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## Did the Structure of Trade and Foreign Debt Affect Reserve Currency Composition? Evidence from Interwar Japan

Mariko Hatase\* and Mari Ohnuki\*\*

### Abstract

Historical experience is often invoked in the modern debate on competition among reserve currencies, yet little is known about quantitative aspects or institutional features of reserve management. By drawing on newly obtained data on foreign exchange reserves, especially those broken down by currency, this paper explores the competition between the British pound sterling and the U.S. dollar for the status of leading reserve currency in Japan during the interwar period. We find that competition between these two currencies remained undecided and that their relative status alternated repeatedly. Historical materials and the results of econometric analysis suggest that the key factors explaining a choice of reserve currencies are trade volumes and the currency denomination of external debt. The latter criteria supported maintaining sterling's status as a reserve currency for the interwar period, reflecting its considerable share in debt service generated through issues that had been launched when London was the sole international market. The stability of potential reserve currencies is shown to be crucial as well. We also find evidence of institutional factors, which include taxation, foreign exchange controls, and restrictions on financial activities.

**Keywords:** Foreign Exchange Reserves; Gold Exchange Standard; Exchange Rate; Trade Structure; Debt Structure; Japan

**JEL classification:** F31, F32, F33, F34, N20, N25

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## Introduction

Competition among reserve currencies is receiving renewed attention in the modern debate about global imbalances. Historical experience is often invoked, but little is known about the quantitative aspects or institutional features of reserve management.<sup>1</sup> According to earlier works, holding of foreign currency (in the form of foreign bills and deposits) was widespread in peripheries before World War I (WWI), with some countries relying more extensively on it than others.<sup>2</sup> The holdings of Russia, India, and Japan accounted for more than half of global foreign exchange reserves.<sup>3</sup> Sterling was the primary reserve currency in 1913, followed by French francs and German marks.<sup>4</sup>

The literature has documented that, in Japan, foreign exchange reserve accumulation began in the late 19th century through the initial buildup of reserves that resulted from China's war indemnity and Japan's adoption of the gold standard in 1897. This first episode of keeping foreign exchange reserves abroad terminated when foreign assets were later converted into gold and shipped to Japan.<sup>5</sup> After this, Japanese authorities again accumulated foreign exchange reserves through foreign bond issues during the Russo-Japanese war (1904–1905). They kept funds that were denominated in foreign currency and acquired through bond issues in London and New York, and the practice of holding foreign exchange reserve was institutionalized thereafter.<sup>6</sup> These bond issues, together with other foreign loans used to finance current account deficits, generated considerable amounts of financial flows.<sup>7</sup> Before WWI, Japan issued sovereign bonds largely in London, and most of them were sterling denominated.<sup>8</sup> Just before WWI, the combination of trade deficits and unfavorable conditions for international borrowing resulted in the gradual reduction in foreign

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<sup>1</sup> Eichengreen (2006, pp. 123–5).

<sup>2</sup> See Flandreau and Gallice (2005) for details on the forms of foreign currency holdings in Paris by countries in the “periphery” of the European gold standard before WWI.

<sup>3</sup> Nurkse (1944, pp. 29–30); Bloomfield (1963, p. 7).

<sup>4</sup> Lindert (1969, p. 17).

<sup>5</sup> Foreign currencies were intended to be converted into gold and to be shipped to Japan for the adoption of the gold standard (The Committee of the Compiling One Hundred Year History of the Bank of Japan [hereafter “Committee”] 1983a, p. 3). However, the British monetary authorities were concerned that a large transfer of gold might cause a market disturbance. The Bank of England required Japan to hold funds acquired from China in London. The monetary authorities of Japan acceded to this request, keeping its funds in pound sterling in London for a while; they also decided to include those assets as reserve for issuance (Inouye 1931, pp. 73–4; Asai 1982 [2000], p. 218). Not so much is known about the subsequent history of these holdings. At this stage, we cannot find evidence of exactly when gold was eventually shipped to Japan. The task is complicated by the fact that detailed records on BOJ's operations during this early period were lost owing to fire in the Great Kanto Earthquake of 1923.

<sup>6</sup> Asai (2007, p. 256).

<sup>7</sup> For external financing from the second half of the 19th century to the first half of the 20th century, Japan depended mainly on sovereign bonds; Asai (1982 [2000], pp. 208–9).

<sup>8</sup> See Suzuki (1994) for details of Japan's pre-WWI bond issues.

exchange reserves until the outbreak of the war.<sup>9</sup> The significant expansion of exports triggered by WWI led to large current account surpluses, and the outstanding amount of foreign exchange reserves ballooned from 213 million yen at the end of 1914 to 2,045 million yen at the end of 1919.<sup>10</sup>

These matters have been discussed previously, but little is known regarding the interwar period. However, information can be obtained using heretofore unexploited data from archival materials of the Bank of Japan, such as accounting books and other materials showing the views of contemporaries on reserve management and factors behind operations on foreign exchange reserves. We use this newly obtained data on Japanese foreign exchange reserves (and their currency decomposition) to explore the competition between sterling and dollars for the status of leading reserve currency in Japan during the interwar period. This competition was never entirely resolved, as leadership swung repeatedly. By combining the historical materials just described with econometric analysis, we are able to identify the factors that explain the choice of reserve currencies by Japanese monetary authorities. In particular, we outline the importance of trade volumes and the currency denomination of external debt. These and other factors—such as the stability of the currency in question—proved crucial. Archival materials and the result of our empirical analysis suggest that Japanese authorities were more inclined to hold currency that was less volatile. We also find qualitative evidence of such institutional factors as foreign exchange controls, restrictions on financial activities, and taxation.

This paper is organized as follows. Section 1 provides information about Japan's exchange rate policy during the interwar period. Section 2 describes the institutional framework for foreign exchange reserve holdings, and Section 3 details key facts regarding Japan's experience as revealed by our new data set. Section 4 discusses the mechanisms that drive reserve management from the viewpoints of contemporaries. Section 5 summarizes modern economic literature on the determinants of reserve composition and also provides an empirical analysis based on determinant factors. Section 6 concludes.

## **1. Japanese exchange rate policy during the interwar period**

At the time when this story begins, Japan belonged to the periphery of the international economic and financial system.<sup>11</sup> The Japanese economy was far less developed than leading economies, and its gross domestic product (GDP) per capita suggests that economic development was lagging behind.<sup>12</sup> In 1925, Japanese GDP accounted for only 4.5 percent of the world total and was only 15 percent the size of U.S. GDP. Japan's share of the global trading system was also modest, although Japan

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<sup>9</sup> Fukai (1941, pp. 108–9).

<sup>10</sup> Committee (1986).

<sup>11</sup> Ito (1989, p. 348).

<sup>12</sup> Maddison (2003).

emerged before WWI as a regional trade and military power. International financial links were not well developed, and Japan relied on Western markets for external clearing and borrowing.<sup>13</sup> Japanese authorities adopted the gold standard in October 1897, but they floated the yen in September 1917 following the U.S. decision to suspend convertibility. World War I brought a succession of current account surpluses that, however, began to fade away when the war ended. Invoking this weak external position, Japanese policy makers delayed resumption of the gold standard even as they proclaimed it to be a most important economic policy goal.<sup>14</sup> As a result, yen exchange rates fluctuated until the return to the gold standard in 1930 (see Figure 1). The yen was stable against the dollar in the early 1920s, then collapsed in the mid-1920s and recovered afterwards. Contemporary observers mentioned that the exchange market was at the mercy of bankers.<sup>15</sup> The prewar consensus still prevailed: exchange rates should be left to market forces except for infrequent interventions by the authorities. Junnosuke Inoue, then a member of the House of Lords and a former finance minister, stated in 1926 that “the exchange rates have been left to the mercy of circumstances, or [...] of the exchange bankers, to do with them what they will. The idea seems to be that we should go on trading till the day comes when we find ourselves short. Then the Government is to step in and to provide, by selling its foreign currency balances at the current rate of exchange, the wherewithal for us to carry on”.<sup>16</sup>

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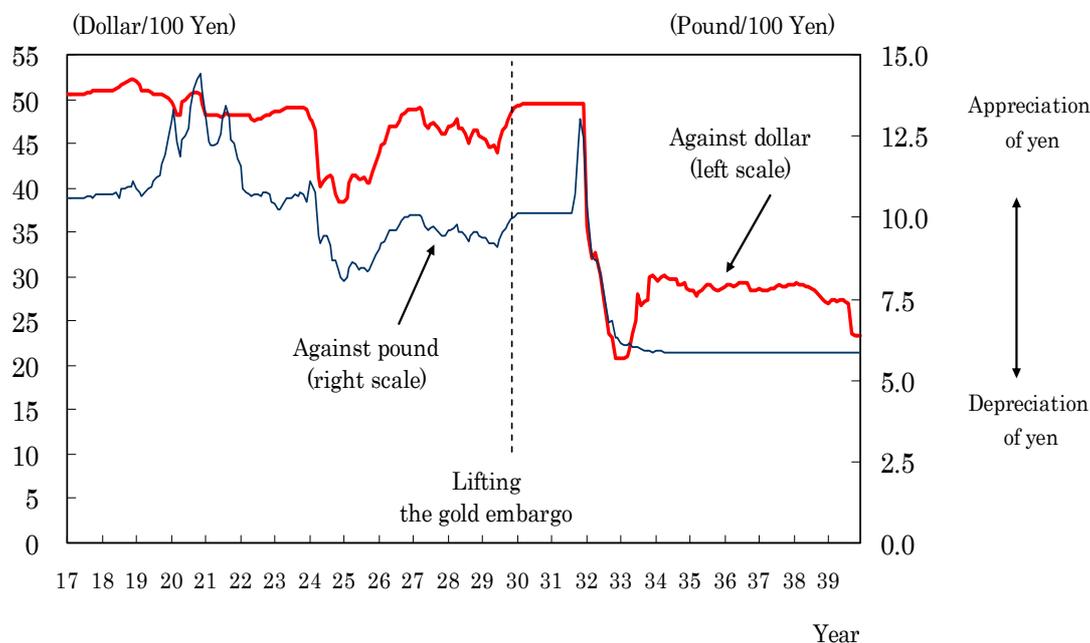
<sup>13</sup> Flandreau and Jobst (2005, p. 997) argue that, before WWI, Japan belonged to the periphery group in foreign exchange markets because its currency was not quoted in leading financial centers—whereas, at the same time, bills denominated in leading currencies (such as the pound, franc, and mark) were traded in Tokyo. The authors also show that Tokyo participated in a regional subgroup of interrelated Asian foreign exchange centers.

<sup>14</sup> Ito (1989, p. 133).

<sup>15</sup> Fukai (1941, pp. 124–8). Compare with Bloomfield (1963, pp. 20–21), who describes the policies taken by “Asiatic countries” as being characterized by frequent interventions by monetary authorities.

<sup>16</sup> Inouye (1931, p. 83).

**Figure 1. Yen Exchange Rates during the Interwar Period**



Source: *Reference Book of Financial Matters*

In July 1929, the change in leadership (Tanaka of the Seiyukai Party was replaced as prime minister by Hamaguchi of the Minseito Party) triggered speculation of a return to gold at the prewar parity, as the Minseito Party had pledged.<sup>17</sup> The yen appreciated.<sup>18</sup> Japan finally returned to the gold standard in January 1930, but in retrospect the timing could not have been worse because it coincided with the onset of the Great Depression.<sup>19</sup> The British departure from the gold standard in September 1931 was followed by massive bear speculation against the yen, and Japan abandoned the gold standard in December of that year.<sup>20</sup> After departing from the gold standard, the yen temporarily plummeted by about 60 percent against the dollar. The government initially adopted a laissez-faire exchange rate policy, but in 1932 it changed direction by embracing exchange rate stabilization policies along with controls on capital and foreign exchange.<sup>21</sup> The 1933 U.S. gold embargo led

<sup>17</sup> In response to the restored international gold standard system in the mid-1920s, major political parties considered returning to gold. However, the Tanaka cabinet intended to proceed with minimum frictions and, as a result, was unable to achieve a return to the gold standard (Fukai 1941, pp. 235–7; Ito 1989, pp. 134–7).

<sup>18</sup> Committee (1983b, p. 380).

<sup>19</sup> Committee (1983b, p. 141).

<sup>20</sup> Ito (1989, pp. 234–5).

<sup>21</sup> Ito (1989, p. 262). The Capital Flight Prevention Law was passed by the Diet in July 1932, though most

Japanese authorities to peg their currency to sterling in 1934.<sup>22</sup> This peg remained until 1939, when the United Kingdom imposed controls on foreign exchange following the outbreak of war in Europe. In October of that year, Japan began pegging to the U.S. dollar.<sup>23</sup>

## **2. Japan's holding of foreign exchange reserves: Background**

When the Genoa Conference in 1922 recommended adoption of the gold exchange standard, foreign exchange holdings by monetary authorities were rationalized as a way to save on gold.<sup>24</sup> Another key motivation was that, unlike gold bars, foreign exchange bore interest.<sup>25</sup> As a result, countries were encouraged to hold assets denominated in foreign currency in foreign financial centers. Governments who borrowed abroad were naturally led to keep balances in the financial markets and currencies of the countries where they secured funding. This official practice was not different from the procedure used by corporate entities with international activities.<sup>26</sup>

After the Genoa conference, the gold exchange standard spread among European countries. As a result, foreign exchange holdings of major central banks increased in the late 1920s and reached a peak in 1930. In 1931, wholesale liquidation of foreign exchange reserves began, and the outstanding amounts of foreign exchange reserves collapsed.<sup>27</sup>

The evolution of foreign exchange reserves in Japan runs counter to this general trend. The post-WWI period saw Japan retreat from the gold exchange standard. In October 1919, its monetary authorities decided that they would limit the amount of foreign exchange reserve that could be used as backing for circulation of bank notes. The view was that, although balances in foreign currencies were useful, they had to be disconnected from domestic money creation because the huge increases in foreign exchange reserves during WWI could, it was feared, cause rapid monetary expansion and thus inflation. In August 1922, the Japanese government abolished the use of foreign exchange as

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now view this law as ineffective because of loopholes. The Foreign Exchange Control Law was enacted in May 1933.

<sup>22</sup> To be precise, it was the Yokohama Specie Bank that decided to peg the yen to sterling in 1934 (Committee 1984, p. 70; Bank of Tokyo 1982, p. 51). At the time, decisions about foreign exchange rates were considered to be private matters, though the Yokohama Specie Bank played a critical role in implementing Japan's foreign exchange policy. The unique status of the Yokohama Specie Bank is described later. It was not until 1937 "that maintenance of yen exchange rates against sterling became an explicit policy of the Japanese government." (24 October 1939, "The Statement by the Finance Minister at the Cabinet Meeting," Letters Regarding Foreign Exchange Division, Department of Economics, University of Tokyo, Yokohama Specie Bank Historical Materials; authors' translation.)

<sup>23</sup> Committee (1983b, pp. 371–3).

<sup>24</sup> Nurkse (1944, p. 28).

<sup>25</sup> Lindert (1969, p. 27).

<sup>26</sup> Lindert (1969, p. 16, pp. 28–9); Flandreau and Gallice (2005); Eichengreen (2006, pp. 127–8).

<sup>27</sup> Nurkse (1944, p. 33, pp. 234–5); Accominotti (2009); Eichengreen and Flandreau (2009).

reserve for issuance, a decision that was contrary to the spirit of the Genoa stipulations.<sup>28</sup>

During the interwar period, the sum of official holdings of gold and foreign exchanges was defined as “specie.” Specie was divided into two categories—namely, “domestic specie” and “overseas specie (*zaigai seika* in Japanese)”—that reflected the geography of holdings. Judging from historical materials, domestic holdings were in gold while overseas holdings consisted of foreign currency assets owned by the government and the Bank of Japan (hereafter BOJ),<sup>29</sup> although reserves abroad were sometimes held in gold.<sup>30</sup> “Specie” thus means foreign exchange holdings, in contrast to what the word may suggest to an English-speaking reader.<sup>31</sup> In this paper we shall use the more transparent wording “foreign exchange reserve” instead of “overseas specie”. This is the topic of our study and so we leave aside “domestic specie”, which can be translated as “gold reserves”, altogether. See the Appendix for a more detailed discussion of the concepts involved.

Another complication in the tracking of Japan’s interwar foreign exchange reserves is agency competition, which affected and was influenced by successive policy arrangements. Foreign exchange was held by the central bank and also by the treasury. Foreign exchange reserves thus fell into three categories: (i) foreign currency-denominated assets owned by the BOJ and adopted as reserve for banknote issuance; (ii) foreign currency owned by the BOJ but not adopted as reserve for issuance; and (iii) foreign currency owned by the government.<sup>32</sup> In practice, it makes sense to aggregate all official holdings in our attempt to measure “Japan’s” foreign exchange reserves. This follows the practice of contemporary monetary authorities and subsequent studies, which treated government and BOJ holdings, statutory or not, as substitutes. Eigo Fukai, who was one of the central figures for monetary policy in the 1920s and 1930s (he was executive director of the BOJ between 1918 and 1928, deputy governor between 1928 and 1935, and governor between 1935 and 1937), argued that it was reasonable for overseas funds held either by the Japanese government or by the BOJ to be called “overseas specie” (Fukai 1928, pp. 319–28).<sup>33</sup>

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<sup>28</sup> Committee (1983a, pp. 550–4); Ito (1989, p. 56).

<sup>29</sup> Ito (1989, p. 57). To be precise, some foreign currency-denominated assets were excluded from overseas specie or foreign exchange reserves; see footnote 43.

<sup>30</sup> “Domestic and Overseas Specie [Naigai Seika],” Bank of Japan Institute for Monetary and Economic Studies Archives, Document 1230.

<sup>31</sup> This issue is not specific to Japan, however. It is common in some countries to define “gold reserves” as reserves held in gold convertible currencies. In such cases, establishing what is meant by “gold” is possible only with access to greater (archive) details.

<sup>32</sup> As already mentioned, those belonging to category (i) were institutionally abolished in 1922.

<sup>33</sup> See Ito (1989, p. 57) for a contemporary assessment. Statistics published at the time also aggregate government and BOJ holdings. For example, the “Reference Book of Financial Matters [Kinyu Jiko Sankosho],” published by the Financing Bureau of the Ministry of Finance, contains a table entitled “Outstanding Amounts of Specie [Seika Genzaidaka Hyo]” with the data series of “overseas specie” including both the government’s and BOJ’s holdings. Several different archival materials held by the BOJ also indicate that the inclusion of nonreserve foreign currency-denominated assets in specie was widely

Another important entity involved in reserve management was the Yokohama Specie Bank (hereafter YSB), which provided services to Japanese monetary authorities through its overseas branches in London and New York. It was through the YSB that both the government and the BOJ dealt with foreign exchanges.<sup>34</sup> The YSB had a mixed ownership, with the government holding a third of YSB's capital when it was established in 1880.<sup>35</sup> The bank's primary role was to provide trade finance, and it played a large part in Japan's foreign exchange policies because of its expertise in foreign exchange. It could hold reserves for official bodies during the interwar period, although the bank's role and importance varied over time.<sup>36</sup> In any case, YSB's *own* foreign currency holdings had the same status as those of any private concern; hence, in contrast with some authors, we exclude YSB own balances from our accounts in this paper.<sup>37</sup>

The government and the BOJ were the only official holders of foreign exchange reserves, but their respective roles changed over time to reflect institutional reforms. Before WWI, the BOJ was formally to be the main holder of foreign exchange reserves; a recurrent suggestion was that the government should abolish its foreign currency holdings, but this never occurred.<sup>38</sup> To cushion the expansionary effects of the rapidly growing current account surplus and to prevent exchange reserves from fueling inflation, the Ministry of Finance purchased foreign currency-denominated assets in the open market. For this purpose, it mobilized funds from the general budget and also from its "Deposit Bureau".<sup>39</sup> One result was that, after WWI, the government became a major holder of foreign

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accepted among monetary authorities. Nurfse (1944, p. 31) and Jobst (2009) report evidence suggesting that Japan's treatment of these holdings was not unusual.

<sup>34</sup> The London branch of the YSB became a BOJ agency in 1896; the New York branch became an agency in 1904 (Manuals and Rules of the Bank of Japan's Operations, Collection 3, Volume 5, p. 679).

<sup>35</sup> Bank of Tokyo (1980, p. 70). The YSB was originally set up to deal with silver coins but soon transformed itself into a bank dealing with foreign exchange business (Tamaki 1995, pp. 46–7). It was the largest bank dealing in foreign exchange, despite competition from private banks (Mitsui, Mitsubishi, and Sumitomo Bank) as well as official ones (Bank of Chosen in Korea and the Bank of Taiwan). This situation lasted until the late 1930s when strict foreign exchange controls were introduced, further elevating the position of YSB relative to other private banks (Committee 1983a, p. 294; Hara 1972, pp. 28–9). For the details on this point, see Ito (1989).

<sup>36</sup> For example, the BOJ tried to curtail capital outflow through a kind of foreign exchange control imposed on the YSB during the era of the restored gold standard in 1930 and 1931 (Ito 1989, pp. 231–5; Committee 1983b, pp. 429–32). During the same period, the YSB supported the yen under instruction of the monetary authorities (Committee 1983a, pp. 515–16).

<sup>37</sup> Bloomfield (1963) and Lindert (1969) include assets held by the YSB in total official foreign exchange holdings.

<sup>38</sup> Ito (1989, pp. 49–50).

<sup>39</sup> The Deposit Bureau (established in 1884) was originally intended to be a kind of savings bank, run by the government, that could utilize the funds raised through the postal savings system. The funds held by the Deposit Bureau tended to be a flexible source for the Ministry of Finance—a result of the Diet's weak supervision of the bureau. For the governance of the Deposit Bureau, see Mukai (1979).

exchange reserves.<sup>40</sup> When the plan to return to the gold standard was announced in 1929, finance minister Inoue stated his intention to abolish foreign exchange holdings by the government.<sup>41</sup> However, figures described later reveal that the government kept a certain amount of assets denominated in foreign currencies.<sup>42</sup>

Finally, as far as the nature of the holdings is concerned, we find Japan to have been fairly typical. After poring over the statistics for holdings of the BOJ and the government, we find that their short-term holdings included deposits (current account, sight deposits, and time deposits) and short-term securities, such as U.K. treasury bills.<sup>43</sup>

### 3. The development of Japan's foreign exchange reserves

In this section, we examine the development of overall foreign exchange reserves by holder and by currency. We begin with Figure 2, which depicts the evolution of total reserves. As mentioned previously, reserves had sharply increased during WWI, and we see that the early 1920s inherited large holdings. Under the persistent external deficits in the 1920s, however, reserves were again gradually depleted and almost dried up by the end of the decade.<sup>44</sup> The expectation of returning to the gold standard in 1929 led to some efforts to replenish the reserves, but this recovery was reversed when the government actually announced its intention of returning to the gold standard in November 1929. The Committee (1983b) mentions the role of profit taking by currency speculators who had played the yen up. When Japan finally returned to gold on 11 January 1930, “the condition surrounding overseas specie [foreign exchange reserves] did not allow having an optimistic view.”<sup>45</sup>

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<sup>40</sup> Ito (1989, pp. 53–4) argues that, in WWI Japan, funds from the general budget accounted for 80 percent of the total purchases of foreign exchange reserves.

<sup>41</sup> On that occasion, he made the following statement. “In Japan, the government has held the considerable amount of overseas specie [foreign exchange reserve] not only for settlement abroad but also for the conduct of foreign exchange controls through purchases and sales of foreign currencies directly. This practice is quite abnormal and emerged from unusual situations. Therefore, on the occasion of the lift of the gold embargo, this practice will be changed and it will [henceforth] be the BOJ that conducts the maintenance of specie and foreign exchange policies.” (“The announcement of Finance Minister Inoue,” 21 November 1929, in Committee 1983b, p. 418; authors’ translation.) The view that the holdings of foreign exchange reserves by the government was “abnormal” under the gold exchange standard was shared by officials of the monetary authorities. Eigo Fukai, then deputy governor of the BOJ, argued that holding foreign exchange reserves through excess funds for treasury was “abnormal”: because funding for the holdings incurred costs, it was natural to allow only a central bank to hold them (Fukai 1928, pp. 324–7).

<sup>42</sup> One of the new facts we discover from examining historical materials is that *formal* changes regarding the holdings of foreign exchange reserves did not directly translate into *actual* changes. The reasons for this inconsistency may warrant further study.

<sup>43</sup> See Eichengreen and Flandreau (2009) for information on other countries. There were also sterling- and dollar-denominated Japanese government bonds, but in May 1919 the BOJ excluded them from foreign exchange reserves (Committee 1983a, p. 553); we have likewise excluded such bonds from our definition.

<sup>44</sup> Ito (1989, pp. 126–9).

<sup>45</sup> Committee (1983b, pp. 394–5, pp. 415–18; authors’ translation).

In the first half of 1930, foreign exchange reserves fell again. Ito (1989) mentions the effects of continued profit taking, repayments for borrowing from abroad, and the seasonal demand for foreign exchange as reasons for the decline.<sup>46</sup> Two thirds of foreign exchange reserves were lost during the period when the gold standard was restored. After the gold standard was abandoned at the end of 1931, it became increasingly difficult to meet external deficits. Capital inflows dried up as world bond markets collapsed, and plummeting world trade made it difficult to attract foreign currency.<sup>47</sup> As the level of foreign exchange reserves remained low, the Japanese government resorted to gold shipments in order to pay for outstanding overseas debts.<sup>48</sup> The balances held on the books of the YSB turned out to be too small to cover trade deficits in the late 1930s.<sup>49</sup> A balance-of-payment crisis came in 1937.<sup>50</sup>

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<sup>46</sup> Ito (1989, pp. 234–5).

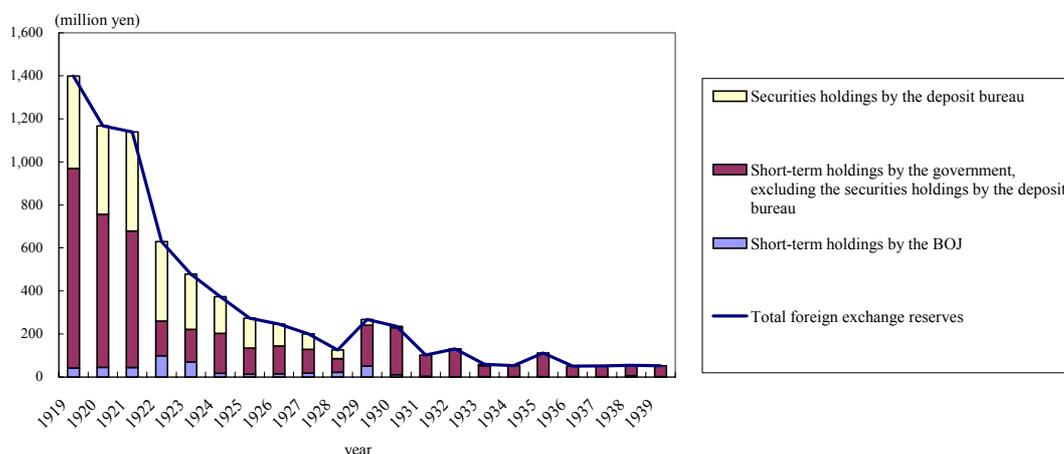
<sup>47</sup> Ito (1989, p. 297). The opportunity to issue external bonds vanished owing to the contraction of international markets, the devaluation of the yen, and the loss of Japanese bonds' credibility due to political reasons (e.g., international reaction to the Manchurian Incident in 1931).

<sup>48</sup> There were seven shipments of gold to the United States and the United Kingdom in 1932 and three shipments in 1933; these shipments relied on the gold bought by the government under terms of the procedure for purchasing and exporting gold in 1932 (Committee 1983b, pp. 75–6).

<sup>49</sup> In the 1930s, transactions involving trade finances tended to be centralized at the YSB for the purpose of foreign exchange control. Therefore, the amount of the trade deficit matched the amount of the demand by the YSB on foreign currency-denominated assets or gold (Hara 1972).

<sup>50</sup> Ito (1989, pp. 315–18).

**Figure 2. Foreign Exchange Reserve Holdings**



Sources: See the Appendix.

Figure 2 also indicates that the government, including the Deposit Bureau of the Ministry of Finance, dominates the holdings of foreign exchange reserves in terms of outstanding amounts throughout the interwar period. This is in spite of the efforts and institutional changes in 1930 that were intended to make the BOJ a primary holder of foreign exchange reserves. Within the various government departments, the initial huge share of securities holdings by the Deposit Bureau declined steadily (from about 40 percent of total government holdings to almost nil toward the end of the 1920s before disappearing entirely in 1934).

Eichengreen and Flandreau (2009) argue that deposits, bills, and foreign securities were the three main types of currency holdings during that period in other countries. Available information for Japan does support this finding.<sup>51</sup> Table 1 displays information on the government's holdings for selected years.<sup>52</sup> Deposits consisted of current account, notice account, and time deposits, with data suggesting that shifts across asset classes were not uncommon. As foreign exchange holdings fell during 1923–1925, the share of U.K. treasury bills declined while that of current account deposits increased, perhaps reflecting a shift toward more liquid holdings. As reserves increased again in 1929, the share of treasury bills recovered.

<sup>51</sup> Information on government holdings is available for the periods 1923–1925 and 1929–1930. For the pre-WWI era, Kojima (1981, p. 361) refers to documents of the Ministry of Finance that mention a detailed breakdown of foreign exchange reserves at the end of 1912.

<sup>52</sup> Some of the government assets are unspecified.

**Table 1. Composition (percent) of London holdings by the government for selected months**

	1923		1924	1925	---	1929	1930
	January	December	December	December	---	December	December
Current account	3.6	4.0	35.4	32.4		2.7	1.5
Notice account	17.4	16.7	18.9	14.2		31.7	0.0
Time deposits	34.9	45.7	31.1	34.8		20.6	24.0
UK Treasury bills	28.1	20.5	0.0	0.0		16.9	4.2
Unspecified	16.0	13.1	14.6	18.7		28.2	70.4
Total	100.0	100.0	100.0	100.0		100.0	100.0

Notes: Securities held by the Deposit Bureau are *excluded* from this tabulation. Because of rounding, percentages may not actually sum to 100.

Sources: “The Detailed Accounting Book for Sterling Denominated Assets at London Agency on Behalf of the Government [Rondon Dairi-ten Seifu Eika Meisai Cho],” Bank of Japan Institute for Monetary and Economic Studies Archives, Documents 46113, 46114, 46115.

Archival evidence on portfolio management by some agencies sheds light on underlying strategies. For instance, we find that the Deposit Bureau, which concentrated its investments in U.K. treasury bills (though they also held other sterling-denominated securities until 1926), most probably resorted to a “buy and hold” policy.<sup>53</sup> In support of this inference we have evidence of a comparable number of purchases and redemption operations, with the amount of each purchase nearly equal to the sum of redemption plus accrued interest.<sup>54</sup>

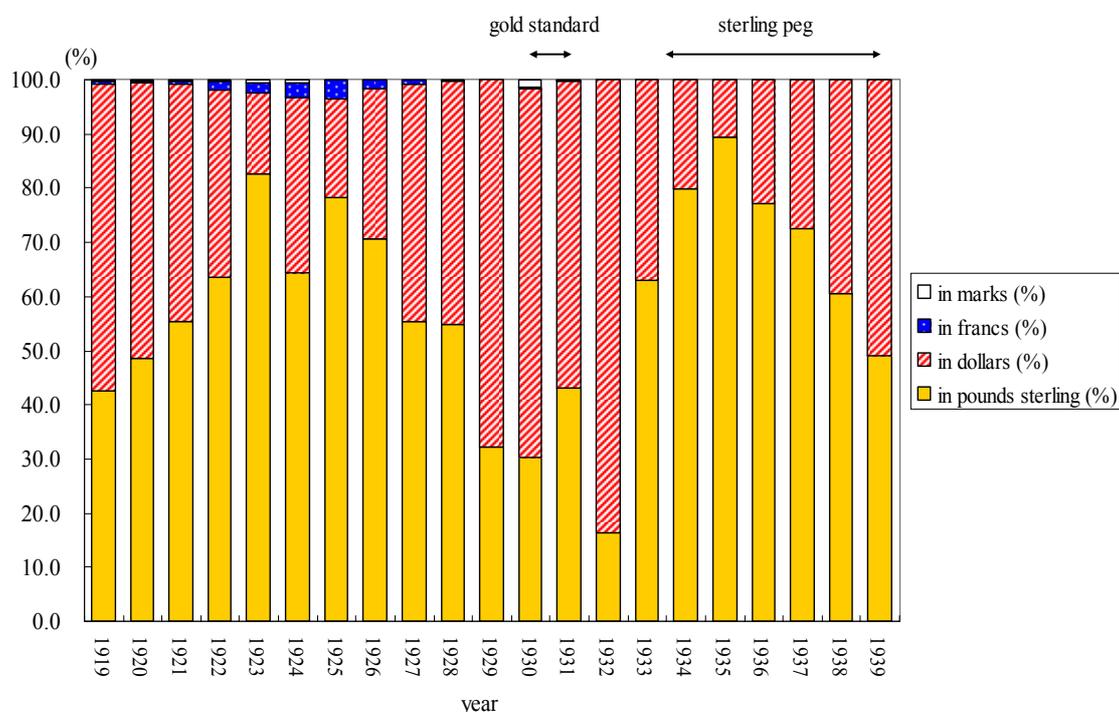
Foreign exchange reserves held by Japanese authorities during the interwar period consisted of four currencies: British pound sterling, U.S. dollar, French franc, and German mark. The share of the latter two never reached even 5 percent. This pattern is typical of other countries’ records, and it shows the tendency of foreign exchange holdings to concentrate on a limited number of international currencies. Sterling and the dollar were thus the main reserve currencies of the time, but

<sup>53</sup> Apart from U.K. treasury bills, at the end of 1923 the Deposit Bureau held sterling-dominated Japanese bonds (government, City of Tokyo, and South Manchurian Railway Company bonds) and other sterling-denominated securities such as U.K. exchequer bonds. See “The Detailed Table of Securities Holdings of the Bank of Japan’s London Agency 1.A [Nichigin Rondon Dairiten Yukashoken Meisaicho],” Yokohama Specie Bank Historical Materials, Microfilm Edition, Second Period, 0047.

<sup>54</sup> For the month of January 1923, the Deposit Bureau bought U.K. treasury bills in the amount of 19,025 thousand pounds, and the sum of redemption and interest rate earnings was 19,008 thousand pounds (“The Detailed Accounting Book for Sterling Denominated Assets at London Agency on Behalf of the Government [Rondon Dairi-ten Seifu Eika Meisai Cho],” Bank of Japan Institute for Monetary and Economic Studies Archives, Document 46113). In general, the activities of the Deposit Bureau were not disclosed, and the details of its operation policy for foreign exchange reserves have not been conclusively demonstrated. For example, the official history of the Deposit Bureau gives only the figures for overseas assets (Ministry of Finance 1964, pp. 488–90).

without any clear or durable leadership emerging (see Figure 3). Lindert (1969, pp. 18–19) argues that, in 1913, sterling was the dominant currency in Japan (with more than 80 percent of the total). After WWI, we find that the dollar’s share increased to reach more than 50 percent in 1919 and 1920.<sup>55</sup> Sterling then recovered its status as the dominant currency throughout the 1920s. However, just before the return to the gold standard, the dollar regained the lead. After the dollar’s devaluation in 1933, sterling recovered and remained the leading instrument as long as Japan continued pegging its currency to sterling. The U.S. dollar became the primary currency in 1939 (although its ascendance began earlier), coinciding with the shift in Japanese currency peg from sterling to the dollar.<sup>56</sup>

**Figure 3. Foreign Exchange Reserves by Currency**



Sources: Authors’ database; see the Appendix.

<sup>55</sup> Ito (1989) finds a similar tendency evidenced by figures obtained through the historical materials of the Ministry of Finance in March 1915. Ninety-three percent of foreign exchange reserves were held in London; at the end of 1921, total assets consisted solely of nearly equal amounts of sterling- and dollar-denominated assets (Ito 1989, p. 40, pp. 56–7).

<sup>56</sup> The figures in this paper are based on annual data and therefore do not reflect seasonal variations.

In sum, we find that Japan's foreign exchange reserves declined during the 1920s. This runs counter to the trend in other countries, where foreign exchange reserves were ballooning during this decade (Eichengreen and Flandreau 2009). On the other hand, the resilience of sterling and its characteristic unwillingness to surrender easily (in the mid-1920s and then again in the mid-1930s) is consistent with results for contemporaneous countries. Likewise, in Japan there was a heyday of the U.S. dollar between 1929 and 1932 that echoed similar tendencies elsewhere.

#### **4. Contemporary views on portfolio management**

How did policy makers think of foreign exchange management? The government, the BOJ, and the YSB have left material exhibiting their views on the matter. In this section we review archival evidence regarding reserve accumulation and currency selection. These materials help us to understand the factors affecting portfolio choices, to be discussed later on. Elements of concerns to Japanese authorities included liquidity, location of holdings, the portfolio of foreign exchange reserves, and identifying the best international currency. At a broader level, of course, the question of how accumulating foreign exchange reserves was related to a country's macro objectives. For instance, BOJ official Eigo Fukai pointed to factors in common with other gold standard countries, such as saving the costs of actual gold shipments.<sup>57</sup> In November 1919, BOJ governor Junnosuke Inoue explained that the bank's main purpose in acquiring foreign exchange was not earning profits but rather "enhancing trade" in accordance with government targets, which we interpret as a policy to promote trade by providing financial instruments that would smooth settlements.<sup>58</sup> Inoue also stated that this imperative trumped profit motives, implying that foreign exchange accumulation could occur without reference to portfolio maximization. On the other hand, foreign exchange balances could be subjected to reallocation, and there is abundant evidence of sophisticated thinking on how best to accomplish this.

At the end of 1912, the Ministry of Finance stated that foreign exchange balances held by the government in the United Kingdom ought to be maintained at "first class" banks. Deposits were to be kept in instruments that would facilitate payments and, if the situation allowed, in instruments that would generate better returns. We have evidence that the Ministry of Finance occasionally purchased U.K. treasury bills instead of time deposits when the former became more profitable owing to changes in interest rates.<sup>59</sup> When the accumulation of foreign exchange reserves accelerated during WWI, proper management of the reserve became a more pressing issue. In 1916, the government set the principle that it would "purchase short-term profitable foreign securities in order

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<sup>57</sup> Fukai (1941, pp. 80–2).

<sup>58</sup> "Speech at the Nobility Hall," 21 November 1919, in Committee (1983a, p. 552; authors' translation).

<sup>59</sup> Kojima (1981, p. 361), who also finds that most U.K. treasury bills held by the government at this time had maturities of six months.

to earn interest”.<sup>60</sup> In October 1919, the BOJ ruled that “deposits for overseas reserve should be in current accounts with a possibility of sight, or few days notice, withdrawals.”<sup>61</sup> It also decreed what banks were eligible for depositing funds; in the United Kingdom, it had to be the Bank of England. In the United States, only the Federal Reserve banks and a few large private banks in principal U.S. cities were eligible.<sup>62</sup> In 1939 the Ministry of Finance emphasized liquidity for the holdings of the Deposit Bureau.<sup>63</sup>

In 1927 the head of the New York branch of the YSB, as agent for foreign reserve management, wrote a letter to the YSB president about the general principles of such management, making several suggestions concerning Japan’s expected return to the gold standard. He emphasized that foreign exchange should be liquid (kept in the form of “securities easily sold in order to obtain funds”), held in New York (because “the economic ties between Japan and the US are so strong and the global financial center has shifted from London to New York”), and with maturities matching projected needs (“when they are frequently used for maintaining foreign exchange rates, for example as were after the Great Kanto Earthquake, the most part of them should be placed as deposits on current accounts. By contrast, some parts can be invested in short-term treasury bills when assets are not likely to be sold”).<sup>64</sup> The volatility of exchange reserve currencies was also an important factor. One BOJ document (to be discussed shortly) shows transaction records in the midst of the 1931 sterling crisis that suggest the government intended to shift sterling-denominated assets to dollar-denominated assets in order to avoid capital losses.<sup>65</sup>

Sources also indicate that service of external debt (mainly government debt) was a primary driver of the selection of currency holdings. In the early 1930s, the fiscal and financial section (*zaisei kinyu kakari*) of the BOJ created a document entitled “The Record of Funds Located in the U.K. and

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<sup>60</sup> “The Summary of Explanation by the Finance Minister, Taketomi,” *Tokyo Asahi Newspaper*, 19 April 1916, reprinted in *The Bankers’ Magazine*, 20 May 1916, Vol. 61, No. 367 (authors’ translation). The government intended to repay its foreign debt by accumulated assets denominated in foreign currency (Committee 1983a, pp. 319–20).

<sup>61</sup> These principles are stated in a document created by the BOJ to obtain the permission from the Ministry of Finance (Committee 1983a, p. 554; authors’ translation).

<sup>62</sup> Committee (1983a, p. 554).

<sup>63</sup> Ministry of Finance (1964, p. 220).

<sup>64</sup> Letter dated 31 January 1927 from Kashiwagi, the New York branch manager, to the YSB president (“Letters from New York in the First Half of 1927 [Nyuyoku Shiten Raikan Showa Ninen Kamihanki],” Yokohama Specie Bank Historical Materials, Microfilm Edition, Second Period, 25; authors’ translation). Kashiwagi also stated that the government considered profitability to some extent, as it invested in tax-exempt U.S. treasury bills.

<sup>65</sup> “The Record of Funds Located in the UK and the US from 20 September 1931 to the End of the Same Year[Eibei Shikin Shimatsu],” Bank of Japan Institute for Monetary and Economic Studies Archives, Document 1366.

the U.S. from 20 September 1931 to the End of the Same Year.”<sup>66</sup> Although the precise date of this document is not known, it was created in early 1932 after the gold standard had been abandoned and in the context of collapsing exchange rates.<sup>67</sup> The document provides a kind of balance sheet of the foreign exchange needs in a context of capital outflows. On the one hand, the holdings of sterling- and dollar-denominated assets at the end of 1931 are shown. On the other hand, a simulation of foreign exchange needs for 1932 is provided based on both financial and trade factors. The calculation shows the importance of interest payments on external debts (which exceeded the trade deficit). It also reflects a kind of “cash in advance” approach to foreign exchange management: needs were identified and budgeted, which led to the target values of currency holdings.

As for selecting where assets should be held, we found an explanation referring the status of the market as an international financial center. In October 1939, when the yen was pegged to the U.S. dollar, finance minister Kazuo Aoki declared that “now we can neither treat London as the center for the international settlements nor consider sterling as an international currency for settlement anymore” and then raised three major conditions for a “reference currency”. The discussion that resulted is interesting because it reflects the close association, in the minds of policy makers, between reserve portfolio management and exchange rate targeting. We therefore provide the complete text of Aoki’s declaration as follows.

The reasons why the reference currency for foreign exchange rates used to be sterling were that sterling kept relatively stable values and was free from restrictions in international settlements. Once meeting these conditions, it was considered to be an additional advantage that our country had a deep trade linkage with the sterling area. However, now sterling has lost its stability and as far as the transactions with our country are concerned, it has become a restricted currency. The reasons for taking sterling as a reference currency have gone. Under such circumstances, we have faced the situation under which it is necessary to re-think the basis of foreign exchange targeting. When it comes to the situation of our foreign trade, we note that about 70 percent of the imports are from the U.S. dollar area, while almost half of exports go there. The relationship with the U.S. dollar area is deeper than with the sterling area. It is likely that this condition will last for a while. In addition, because the London market can no longer be used for foreign exchange settlements, operations must be shifted to New York. It is widely accepted that the U.S. dollar is stable and that New York is the

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<sup>66</sup> Bank of Japan Institute for Monetary and Economic Studies Archives, Document 1366.

<sup>67</sup> A reference to “last year”, meaning 1931, dates the document to sometime in 1932.

freest market for international settlements. Furthermore, there have been several examples where countries departing from a sterling peg have moved to the U.S. dollar. For the reasons above, we have concluded that the most suitable decision is to choose the U.S. dollar as a reference currency for Japan.<sup>68</sup>

## **5. Factors determining Japanese reserve currency composition**

In this section we describe our empirical study of the factors influencing the currency composition of foreign exchange reserves. We found earlier that the British pound sterling and the U.S. dollar dominated other currencies; accordingly, our dependent variable is the relative share of sterling and the dollar in total foreign exchange reserves. We adopt an eclectic approach to determining explanatory variables. The previous section surveyed a number of factors that may have influenced contemporary policy makers. Modern empirical research has found various determinants of the composition of foreign exchange reserves. The influential work of Dooley, Lizondo, and Mathieson (1989) stresses the choice of the currency peg, the identity of the country's dominant trade partner, and the composition of the country's foreign debt. These factors are also supported by the research of Eichengreen and Mathieson (2000). Eichengreen (2006, pp. 133–4) also emphasizes frictions in markets, foreign exchange controls, and other institutional factors.<sup>69</sup> There are no previous empirical studies of the determinants of historical foreign exchange reserves, but Flandreau and Jobst (2009) provide evidence on the related issue of the international reach of currencies in foreign exchange markets. The authors emphasize the role of geography, liquidity, trade, and network externalities in conferring key currency status and in facilitating the spread of international currencies.

Our model considers three main explanatory variables: trade, finance, and exchange rate instability. In some regressions, the trade and finance variables were aggregated to produce a synthetic indicator.<sup>70</sup> The effect of trade is measured by computing the ratio of trade with the sterling areas to trade with the United States.<sup>71</sup> Finance is proxied by external debt service on government

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<sup>68</sup> “The Statement by the Finance Minister at the Cabinet Meeting,” 24 October 1939, in “Letters Regarding Foreign Exchange Division in 1939 [Todoriseki Kawaseka Shoshin Showa Juyonenchu],” Department of Economics, University of Tokyo, Yokohama Specie Bank Historical Materials; authors’ translation.

<sup>69</sup> These frictions make securities markets less liquid, making the currency in question less attractive.

<sup>70</sup> Trade flows and debt service are aggregated (in yen).

<sup>71</sup> We use “the sterling area” rather than the United Kingdom because settlements of sterling-area trade relied largely on London (Tsurumi 1972 [2000], pp. 340–5; Ito 1989, p. 31). During the interwar period, a considerable portion of Japan’s import/export transactions were with the British Empire in Asia. For example, India was a major trading partner in the textile sector. Before WWI, London was the sole center for trade settlements even though the United States was one of Japan’s most important trading partners (Tsurumi 1972 [2000], pp. 340–1; Metzler 2006, p. 97). Thus, the argument based on trade structure may not apply to the prewar period. For a study of the influence of trade and finance on international currency status before WWI, see Flandreau and Jobst (2009).

debt, a major item of the balance of payments. Dooley, Lizondo, and Mathieson (1989) emphasize this as a powerful determinant for modern developing countries. Our specific variable is the ratio of the service on sterling debts to that on dollar debts.<sup>72</sup> Observe that this variable does capture to some extent the effect of specific institutional constraints, since limitations on foreign debt issuance or on payments in certain markets may have influenced debt denomination. It also captures inertia built into the financial system: between 1920 and 1931, Japan borrowed about 1.6 billion yen (or about 0.75 billion U.S. dollars, according to the average exchange rate for that period), a large proportion of which was taken in New York.<sup>73</sup> Reasons for this included the rise of New York as an international financial center for foreign bonds<sup>74</sup> and restrictions in London by British monetary authorities (these were related to various schemes designed to control the capital account in such events as the 1925 return to the gold standard).<sup>75</sup> However, outstanding debt service did not adjust fully to the new conditions because of the long maturity of pre-WWI issues (the weighted averaged maturity was 25.4 years at the end of 1932).<sup>76</sup> Even in the early 1930s, debt service on sterling-denominated loans amounted to about half of the government's external payments.<sup>77</sup>

Next we consider the relative stability of sterling versus the U.S. dollar.<sup>78</sup> To capture the "quality" of reserve currencies, we use a variety of measures. One is an indicator of relative strengthening (measured as sterling fluctuation against the dollar over the previous three years).

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<sup>72</sup> It was common to include an option for bearers of the securities to have the coupon paid in the market and currency of their choice. In practice, however, the U.S. dollar was used for payments for dollar-denominated Japanese sovereign bonds (Tsushima 1966, pp.137–44). In the mid-1930s, three Japanese sovereign issues had this option for sterling-denominated bonds. The optional currencies were U.S. dollar, French franc, and Swiss franc. ("The Restrictions on Foreign Exchange Transactions Reflecting Current Situation, vol. 11 [Jikyoku ni Motozuku Kawase Torihiki jo no Shogai ni Kansuru Ken]," in "Letters and Telegrams in Foreign Exchange Division," Department of Economics, University of Tokyo, Yokohama Specie Bank Historical Materials). The outstanding amounts of these three issues accounted for 35 percent of the total sovereign debt denominated in sterling at the end of 1939. However, since the option was not between sterling and dollars, our measure is robust to this complication. (Figures are calculated based on data in Table 29, "Reference Book of Financial Matters," Ministry of Finance, 1940).

<sup>73</sup> Asai (1982 [2000], pp. 214–15); Ito (1989, p. 147).

<sup>74</sup> Ito (1989, p.154).

<sup>75</sup> In 1924, Montagu Norman, governor of the Bank of England, requested issuing houses not to allow overseas bonds to be sold in London starting in April (Sayers 1976, p. 138; Cottrell 2005, pp. 161–2). Suzuki (2001, p. 141) points to the deterrent role of the U.K. stamp duty on new issues, which gradually rose from 0.5 percent to 2 percent by 1920.

<sup>76</sup> Figures are calculated based on data in Table 33, "Reference Book of Financial Matters," Ministry of Finance, 1933.

<sup>77</sup> Figures here are calculated using data from BOJ archival material ("Documents Relevant to the Government's Finance, vol.1 [Seifu Shikin Hoju Kankei Shorui, 1/4]," Bank of Japan Institute for Monetary and Economic Studies Archives, Document 6520).

<sup>78</sup> These variables and the way they are measured are consistent with previous studies; see e.g. Dooley, Lizondo, and Mathieson (1989).

Another measure is an indicator of past volatility (measured as the coefficient of variation of sterling in terms of yen divided by that of dollars, computed over the previous three years). In order to capture the effects of expectations on exchange rate volatilities, we compute the same coefficient but adjust it to cover a window from time  $t + 1$  to  $t - 1$ . This measure also captures future volatility.<sup>79</sup> Finally, we add a year dummy to control for the effect of preparations for the 1935 redemption of a corporate bond issued by the South Manchurian Railway Company.<sup>80</sup> To sum up, we consider the following specification:

$$\frac{S_t}{D_t} = \alpha + \beta \left( \frac{\text{TRADES}_t}{\text{TRADEUS}_t} \right) + \gamma \left( \frac{\text{DEBTS}_t}{\text{DEBTUS}_t} \right) + \delta(\text{FXSTAB}_t) + \mu(1935) + \varepsilon_t, \quad (1)$$

where

S = ratio of sterling-denominated assets to total foreign reserves at the end of each year;

D = ratio of dollar-denominated assets to total foreign reserves at the end of each year;

TRADES = annual sum of Japanese exports and imports to and from sterling-area trading partners;

TRADEUS: annual sum of Japanese exports and imports to and from United States;

DEBTS = annual interest payments on Japan's sterling-denominated sovereign bonds;

DEBTD = annual interest payments on Japan's dollar-denominated sovereign bonds;

FXSTAB = relative stability of exchange rate between pound sterling and U.S. dollar; and

1935 = year dummy.

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<sup>79</sup> Exchange regime dummies could also be considered, in the spirit of more recent studies. Hence, instead of exchange rate volatilities, we also ran the model with a U.K. gold standard dummy. This variable turned out not to be significant. Likewise, an added control dummy for 1939 U.K. capital control is not statistically significant.

<sup>80</sup> The sterling share of the total foreign exchange reserves temporarily surged at the end of 1935 owing to the fourth issue of the South Manchurian Railway Company's corporate bond, which was due for redemption at the end of January 1936. This issue was taken over by the government, which had to store sterling-denominated assets in preparation for the redemption, causing an anomalous jump in sterling's share. The government sterling holdings in London surged from 1.5 million pounds at the end of November to 5.8 million pounds toward the end of December, and the outstanding amount declined to the previous level after the redemption in March ("Overall Accounting Book of the Bank of Japan [Soukanjou Motocho]," Bank of Japan Institute for Monetary and Economic Studies Archives, Documents 21638, 21640).

As can be seen, our basic equation is consistent with both earlier research and contemporary opinions. Accordingly, the expected effect of greater trade flows with the sterling area or larger interest payments in sterling is a larger relative share of sterling in total reserves. In contrast, holdings of sterling should be adversely affected by the currency's volatility, and its coefficient should be negative. The share of each currency's holdings to total foreign reserves is extracted from archival sources described in the Appendix. Trade and debt-service figures are collected from statistics published by the Ministry of Finance,<sup>81</sup> and foreign exchange rates are available in statistics published by the BOJ.<sup>82</sup> The estimation method is ordinary least squares, and the sample period is between 1924 and 1939.<sup>83</sup> The hypothesis of a unit root can be rejected for all variables by the DF-GLS test, which is supposed to have enhanced power in small samples.<sup>84</sup>

Results are shown in Table 2. Trade flows and interest payments are statistically significant when treated separately. In some cases, they are statistically significant when treated as an aggregate variable.<sup>85</sup> Japanese monetary authorities raised (resp. reduced) their relative holdings of sterling-denominated assets when trade volumes with the sterling area increased (resp. decreased) with respect to trade volumes with the United States. Authorities also raised (reduced) sterling holdings when sterling-denominated external interest payments increased (decreased). This may have reflected the inclination of monetary authorities to hold currencies in which payments had to be made. This interpretation is consistent with the archival evidence showing that Japanese authorities "budgeted" their need for foreign exchange reserves. Because the currencies were not accumulated for sale to the private sector, another possible interpretation is that currencies associated with a large turnover faced smaller transaction costs and thus were more attractive vehicles.<sup>86</sup> We note that the effects of debt structure on the currency composition of foreign exchange reserves could partly explain the resistance of sterling against the dollar during the 1920s, given that sterling's share of debt stocks exceeded the dollar's share throughout the period.

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<sup>81</sup> Financing Bureau of the Ministry of Finance, "Reference Book of Financial Matters [Kinyu Jiko Sankosho]," various issues.

<sup>82</sup> Research Department of the Bank of Japan, "Economic Statistics of Japan [Honpo Keizai Tokei]," various issues.

<sup>83</sup> The sample period starts in 1924 because there were no interest payments on dollar-denominated sovereign bonds until then. The results of the estimates here should be interpreted with reservation in light of the small sample numbers.

<sup>84</sup> The hypothesis of a unit root can be rejected at the 1 percent level for foreign exchange rates; at the 5 percent level for the relative share of sterling against the dollar in foreign exchange reserves, trade flows, sum of trade and financial flows, and coefficient of variation of sterling divided by that of the dollar; and at the 10 percent level for interest payments.

<sup>85</sup> The aggregate variable is not statistically significant when estimated without other variables or with foreign exchange rates.

<sup>86</sup> See Flandreau and Jobst (2009) for a survey of previous studies on the issue of transaction costs and trading volumes of currencies.

**Table 2. Determinants of the currency compositions of foreign exchange reserves, 1924–1939**

Constant term	Trade flows	Interest payments	Trade and financial flows	Foreign exchange rates	Volatility for foreign exchange rates(a)	Volatility for foreign exchange rates(b)	1935 dummy	Adjusted $R^2$	DW statistic
-17.28 (-1.81)	8.10 (4.36)***	1.68 (2.56)**	—	1.87 (1.08)	—	—	5.36 (5.53)***	0.83	1.12
-8.05 (-3.93)	8.17 (5.05)***	1.77 (2.99)**	—	—	-0.70 (-1.89)*	—	4.87 (5.21)***	0.86	2.05
-7.32 (-4.22)	7.29 (5.45)***	1.80 (3.56)***	—	—	—	-0.85 (-2.91)**	5.02 (6.47)***	0.89	1.89
-1.14 (-0.66)	—	—	3.39 (1.73)	—	—	—	5.99 (4.57)***	0.66	1.17
-1.79 (-0.13)	—	—	3.44 (1.53)	0.13 (0.05)	—	—	5.98 (4.36)***	0.64	1.16
-1.26 (-0.71)	—	—	3.93 (1.85)*	—	-0.42 (-0.73)	—	5.59 (3.89)***	0.65	1.40
-0.94 (-0.58)	—	—	3.90 (2.14)*	—	—	-0.85 (-1.80)*	5.35 (4.25)***	0.71	1.23

Notes: Values as determined by equation (1); figures in parentheses are  $t$ -statistics. Annual data described in the text. Sterling area includes the United Kingdom and countries classified in Nurkse (1944, p. 57) as “sterling area” plus British colonies. These areas include Hong Kong, India, Straits Settlements, Sweden, Norway, Denmark, Portugal, Australia, and Egypt. Sovereign bonds here include three issues of corporate bonds of the South Manchurian Railway Company, since their obligations were transferred to the government. Trade data with Japan are available in “Reference Book of Financial Matters.”

\*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%.

Results regarding the stability are also generally consistent with predictions. Exchange rate appreciation is not significant, although the relative volatility of sterling compared to the dollar shows the expected negative sign. This volatility is significant when regressed against trade flows and interest payments separately but is not significant when trade and finance are lumped together. Relative volatilities with expectation also show negative and significant results in all cases. This implies that Japanese monetary authorities shifted from sterling-denominated to dollar-denominated assets when the relative volatility of sterling increased or was expected to increase.<sup>87</sup>

<sup>87</sup> The Durbin-Watson statistic for estimates in the first, fourth, and fifth rows of Table 2 fall in the inconclusive range.

## **6. Conclusion**

Japan introduced the gold exchange standard before WWI. It was a developing country and a net debtor with heavy debt-service burden. Therefore, management of foreign exchange reserves was one of the central issues in macroeconomic policies during the interwar period.

Archival materials and our recently collected data sets bring new knowledge on how policies were decided. Throughout the interwar period, the major holder of Japan's foreign exchange reserves was the government. Until the mid-1920s, many of these reserves were held through the Deposit Bureau, which was under government's supervision yet escaped parliamentary control. Both the government and the BOJ held foreign exchange reserves in the form of deposits (current accounts, deposits at notice, and time deposits) and treasury bills. The respective share of each asset changed frequently. Archival materials show that monetary authorities of Japan were investment managers who cared about liquidity and safety, although they did not disregard returns. As for the currency composition of reserves, the pound sterling and the U.S. dollar accounted for the lion's share. The sum of French francs and German marks never reached 5 percent, a finding similar to that obtained for most countries during these years (see Eichengreen and Flandreau 2009). Currency leadership swung repeatedly between sterling and the dollar throughout the interwar period.

Both our archival exploration and statistical analyses of reserve currency composition reveal several determining factors in currency selection. First, archival material suggests that trade structures mattered. Results of empirical analysis suggest that trade flows can, to some extent, explain shifts of currencies in foreign exchange reserves. The channel through which trade flows affected currency composition may be transaction costs—to the extent that they were reduced by increased turnover. Archival evidence suggests that the authorities targeted expected trade flows when setting up their desired portfolio.

Second, the debt structure strongly affected reserve currency selection, according to both archival evidence and empirical analysis. Japan was a net debtor at the time, and the fund-raising environment determined its debt structure to some extent. Since the burden of debt service was considerable, a currency that could offer favorable conditions tended to be chosen for denomination. Therefore, a currency was favored if supported by a market that was capable of mobilizing funds and that was less regulated and less burdened with tax. Evidence suggests that it was essential to choose a currency with fewer restrictions. One of the important factors was that the currency be transferrable, suggesting that exchange controls played a significant role. The effects of debt structure could partly explain the inertia of preference for sterling, given the long maturity of sovereign bonds issued prior to WWI.

Finally, the stability of a particular currency's value was another critical determining factor. Archival materials provide supportive evidence. The results of empirical analysis for the period between 1924 and 1939 are in partial agreement, but more detailed data and evidence are needed to help deepen our future understanding of this issue.

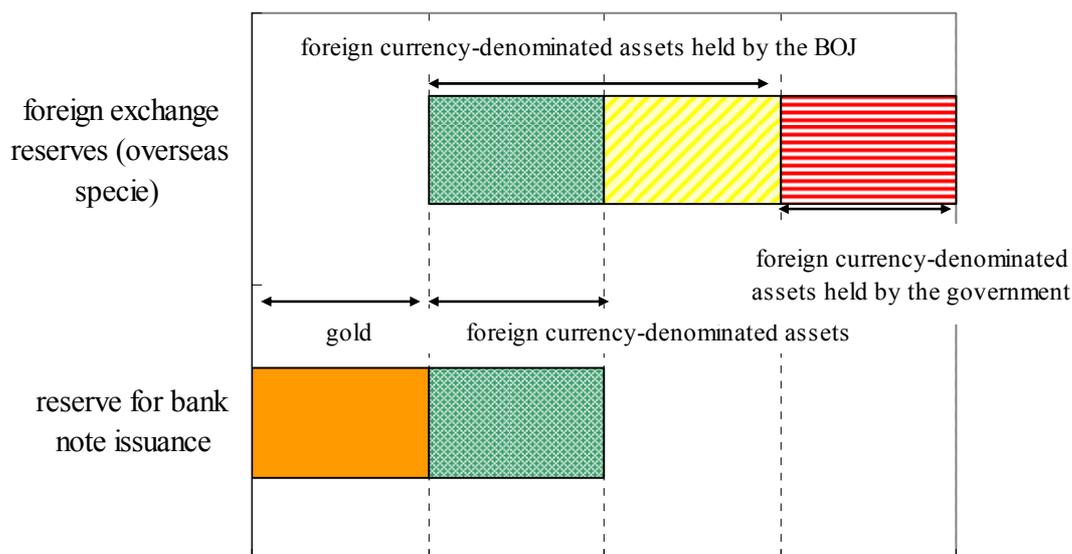
As a result of the factors described here, sterling maintained its status as a reserve currency during the interwar period—thanks, in part, to London’s legacy as the sole international market before WWI. Sterling came to share this status with the U.S. dollar, which emerged as a new reserve currency during the interwar period.

## Appendix

In this appendix we define foreign exchange reserves and provide details of the database concerning them.

As mentioned in the text, the sum of official holdings of gold and foreign exchanges was defined as “specie”. Specie consisted of “domestic specie” located in Japan and “overseas specie” located abroad. The BOJ and the government held foreign currency-denominated assets. The Deposit Bureau, as a part of the government, held a considerable amount of short-term securities (see Section 3), which were recorded separately from other assets owned by the government. We define as *foreign exchange reserves* the sum of foreign exchanges held by the BOJ and the government, including securities by the Deposit Bureau, regardless of whether or not the reserves were backing bank note issuance. See Figure A-1 for the relationship between specie, reserve for bank note issuance, and foreign exchange reserves.

Figure A-1 Foreign exchange reserves and reserve for bank note issuance



The figures in this paper are constructed mainly from the BOJ’s internal statistics and contemporary published statistics for some items (see Table A-1). Assets managed by the YSB as an agent for the BOJ were registered on the BOJ’s balance sheet under “accounts for overseas agencies”. Since the BOJ held overseas assets on behalf of the government, the government’s overseas assets also appeared in that account.<sup>88</sup> The “accounts for overseas agencies” were divided into two subgroups: short-term holdings (in Japanese, *shikin*) and securities (*yukashoken*).<sup>89</sup>

<sup>88</sup> Assets held by these two entities were recorded separately in accounting books.

<sup>89</sup> Manuals and Rules of the Bank of Japan’s Operations, Collection 3, Volume 5, pp. 686–9.

Table A-1 Components and sources for figures for foreign exchange reserves

Components	Sources		
	1919-1929	1930	1931-1939
Foreign exchanges owned by the BOJ	Overall accounting books of the BOJ	Overall accounting books of the BOJ	Overall accounting books of the BOJ
current account deposit	-	-	-
deposit at notice	-	-	-
time deposit	-	-	-
treasury bills	-	-	-
Foreign exchanges owned by the government	Overall accounting books of the BOJ	Overall accounting books of the BOJ	Overall accounting books of the BOJ
the general budget account	-	-	-
the Deposit Bureau account	-	-	-
Securities holdings by the government	-	-	-
securities holdings	-	-	-
UK securities	Domestic and overseas specie (Naigai seika)	Reference book of financial matters	Reference book of financial matters
US securities	Domestic and overseas specie (Naigai seika)	Condition for the Deposit Bureau of the Ministry of Finance	Statistics for the Deposit Bureau

Note: Components are based on the classification in "Domestic and Overseas Specie (Naigai Seika)."

The total amounts for foreign exchange reserves reported in this paper are the sum of short-term holdings by the BOJ and by the government as well as short-term securities held by the Deposit Bureau. This classification is based on the detailed items in one of the most well-known archival documents for specie figures: the internal statistics held by the BOJ Archives, known as "Domestic and Overseas Specie [Naigai Seika]" and containing data on foreign exchange reserves (Table A-1).<sup>90</sup> Short-term holdings of the government are divided into the general budget account and the Deposit Bureau. For the holdings of the Deposit Bureau, those in the form of deposits were recorded as short-term holdings of the governments whereas those in the form of short-term securities fell in the independent category. Unfortunately, this source provides data only until 1930, so we need to draw on other sources in order to construct consistent time-series data sets between 1919 and 1939.

Data for short-term holdings of the BOJ and the government are extracted from the annual "Overall Accounting Book [Sokanjo Motocho]" of the Bank of Japan.<sup>91</sup> As for securities held by the Deposit Bureau, figures in "Domestic and Overseas Specie" mentioned previously are used from

<sup>90</sup> "Domestic and Overseas Specie [Naigai Seika]," Bank of Japan Institute for Monetary and Economic Studies Archives, Document 1230. Some previous literature, such as Ito (1989) and Takeda (2002), rely on this source. Others, such as Bloomfield (1963, p.11) and Lindert (1969, p.12), draw on figures from secondary sources.

<sup>91</sup> Bank of Japan Institute for Monetary and Economic Studies Archives, Documents 21608, 21610, 21612, 21614, 21616, 21618, 21620, 21622, 21624, 21626, 21628, 21630, 21632, 21634, 21636, 21638, 21640, 21642, 21644, 21646.

1919 to 1929, and data after 1930 consist of figures for the holdings of U.K. and U.S. treasury bills extracted from statistics regarding the Deposit Bureau.<sup>92</sup> It is likely that these sources after 1930 are enough to cover total short-term securities holdings by the Deposit Bureau because the only overseas securities it held from 1925 to 1939 were U.K. and U.S. treasury bills (except in fiscal year 1927, according to figures in Ministry of Finance).<sup>93</sup>

Table A-2 shows the results of our estimation.<sup>94</sup>

Table A-2 Foreign exchange reserves of Japan

(end of year, thousand yen)											
	Dec., 1919	Dec., 1920	Dec., 1921	Dec., 1922	Dec., 1923	Dec., 1924	Dec., 1925	Dec., 1926	Dec., 1927	Dec., 1928	Dec., 1929
total	1,399,375	1,167,115	1,139,328	629,958	478,876	373,495	273,585	245,961	200,971	126,530	267,000
in pounds sterling	596,392	566,332	630,654	399,577	395,773	240,568	213,665	173,580	111,121	69,222	85,995
in dollars	792,876	593,241	499,295	218,550	71,005	120,653	50,123	68,396	87,953	56,932	180,739
in francs	8,184	5,644	7,480	9,932	10,074	10,250	9,797	3,986	1,897	375	267
in marks	1,923	1,899	1,899	1,899	2,024	2,024	0	0	0	0	0
in pounds sterling (%)	42.6	48.5	55.4	63.4	82.6	64.4	78.1	70.6	55.3	54.7	32.2
in dollars (%)	56.7	50.8	43.8	34.7	14.8	32.3	18.3	27.8	43.8	45.0	67.7
in francs (%)	0.6	0.5	0.7	1.6	2.1	2.7	3.6	1.6	0.9	0.3	0.1
in marks (%)	0.1	0.2	0.2	0.3	0.4	0.5	0.0	0.0	0.0	0.0	0.0
total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

	Dec., 1930	Dec., 1931	Dec., 1932	Dec., 1933	Dec., 1934	Dec., 1935	Dec., 1936	Dec., 1937	Dec., 1938	Dec., 1939
total	235,917	102,781	130,545	59,131	53,243	111,504	51,023	51,888	54,589	52,140
in pounds sterling	71,148	44,121	21,199	37,289	42,561	99,637	39,372	37,599	33,093	25,564
in dollars	160,604	58,345	109,232	21,785	10,633	11,733	11,620	14,267	21,489	26,567
in francs	1,050	136	103	46	49	134	31	21	7	9
in marks	3,115	179	11	11	0	0	0	0	0	0
in pounds sterling (%)	30.2	42.9	16.2	63.1	79.9	89.4	77.2	72.5	60.6	49.0
in dollars (%)	68.1	56.8	83.7	36.8	20.0	10.5	22.8	27.5	39.4	51.0
in francs (%)	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
in marks (%)	1.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: See the Appendix.

<sup>92</sup> For sterling-denominated assets, we used the figures for U.K. treasury bills held by the Deposit Bureau as reported in “Reference Book of Financial Matters [Kinyu Jiko Sankosho]” published by the Ministry of Finance. For U.S. treasury bills, the data for 1930 is available in “Conditions for the Deposit Bureau of the Ministry of Finance [Okurasho Yokinbu Jokyo],” Bank of Japan Institute for Monetary and Economic Studies Archives, Document 1410; for 1931 onward we used the data in “Statistics for the Deposit Bureau [Okurasho Yokinbu Tokeisyu],” where the figures given are for the end of each fiscal year (rather than each calendar year) and where all figures from 1931 are null.

<sup>93</sup> Ministry of Finance (1964, pp. 489–90).

<sup>94</sup> The figures in BOJ’s accounting books and “Domestic and Overseas Specie” are identical as far as the BOJ’s account is concerned between 1919 and 1929. With regard to government short-term holdings, figures in the accounting books are always larger (by about 10 percent) than those in “Domestic and Overseas Specie”. The reason for the gap is likely that some assets held on behalf of the government were excluded from specie. For example, there are mark-denominated assets in the accounting books that never appear in “Domestic and Overseas Specie”. Between 1937 and 1939, the figures for the BOJ in the accounting books also become larger than those in “Domestic and Overseas Specie”.

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