekly spoke of "the ongoing weakness of the British pound" on 6 July 1929. It then mentioned "fears ... on the solidity of British currency" (21 September 1929), and "a certain mistrust" of sterling (5 October 1929). On 10 January 1930, the sterling difficulties were attributed to "a question of confidence". The rise in the spot pound between January and

²⁰ Gold points estimates are from François-Marsal (1930/31, vol. 3, p. 365) and Einzig (1937). François-Marsal reports the gold points in Paris. He situates the gold export and import points at 123.8 and 124.55 francs per pound for London, and at 25.405 and 25.613 francs per dollar for New York. Gold points were however influenced by policies of metal delivery. For the period from June 1930 to January 1931, Einzig (1937) situates the gold export point from London to Paris at 123.65 francs per pound. But *L'Economiste Français* noted on 5 July 1930 that the pound's weakness did not give rise to gold outflows, because it had become "extremely hazardous to ask the Bank of England to sell gold to the Bank of France - the refining time and subsequent loss in interest could not be even roughly estimated."

July 1931 did not reassure the weekly. It noted that, “in international circles, a feeling of distrust persist[ed] on the future of British currency” (7 March 1931). Comments on the dollar, in contrast, did not show this kind of concern. Even when the franc/dollar spot rate crossed the gold export point after the collapse of the Wall Street market, the journal was not concerned, attributing this movement to “dollar demands from unfortunate speculators who have adjustments to pay” (2 November 1929). On 25 October 1930, it reaffirmed its confidence in the dollar: “America’s wealth and reserves are such that, in spite of the crisis, many European capitalists are still going to New York to find refuge.” The Bank of France’s preference for the dollar was therefore shared by the market. From as early as 1929 on, the pound was not credible anymore. Maintaining a high volume of sterling assets would thus have implied considerable risk-taking for the Bank.

5. A large player’s portfolio choice

5.1. Cooperation at the Bank of France

One unanswered question still remains on this account. If the Bank of France had expected the sterling crisis, why did it lose so much money from it? Several elements indicate a sudden change in the Bank’s attitude towards the pound in autumn 1930. First, sterling liquidations were halted between October 1930 and June 1931 (graph 3). The Bank even intervened on the exchange market in November and December 1930 in order to support the pound.²¹ It also offered French commercial banks a repo operation (a spot franc sale secured by a forward purchase), so as to prevent them from selling their foreign holdings. Lastly, a 25 million pounds credit was granted to the Bank of England in July 1931 (Mouré, 1991, pp. 66-69). At the same time, the Bank of France clearly did not want to increase its risk exposure. In the repo operation with the French banks, it was, by definition, insured against exchange risk. Likewise, in the direct interventions, the Bank sold off any exchange acquired as soon as the pound was a little stronger. Lastly, the credit granted to the Bank of England in July 1931 took the form of commercial bills “discounted at a fixed exchange rate”.²²

5.2. Interpreting cooperation: the large player’s self-interest

Why did the Bank of France suddenly become cooperative in the final months before the sterling crisis? This change in attitude can be explained considering the Bank’s special

²¹ Interventions are mentioned in the PVCG on 13 November, 20 November and 11 December 1930. Eichengreen (1992, p. 257) also evokes the first of these operations. Mouré (1991, p. 65) notes a coordinated intervention between Bank of France and Bank of England in January 1931.

²² PVCG, 13 November 1930, 11 December 1930, 18 December 1930, 26 December 1930 and 27 July 1931.

position on the market: it was a huge holder of sterling assets. At the close of 1931, its sterling portfolio was still worth fifty percent of the Bank of England's gold reserves.²³ Several elements show that the Bank was indeed always acting with its big player position in mind. When the French Senate's Finance Commission, which was investigating on the loss endured after the sterling crisis, asked the Bank officials whether they had been prudent enough, they replied: "We seized every chance we could to liquidate our sterling pound holdings" but "circumstances were far from favouring full implementation of this policy". The Bank said it did not want to "provoke the depreciation of a currency in which it had considerable holdings", reminding that it "would have been the first to suffer" from a sterling collapse.²⁴ These comments show that the Bank was conscious of the possible backlash of its own actions on the exchange market. From autumn 1930 onwards, the Bank was in a trap. Since it couldn't continue liquidating sterling, the only workable option left was to support it.

6. Conclusions and Policy Implications

This paper has brought a number of new results. Firstly, using new data on spot and forward exchange rates on the Paris market, it has proposed a simple credibility test on the two major gold exchange standard reserves currencies. I have shown that sterling credibility was weak from 1929 on, while the dollar's gold adherence was questioned from 1931 on. Eichengreen (1992) has described the interwar gold standard instability as resulting from a credibility issue. Indeed, the gold exchange standard depended on the stability of the international currencies held as central bank reserves. As early as 1929, however, the credibility of one of the two major reserves currencies was questioned.

I have concentrated on France; French reserves policy had important repercussions on the international monetary system. Recent literature has described the Bank of France's policy failure of this period as resulting from a mistaken vision of economic mechanisms. In contrast, I have shown that the Bank's reserves policy was guided by the will to limit exchange risk. This motive explains both its currency allocation strategy during 1929 and 1930 and its cooperative attitude towards Britain in the final months before the sterling crisis.

²³ Precise estimates of market turnover are unfortunately not available. A note found at the Bank of England and dated 1928 estimated the daily dollar/pound and franc/pound turnovers at respectively £4,000,000 and £40,000-80,000. In October 1930, the Bank of France held respectively over 18 and 910 times these amounts (Archives, BoE, EID3/281, "Approximate amounts of foreign currency changing hands on the London market daily").

²⁴ Archives BdF, 1397199403/163, "Réponses aux questions posées par la Commission des Finances du Sénat". Interestingly, the story was told from another angle to Bank of England's director Robert Kindersley, to whom Moret said that it was "the noble principle of market solidarity" that had prevented the Bank from selling its pounds (PVCG, 1 October 1931). Answers to the Senate's Commission also show the Bank's concerns over foreign criticisms of its actions, as emphasised by Mouré (1991).

The Bank of France's actions can be interpreted in the context of the debate over central bank cooperation. Eichengreen (1992) has argued that one reason for the interwar monetary instability was the lack of cooperation between central banks. Nineteenth century central banks were much more ready to cooperate. On the other hand, Flandreau (1997) has claimed that central bank cooperation was only occasional during the classical gold standard era: actually, central banks cooperated only when it was in their own interest to do so. Cooperation at the Bank of France during 1931 was also self-interested: the Bank's motivation in supporting the pound was primarily to avoid an exchange loss for itself. Of course, one can still speculate on what the pound's fate would have been, had the Bank of France not liquidated its sterling assets between 1928 and 1930. However, given sterling's poor credibility, this strategy would have involved considerable risk-taking. The Bank of France was simply not in a position to offer such a high level of cooperation, given its private-bank, low-capital status.

This paper also has important implications for the recent policy debate. Over eight decades after the Genoa Conference, exchange reserves are still central in the international monetary system. Throughout the years 2000, emerging and developing economies have acquired substantial amounts of foreign holdings, mainly in dollars (Aizenman & Lee, 2006, 2007; Rodrik, 2006). The perspective of major evolutions in these countries' reserves currency composition has recently caused concern over the dollar stability. On the one hand, there is the fear of non-cooperative action caused by political tension. On the other hand, profitability seems, more than ever, to be a determining factor in reserves allocation strategies, as attested by the creation of sovereign wealth funds. China, the largest holder of foreign reserves, recently announced its will to diversify its holdings. But its behaviour also seems to be highly constrained by the necessity of not provoking a dollar crash, which would obviously result in a huge capital loss for the Bank of China.²⁵ The gold exchange standard episode shows that these are not new issues. French experience of the early thirties reveals that when the credibility of reserves currencies is questioned, foreign reserves can be an instability factor for the international monetary system, and a burden for the holder.

²⁵ In a recent article in the *Financial Times*, Fred Bergsten considered the diversification option as inevitable, if the Bank of China was to avoid the largest capital loss in history ("The yen beckons China's dollar billions", 13 March 2007). On the other hand, interviewed by the *Financial Times*, a market operator stated that "any Chinese sell-off of dollars assets was unlikely as it would rebound on China's substantial holdings of US Treasuries". (Richard McGregor, "China affirms dollar's reserve status", 13 August 2007). McKinnon & Schnabl (2003; 2004) and McKinnon (2005) argue that China is a victim its inability to lend in its own currency (the conflicted virtue). They predict that China will continue supporting the dollar.

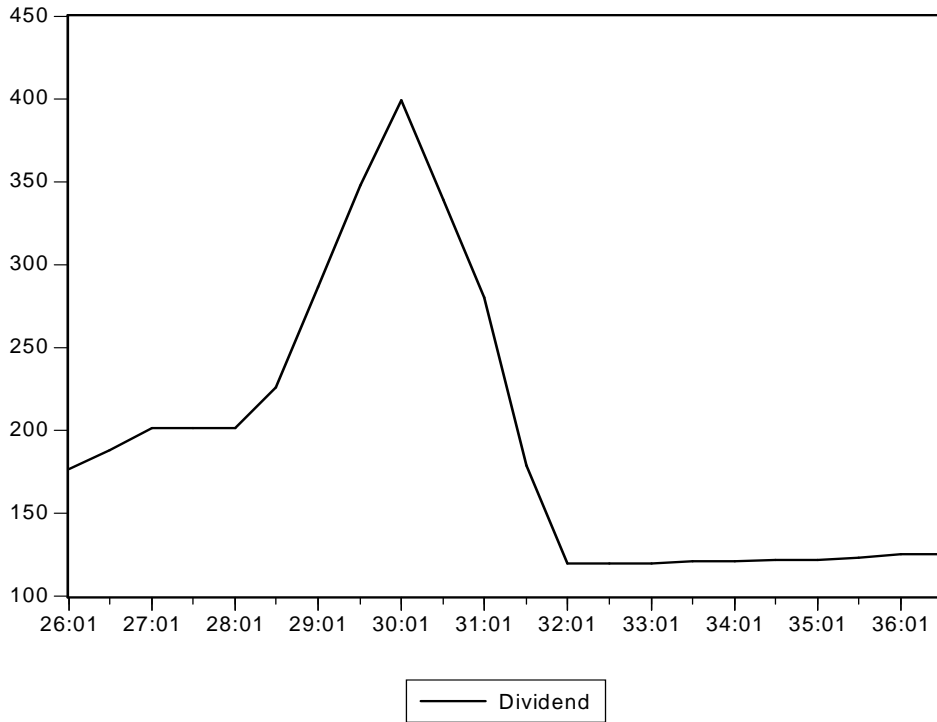
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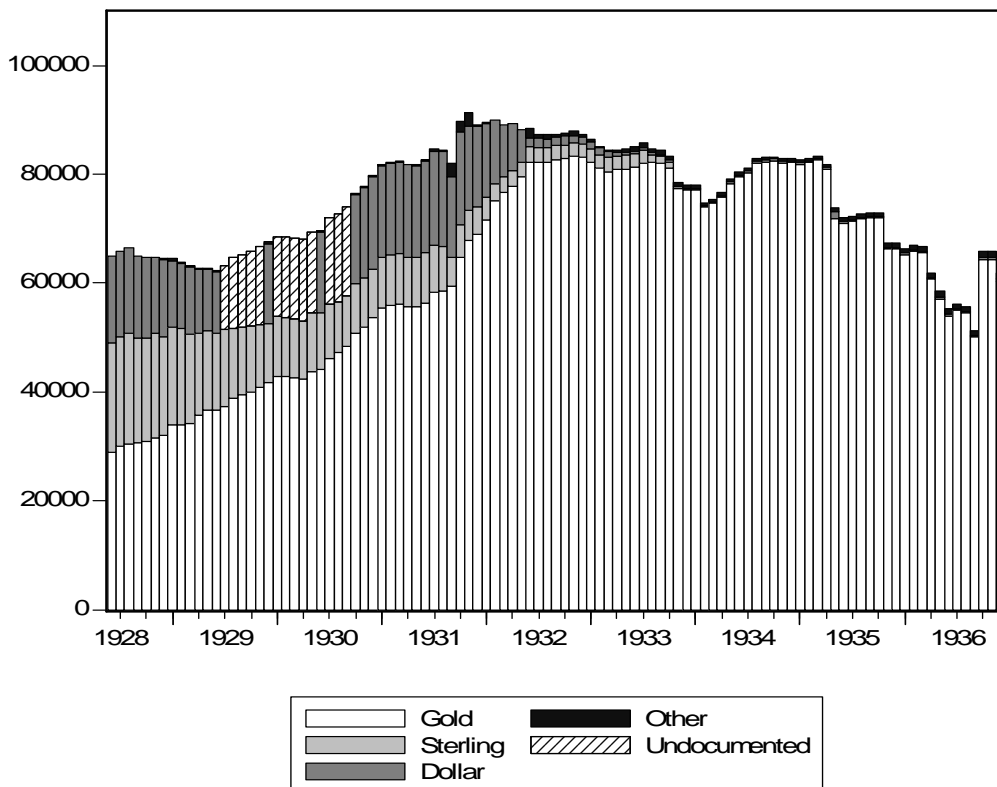
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Graph 1: Bank of France's dividend (in francs), 1926-1936



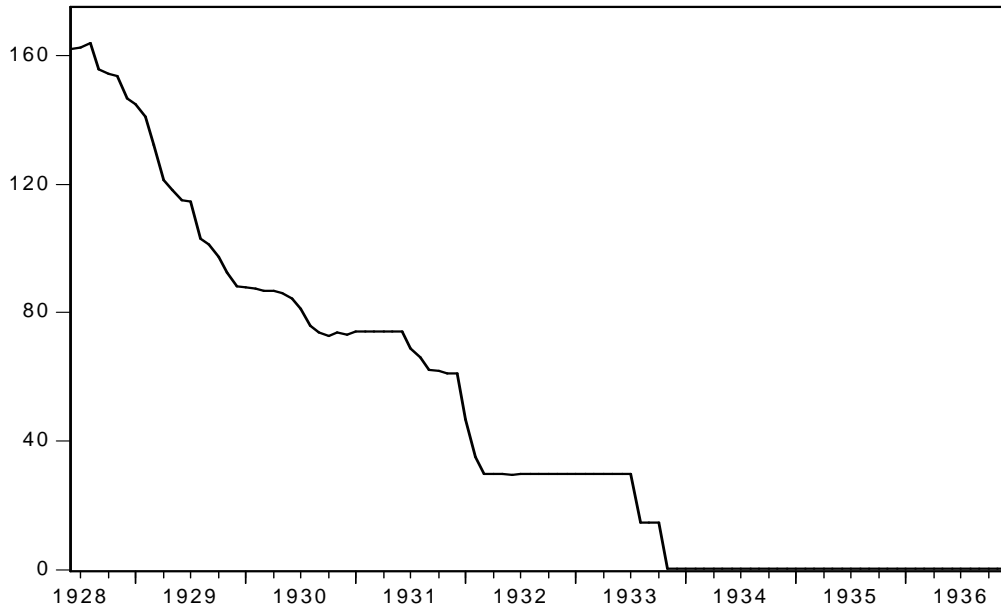
Source: *Bilan*

Graph 2: Currency composition of the Bank of France's Reserves (in francs 000 000), 1928-1936



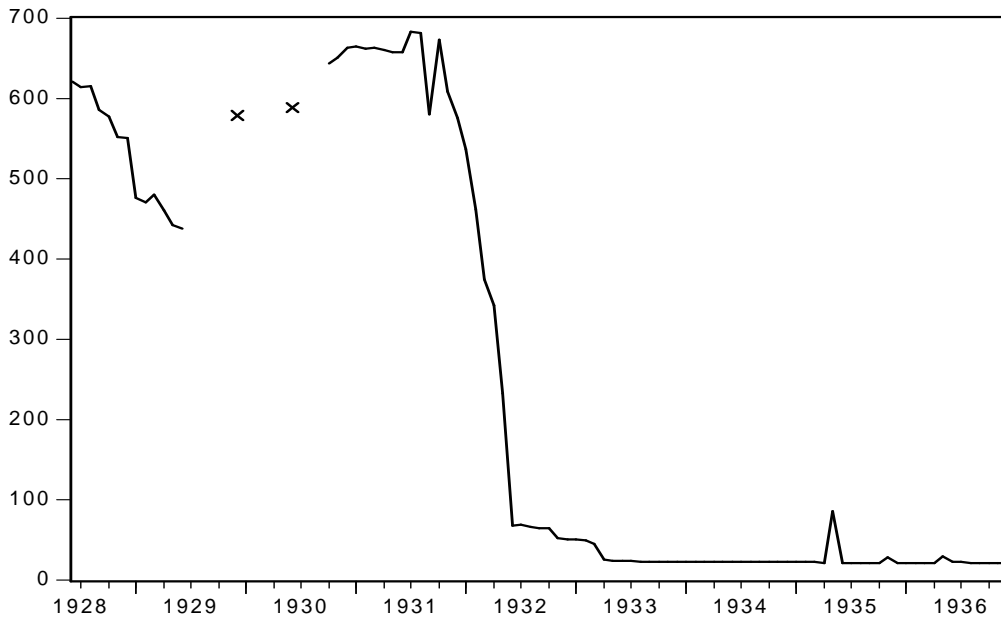
Source : see text and appendix A.1. Amounts in sterling and dollar are valued using the current exchange rate. “Other” corresponds to the total amount of foreign reserves as reported in the *Situation hebdomadaire* less the franc value of sterling and dollar reserves. For the period 1928/6-11, the franc value of dollars and pounds held is larger than the figure reported in the weekly balance sheet for total foreign assets. This is because the published figure does not include foreign exchange bought forward (“Reports”). For 1929/7-12, 1930/1-5 and 1930/7-9, we only have figures for sterling holdings. The rest of foreign reserves is reported as “Undocumented”.

Graph 3: Bank of France's sterling balances (in £ 000 000), 1928-1936



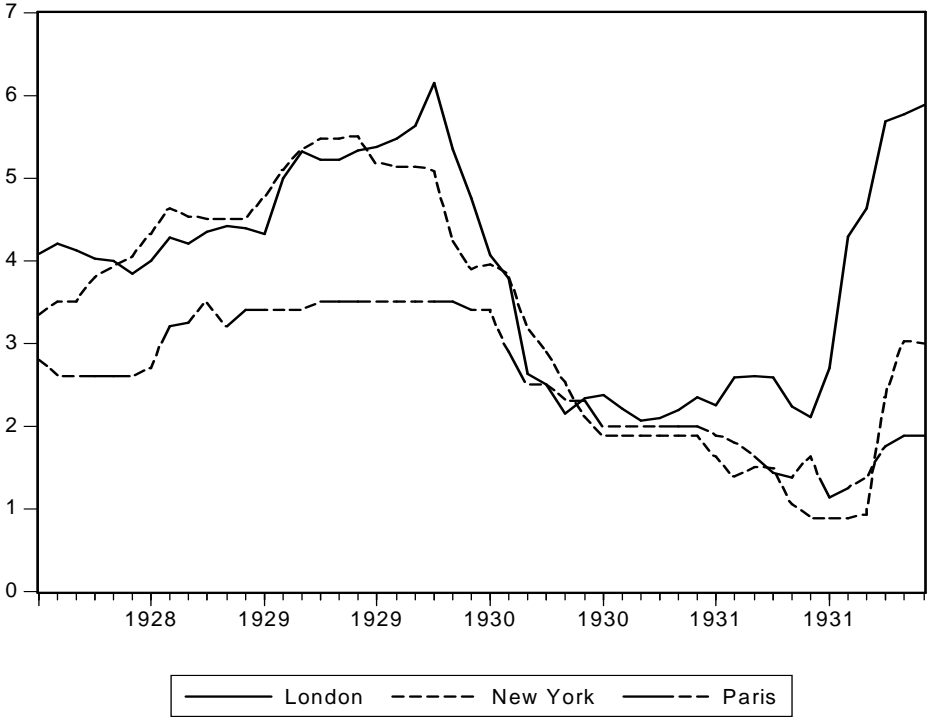
Source: see text and appendix A.1.

Graph 4: Bank of France's dollar balances (in \$ 000 000), 1928-1936



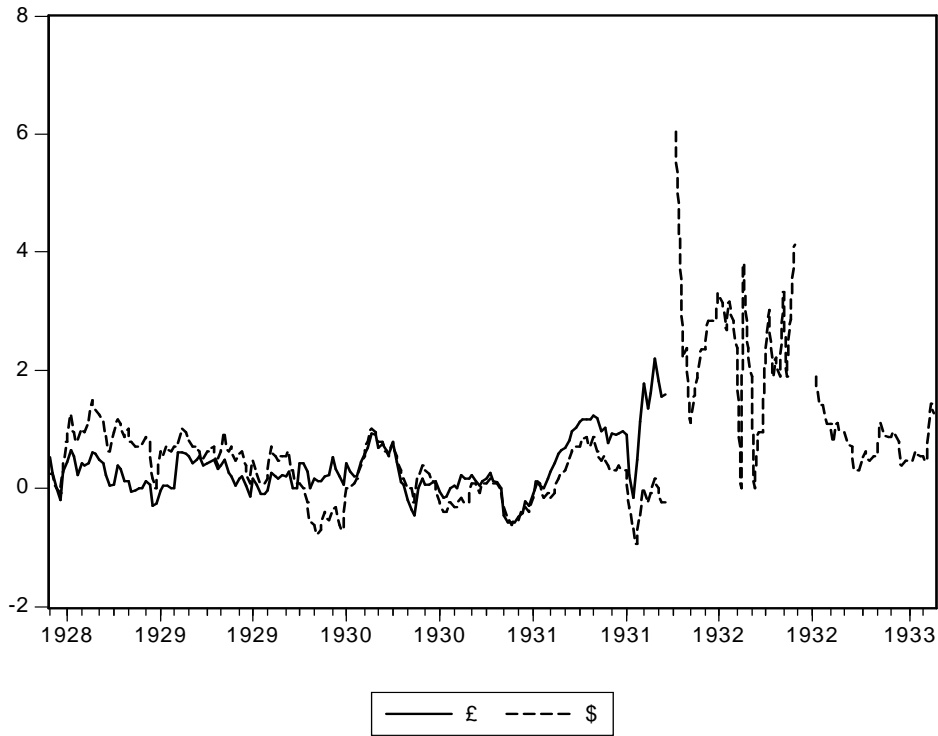
Source: see text and appendix A.1.

Graph 5: Private Discount Rates, London, Paris and New York (in %), 1928-1931



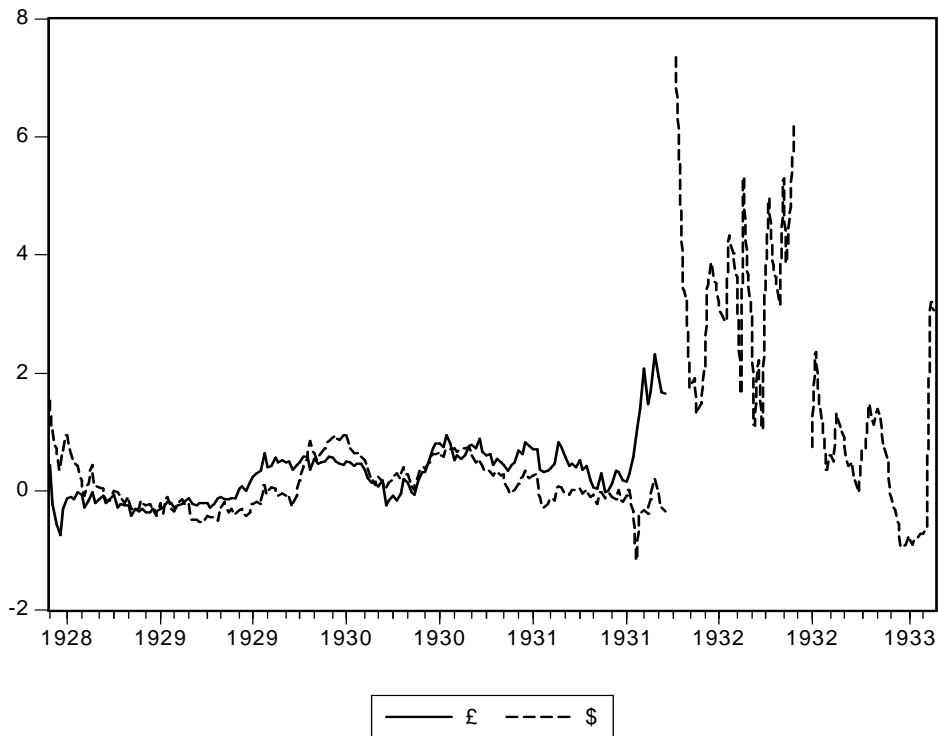
Source: London: *The Economist* (various issues), New York: Federal Reserve Board (1943, pp. 452-459), Paris: *International Abstract of Economic Statistics*.

**Graph 6: Depreciation Expectations of the pound and dollar (in %, annualised),
Simple Method, June 1928-February 1933**



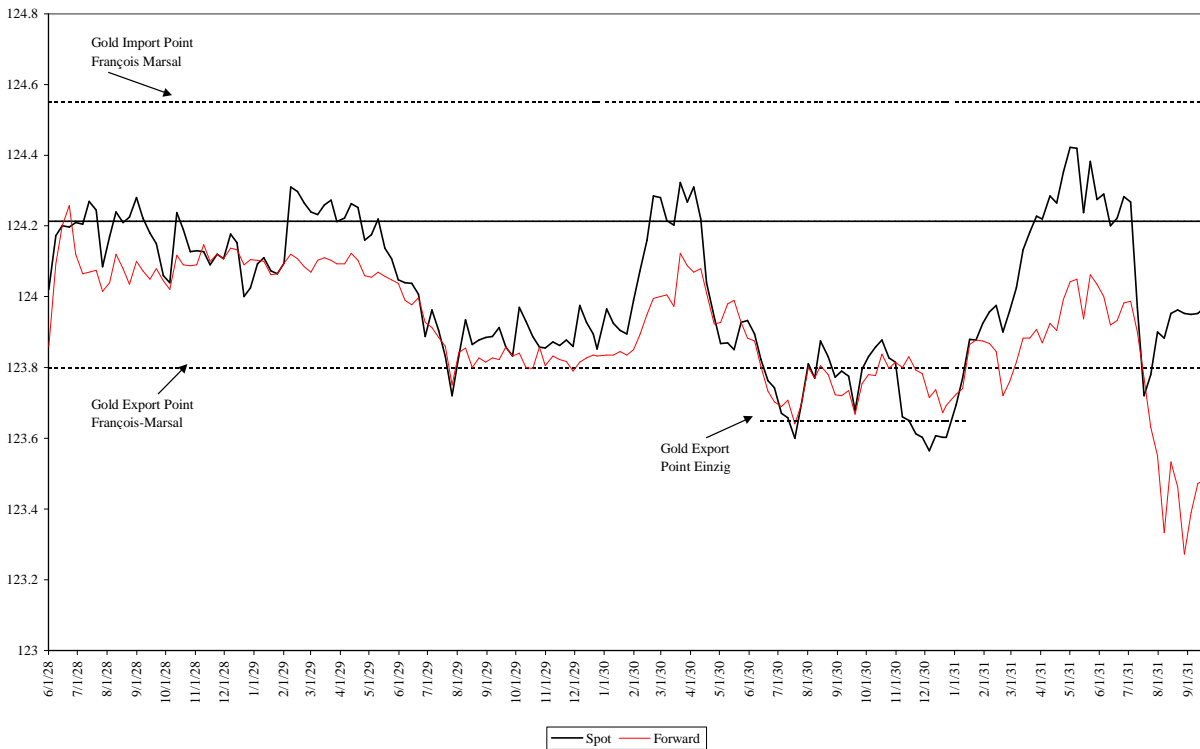
Source: Author's computations (see text and Appendix A.2), based on *Cours des Changes*.

**Graph 7: Realignment Expectations of the pound and dollar (in %, annualised),
Drift Adjustment Method, June 1928-February 1933**



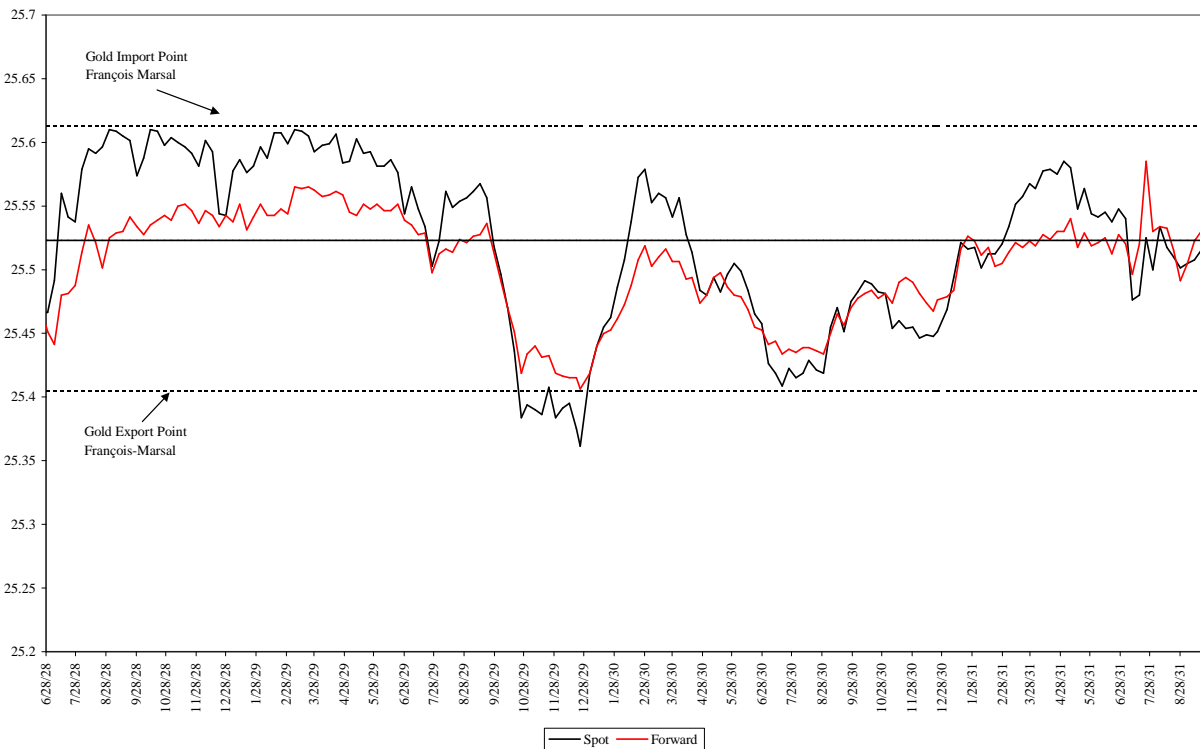
Source: Author's computations (see text and appendix A.2), based on *Cours des Changes*

Graph 8: Spot and forward exchange rates on the franc/sterling Paris market, June 1928- September 1931



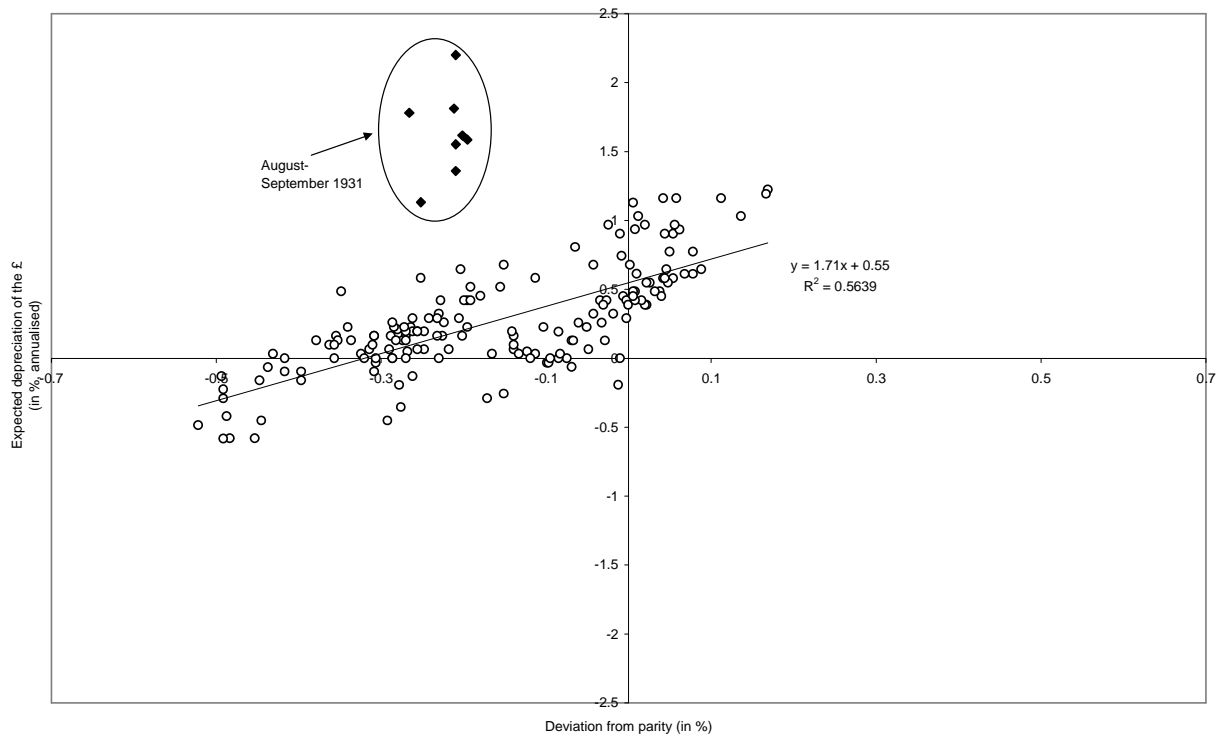
Source: *Cours des Changes*

Graph 9: Spot and forward exchange rates on the franc/dollar Paris market, June 1928- September 1931



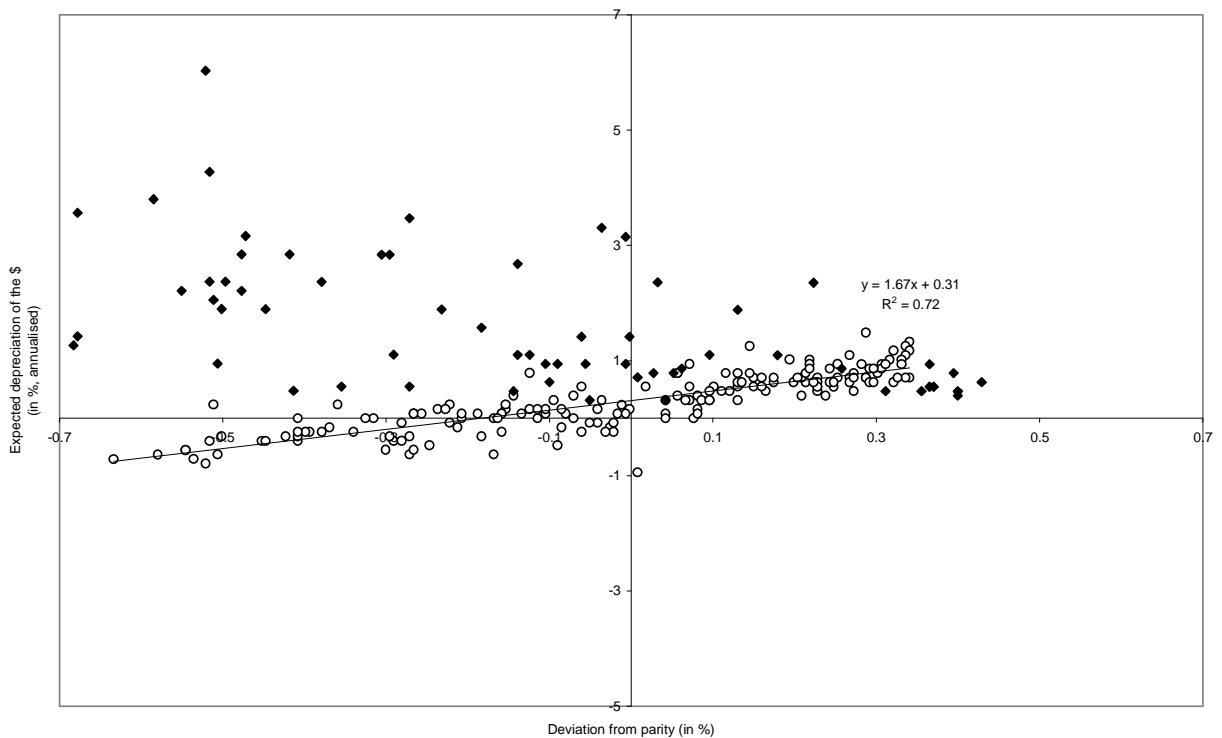
Source: *Cours des Changes*

**Graph 10: Credibility of the pound sterling,
Pre- vs. Post Sterling Attack**



Source: *Cours des Changes*. Circles are for June 1928-July 1931, lozenges for August-September 1931.

**Graph 11: Credibility of the US dollar
Pre- vs. Post Sterling Collapse**



Source: *Cours des Changes*. Circles are for June 1928-September 1931, lozenges for October 1931-February 1933.

Table 1: Calibrating the portfolio model***1.1. Standard deviations and correlations of past returns/ two-year time-window***

| <i>Period</i> | <i>Std. £ (%)</i> | <i>Std. \$ (%)</i> | <i>Correlation</i> |
|-------------------|-------------------|--------------------|--------------------|
| 1927/01 : 1928/12 | 0.70 | 0.79 | 0.84 |
| 1928/01 : 1929/12 | 0.35 | 0.52 | 0.50 |
| 1929/01 : 1930/12 | 0.45 | 0.54 | 0.64 |
| 1929/09 : 1931/08 | 0.51 | 0.56 | 0.57 |

Source: Author's computations (see text and appendix A.3). Standard deviations are annualised.

1.2. Expected returns on the pound and dollar

| <i>Date</i> | Method 1: Random Walk | | Method 2: Forward looking | | Method 3: Perfect foresight | |
|-------------|------------------------------|-----------|----------------------------------|-----------|------------------------------------|-----------|
| | <i>£</i> | <i>\$</i> | <i>£</i> | <i>\$</i> | <i>£</i> | <i>\$</i> |
| 1928/12 | 4.41 | 4.5 | 4.66 | 4.5 | 4.27 | 3.79 |
| 1929/12 | 4.75 | 4.00 | 4.69 | 4.71 | 4.55 | 4.35 |
| 1930/12 | 2.41 | 1.95 | 2.70 | 2.34 | -27.81 | 2.19 |
| 1931/08 | 3.12 | 0.86 | 0.93 | 0.70 | -25.64 | 0.86 |

Source: Author's computations (see text and appendix A.3)

Table 2: Market Portfolio Characteristics

| Method 1: Random Walk | | | | | |
|------------------------------|---------------------|------------------------|-----------------|-----------------------|------------------------|
| <i>Date</i> | <i>Sharpe ratio</i> | <i>Exp. Return (%)</i> | <i>Std. (%)</i> | <i>Share of £ (%)</i> | <i>Share of \$ (%)</i> |
| 1928/12 | 6.37 | 4.42 | 0.69 | 82.98 | 17.02 |
| 1929/12 | 13.68 | 4.71 | 0.34 | 94.90 | 5.10 |
| 1930/12 | 5.36 | 2.39 | 0.45 | 96.57 | 3.43 |
| 1931/08 | 6.12 | 3.12 | 0.51 | 100 | 0 |

| Method 2: Forward Looking Expectations | | | | | |
|---|---------------------|------------------------|-----------------|-----------------------|------------------------|
| <i>Date</i> | <i>Sharpe ratio</i> | <i>Exp. Return (%)</i> | <i>Std. (%)</i> | <i>Share of £ (%)</i> | <i>Share of \$ (%)</i> |
| 1928/12 | 6.71 | 4.66 | 0.70 | 98.74 | 1.26 |
| 1929/12 | 13.71 | 4.69 | 0.34 | 85.60 | 14.40 |
| 1930/12 | 6.03 | 2.66 | 0.44 | 89.97 | 10.03 |
| 1931/08 | 1.83 | 0.90 | 0.49 | 85.54 | 14.46 |

| Method 3: Perfect Foresight | | | | | |
|------------------------------------|---------------------|------------------------|-----------------|-----------------------|------------------------|
| <i>Date</i> | <i>Sharpe ratio</i> | <i>Exp. Return (%)</i> | <i>Std. (%)</i> | <i>Share of £ (%)</i> | <i>Share of \$ (%)</i> |
| 1928/12 | 6.14 | 4.27 | 0.70 | 100 | 0 |
| 1929/12 | 13.23 | 4.53 | 0.34 | 88.27 | 11.73 |
| 1930/12 | 4.03 | 2.19 | 0.54 | 0 | 100 |
| 1931/08 | 1.52 | 0.85 | 0.56 | 0 | 100 |

Source: Author's computations (see text and appendix A.3). Standard deviations are annualised.

Appendix A.1. Data and sources

I. Currency composition of foreign exchange reserves

Data for the currency composition of foreign exchange reserves (see section 3) have been collected at the Bank of France's archives.

- Total amount of foreign exchange reserves

Total amounts of foreign exchange reserves were not distinguishable before 1928 in the Bank's accountability. Indeed, most of the foreign assets held under the regime of the law of 7 August 1926 were included in the "Other" entry of the Bank's published sheet. Only after the legal stabilization of June 1928 did foreign exchange reserves become really identifiable (PVCG, 23 June 1928). They were composed of two elements appearing as two distinct entries: the entry "Disponibilités à vue à l'étranger" was regrouping all demand deposits with foreign banks; the entry "Effets négociables et autres emplois à court terme à l'étranger" was corresponding to the portfolio of short-term foreign bills. Foreign bills' maturity never exceeded 3 months (PVCG, 25 September 1930). These amounts are reported at a weekly frequency in *Situation hebdomadaire de la Banque de France*, and available online through "Annhis".

- Reserves currency composition

Reserves currency composition was not appearing in the Bank of France's published sheet. A monthly database has been constructed based on various documents found at the Bank of France's archives:

- 1928/06-1929/05 (weekly)

Archives, Bank of France: 13979199403/162.

"Change: Gestion du Portefeuille de Devises" (handwritten document).

Weekly data on total holdings in pounds sterling, US dollars and Swiss francs. Values given in French francs.

- 1929/06-1930/06 (semi-annual)

Archives, Bank of France: 1463200401/64.

Direction du Service Bancaire Etranger, semi-annual re-evaluations, "Disponibilités à vue à l'étranger" and "Effets négociables et autres emplois à court terme à l'étranger".

Reports providing detailed composition of the Bank's foreign portfolio. The reports list all accounts with foreign banks as well as short-term foreign bills. All values given both in French francs and units of foreign currency.

- 1929/06-1930/09 (monthly, pounds only)

Archives, Bank of France: 1397199403/163.

Direction du Service Bancaire Etranger, "Situation des comptes en livres sterling", 3 December 1931.

Monthly data on total sterling holdings. Data given in pounds.

- 1930/10-1940/05 (monthly)

Archives, Bank of France: 1495200501/493 (1930/10-1937/03) and 1495200501/445 (1937/04-1940/05).

Direction du Service Bancaire Etranger, monthly reports, "Disponibilités à vue à l'étranger", "Effets négociables et autres emplois à court terme à l'étranger".

Monthly reports established by the *Direction du Service Bancaire Etranger* and intended to the *Comité des Livres et Portefeuilles* (see section 3). These reports are available from 1930/10 to 1940/05. All values given both in French francs and units of foreign currency.

II. Gold reserve

- 1928-1936 (weekly)

Bank of France, *Situation hebdomadaire de la Banque de France(1928-36)*,

Balance sheet's entry : "Encaisse or". Weekly series downloadable on the Bank of France's website (Annhis).

III. Bank of France's dividend

- 1926-36 (semi-annual)

Bank of France, Bilan annuel, "*Résultats des opérations de la Banque*".

Entry: "Dividende brut par action".

IV. Exchange rates

- 1926-1936 (weekly)

Archives, Bank of France: 1377200101/8 (1928) ; 1377200101/9 (1929-1931), 1377200101/10 (1932-1934) 1377200101/11 (1935-1936).

Cours des changes (handwritten registers).

Quotations of the franc/pound and franc/dollar exchange rates (spot and forward) on the Paris market.

V. Interest rates

- London, 3 months bankers' drafts

- 1926-1936 (weekly)

The Economist (various issues).

- New York, 3 months bankers' acceptances

- 1926-1936 (weekly)

Board of Governors of the Federal Reserve System (1943), *Banking and Monetary Statistics, 1919-1941*, "Money rates and related statistics", pp. 450-459.

- Paris, Private Discount Rate

- 1926-1930 (monthly)

International Conference of Economic Services (1934), *International Abstract of Economic Statistics, 1919-1930*, London: International Conference of Economic Services.

- 1930-1936 (monthly)

Permanent Office of the International Statistical Institute (1938), *International Abstract of Economic Statistics, 1931-1936*, The Hague: International Statistical Institute.

VI. Other sources

- Bank of France

Archives de la Banque de France. (Archives, BdF)

Procès-verbaux du Conseil Général de la Banque de France (PVCG).

- Bank of England

Bank of England's Archives. (Archives, BoE)

- Journal Officiel de la République Française

Lois et décrets

Débats Parlementaires, Chambre des Représentants

- Articles in the financial press

L'Economiste Français

The Daily Telegraph

Financial Times

Appendix A.2. Devaluation Expectations: Alternative Methodologies

This appendix presents the two alternative methodologies used in section 4.1 for estimating devaluation expectations.

Simple Method

Suppose $f_{i,t}^{t+3m}$ is the log of the 3-months forward exchange rate between currency i and the franc at date t, and $s_{i,t}$ is the log of the spot exchange rate (in francs per unit of foreign currency). Assuming “exchange market efficiency”, the (annualised) expected depreciation of currency i against the franc can be calculated as:

$$Exp_{depr,i,t} = (f_{i,t}^{t+3m} - s_{i,t}) * (-400) \quad (1)$$

Drift-Adjustment Method

Svensson (1993)’s “drift-adjustment method” allows distinguishing, in the appreciation or depreciation expectations of a currency fluctuating inside a band, the part due to expected exchange rates movements within the band, and the part due to a “realignment expectation”. Suppose the spot exchange rate follows a mean-reverting process of the following type:

$$s_{i,t+3m} = \alpha_0 + \alpha_1 s_{i,t} + \varepsilon \quad (2)$$

,where α_1 is less than zero. α_0 and α_1 can be estimated. The (annualised) “realignment expectation”, which adjusts for mean-reversion, is given by:

$$Exp_{real,i,t} = \left[f_{i,t}^{t+3m} - s_{i,t} - (\alpha_0 + \alpha_1 s_{i,t}) \right] * (-400) \quad (3)$$

The following table shows the results of the estimation of equation (2) for both the pound and dollar. The equation is estimated on data covering the period 6/1/1928-9/18/1931 for the pound and 6/1/1928-2/24/1933 for the dollar. The estimated parameters are used for constructing the indicators in Graph 7.

Dependent variable: Log spot exchange rate at t + 3 months

| | I | II |
|-----------------------------|----------------------|----------------------|
| | Franc/Sterling | Franc/Dollar |
| | 6/1/1928 - 9/18/1931 | 6/1/1928 - 2/24/1933 |
| Log spot exchange rate at t | -0.84 (-10.83) | -0.73 (-10.96) |
| Intercept | 4.05 (10.83) | 2.36 (10.96) |
| N | 160 | 235 |
| Adjusted R ² | 0.42 | 0.34 |

OLS estimates. t-statistics in parentheses.

Appendix A.3. Mean-variance framework

This appendix presents the portfolio model used in section 4.2.²⁶ The model considers the problem of an investor seeking minimal variance on her portfolio for a given level of return (Markowitz, 1952, 1987). There are two risky assets/currencies: sterling and dollar, and one zero-return, zero-variance risk-free asset: gold.

A) Efficient frontier of the risky assets' portfolio

Suppose first that the investor wants to allocate its portfolio between sterling and dollar only. The optimisation problem, then, can be written as:

$$\underset{w_s, w_d}{\text{Min}} \quad w_s^2 \sigma_s^2 + w_d^2 \sigma_d^2 + 2w_s w_d \sigma_{sd} \quad (4)$$

subject to:

$$w_s E(\mu_s) + w_d E(\mu_d) = \bar{\mu} \quad (5)$$

$$w_s + w_d = 1 \quad (6)$$

$$w_s \leq 1, w_d \leq 1 \quad (7)$$

, where w_s and w_d are, respectively, the shares of sterling and dollar assets in the portfolio, μ_s and μ_d the rates of return on those assets, σ_s^2 and σ_d^2 the variances of the rates of return, σ_{sd} the covariance between the rates of return on both currencies, E the expectation operator, and $\bar{\mu}$ the desired level of return. The set of optimal portfolios (the efficient frontier) is found by minimizing (4) subject to (5), (6) and (7), for different levels of desired return $\bar{\mu}$.

B) Finding the market portfolio

If the investor is allowed to include a risk-free asset in her portfolio, the optimal combination of sterling and dollar becomes unique. It is given by the market portfolio, which is found by maximizing the Sharpe ratio:

$$S = \frac{E(\mu_m) - r_f}{\sigma_m} \quad (8)$$

, where $E(\mu_m)$ and σ_m are the market portfolio's expected return and standard deviation, and $r_f = 0$.

²⁶ The model is similar to those presented in the literature on central banks' optimal reserves allocation (Ben-Bassat, 1980; Fischer & Lie, 2004; Papaioannou et al., 2006).

C) Calibration

- Variances and covariances

Variances and covariances of the risky assets are estimated using historical data on weekly returns (in francs) on prime bankers' acceptances in London and New York. The benchmark period is a two-year time-window²⁷.

- Expected returns

As in Papaioannou, Portes and Siourounis (2006), the expected return is set as the sum of the interest rate and the expected exchange rate variation.²⁸ Three hypotheses are made as to expected exchange rates variations:

- 1) Random Walk: when the exchange rate is assumed to follow a random walk with mean zero, the expected rate of return is equal to the interest rate.
- 2) Forward-Looking Expectations: expected exchange rate variations are described by equation (1) of appendix A.2.
- 3) Perfect Foresight: expected exchange rate variations are set as equal to one year realized variations.

Table 1 reports the calibration parameters for four different dates (December 1928, 1929, 1930 and August 1931). Optimisations results are presented in table 2. The table discloses the Sharpe ratio, as well as the market portfolio's annualised standard deviation, expected return, and optimal sterling and dollar shares.

²⁷ Interest rates on prime bankers' acceptances are from *The Economist* for London, and Federal Reserve Board (1943) for New York. Exchange rates are from the Bank of France's *Cours des Changes* registers.

²⁸ From October 1930 onwards, the Bank of France reported interest rates on each type of foreign holding, so that we can easily calculate the mean rate that was to be perceived on both sterling and dollar assets. For the period before, we use the interest rate on 3 months bankers' acceptances indicated by *The Economist* and Federal Reserve Board (1943).