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A Reassessment of Japan's Monetary Policy during the Great Depression: The Constraints and Remedies

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[Abstract]

Temin [1989] and Eichengreen [1992] argue that monetary policy played a key role in each country's economic performance during the Great Depression, and that some European policymakers hesitated to pursue an expansionary monetary policy even after departing from gold. Why did these policymakers not pursue the opportunities they were able to pursue to the fullest extent? This study explores this issue by looking at the case of Japan, focusing on the constraints it faced and the remedies available to it as a small, open economy. This study explores the relationship between interest rates in Japan and in the major international financial centers, using a new series of representative long-term interest rates and narratives. This study reveals that Japan imposed a restrictive monetary policy on itself even after departing from the gold standard. Japan did so because it needed to maintain its ties both with its trading partners and with the international financial markets.

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1. Introduction

Departing from the gold standard was the necessary precondition for an early recovery from the Great Depression in the 1930s (Eichengreen and Sachs [1985]). Temin [1989] and Eichengreen [1992] both argue that monetary policy played a key role in the economic performance of each country.

Temin [1989] and Eichengreen [1992] also suggest that some European policymakers hesitated to pursue expansionary monetary policies even after departing from gold. On British monetary policy after Great Britain had departed from gold, Temin claims "The policy was of only limited success… because the British authorities did not take advantage of this opportunity as they should have."[1] On Swedish policy after Sweden had departed from gold, Eichengreen claims "Policymakers' newfound freedom from its constraints, which would have allowed them to implement more expansionary policies, was very incompletely exploited."[2]

Why did these policymakers not pursue the opportunities they were able to pursue to the fullest extent? We will explore this issue by looking at the case of Japan. We use Japan as a case study to explore how a peripheral country looked at and responded to the collapse of the international gold standard system. In a sense, this study complements those of Temin [1989] and Eichengreen [1992], given that their studies focused primarily on the core countries, although Eichengreen mentions certain peripheral countries, including Japan.

Japan departed from the gold standard in December 1931 under the leadership of its veteran Finance Minister, Korekiyo Takahashi.[3] Many observers argue that

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[1] Temin [1989], p.74.

[2] Eichengreen [1992], p.302.

[3] Korekiyo Takahashi (1854-1936) was a distinguished financial and political leader in Japan. He joined the Bank of Japan (BOJ) in 1892 and served as Governor of the Bank from 1911 to 1913. He then served as Finance Minister 7 times between 1913-36 and as Prime Minister once from 1921-22. He was assassinated by a group of militarists on February 26, 1936. During his career in public service, he played a central role in raising funds in Western countries during the Russo-Japanese War (1904-05). He solved a major financial crisis in Japan in 1927 and implemented a drastic economic stimulus

Takahashi's three-pronged economic stimulus package, combining depreciation of the yen, expansionary fiscal policy, and the lowering of interest rates, contributed to the early recovery of the Japanese economy during the Great Depression (Nakamura [1971], Patrick [1971]).

A few previous quantitative studies have analyzed Takahashi's economic policies. Among these studies, Nanto and Takagi [1985] stress the effects of the increase in exports accompanying the depreciation of the yen. Cha [2003] emphasizes the effects of the debt-financed fiscal expansion. However, very few studies have focused on the conduct of monetary policy. Most previous studies on monetary policy in interwar Japan have been constrained by the lack of data enabling empirical research to be conducted.[4]

This study explores monetary policy during the interwar period in Japan, making use of a new dataset and narratives. It derives a new series of representative long-term interest rates from the market price of one kind of government bond. It then uses this interest rate series to explore the relationship between long-term interest rates in Japan and in the two main financial centers, Great Britain and the United States. This study also explores the contemporary view of Japanese policymakers at that time using narratives. In doing so, it delivers a new interpretation of monetary policy in Japan, a small open economy, during the interwar period.

This study reveals that Japan imposed a restrictive monetary policy on itself even after departing from the gold standard. Japan did so because as a small, open economy, it needed to maintain its ties both with its trading partners and with international financial markets. Quantitative analysis shows that Japanese long-term interest rates had a long-run relationship with British rates throughout the interwar

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package during the Great Depression. According to Smethurst [2007], Takahashi had learned the essence of economic policy before becoming Finance Minister for the 5th time in December 1931.

[4] Shizume [2002] employs "Taylor rule" analysis, and shows that Japanese monetary policy was pro-cyclical in the period 1885-1940, including the period after Japan's departure from the gold standard.

period. Narrative analysis shows that Japan sacrificed monetary policy autonomy in order to stabilize the exchange rate. The primary reasons for the adoption of restrictive monetary policy in Japan, as a small open economy, were to maintain its relationships with its trading partners and to service its external debts. A comparison of the Japanese economy with other countries suggests that monetary policy did not contribute to the early recovery of the Japanese economy, but that the depreciation of the currency and debt-financed fiscal stimulus did.

The rest of this paper is organized as follows. Section 2 derives a new data series of long-term interest rates. Section 3 employs quantitative analysis, using the new data derived in Section 2. Section 4 interprets the results of quantitative analysis using narrative analysis. Section 5 concludes the paper.

2. A New Series of Long-Term Interest Rate Data

First, we need to resolve the problem of data constraints in order to formulate a quantitative analysis of Japanese monetary policy during the interwar period. To this end, we need to create a new dataset comprising a series of Japanese interest rates because previously available interest rate data are problematic. Existing short-term interest rate data for the interwar period in Japan are those for private sector debts such as bills discounted by banks or bank certificates of lending[5]. These private sector interest rates were subject to high and volatile credit risk premiums because the Japanese economy suffered from periodic financial panics, including the financial crisis of 1927, and financial instability throughout the interwar period.

No representative data is available on short-term interest rates in interwar

[5] The interest rates for "discounted bills" and "certificates of lending" were reported by the Tokyo Bankers Association. Their maturities varied, and they were often refinanced on maturity. According to Aoki [1932], the average maturities in 1927 were about 2 months for discounted bills and 8 months for certificates of lending (Aoki [1932], p.45). It is often claimed that certificates of lending included various kinds of lending with higher levels of risk and less liquidity than discounted bills. See Sano [1936], p.8.

Japan for public debt (such as Treasury bill rates) that can be used as a substitute for the existing private sector data. While Treasury bills were issued from time to time during the interwar period, they were circulated for short periods only and the availability of interest rate data was limited.

During the interwar period, investors traded various types of bonds, including government bonds, municipal bonds, and corporate bonds, both in the official markets and over the counter via securities companies. The Tokyo Stock Exchange (TSE) served as the central market of Japan. In November 1932, the TSE listed 37 issues of Japanese government bonds, one issue of foreign (Chinese) government bonds, 95 issues of municipal bonds and 463 issues of corporate bonds for its spot transaction facility.

Interest rates on government bonds are important for an analysis of Japanese monetary policy during the interwar period for two reasons. First, they represented policy target rates for Japanese policymakers during the 1930s. As Fukai Eigo, a distinguished economist and then Vice Governor of Bank of Japan, observed, "lowering interest rates on government bonds was essential to lower interest rates in general." [6] In the 1930s, the BOJ regarded its open market operations in government bonds as one of its primary policy instruments. Second, unlike interest rates for the private sector, interest rates on government bonds are risk-free rates, which are used as a basis for comparing rates in different countries.

Nevertheless, one series of long-term interest rate data for government bonds does exist. Nippon Kangyo Ginko (Japan Hypothec Bank, or JHB) collected price data for bonds, and calculated compound yields to maturity for the bonds it covered. However, the series begins only in July 1921, and the data is calculated only for the first working day of each month.

We create a new series of long-term interest rate data from the market prices of

[6] Fukai [1941], p.365.

a government bond called the "Ko-go" 5 percent government bond.[7] We use the TSE price data for spot transactions in the Ko-go. The Ko-go was the most actively traded bond in Japan during the interwar period. Trading in the Ko-go accounted for 18 percent of the total number of transactions in government bonds on the TSE in 1932. Investors regarded the Ko-go as the benchmark.

We calculate compound yields to maturity on monthly average prices from January 1919 to December 1938. The monthly average price means total traded value divided by the total number of bonds traded in a month. The compound yield to maturity is derived using the formula below:

$$P_t = \sum_{j=t}^{n} CF_j \cdot (1 + r_t)^{\frac{j-t}{12}}, \qquad (1)$$

where r_t is the compound yield to maturity in period t, P_t is the bond price in period t, CF_j is the cash flow in period j, and $n\,(n \geq t)$ is the maturity date. Here, t, j, and n are expressed on a monthly basis.

We confirm that our method of calculation is consistent with that used for previously available JHB data. While JHB did not publish its method of calculation, we are able to compare the results of our calculation with those for JHB data. For the yield on the same day for the same bond, the discrepancies between our estimates and the figures in JHB data are less than 1 basis point (one hundredth of one percent).

Our data has certain advantages over the JHB data. First, our data covers the period from 1919 to 1938, while the JHB data is available only from 1921. Second, we have calculated monthly averages using data for all trading days, while the JHB data covers only one particular day in each month. Our data is convenient because the data on Great Britain and the United States, which we are going to analyze in relation to the Japanese data, are also monthly averages.

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[7] The "Ko-go" 5 percent bond was issued in the years 1908 and 1909 after 17 large private railway companies were nationalized in 1906 and 1907. The bonds were delivered to the stockholders of the predecessor railway companies. The bonds reached their maturity date in 1962 and 1963.

3. Econometric Analyses

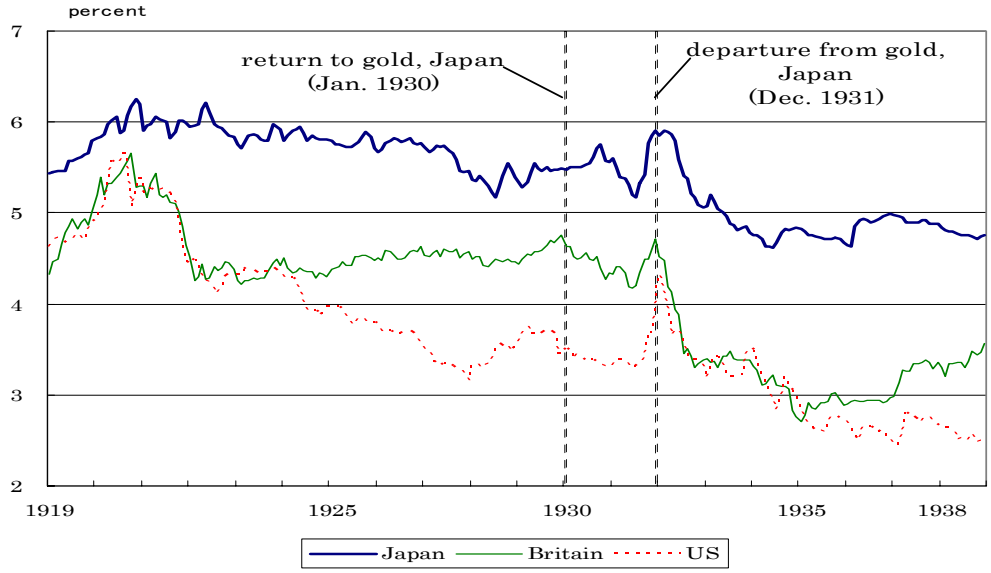
Using the long-term interest rate data derived in Section 2, we will now explore the relationship between the long-term interest rates of Japan and two international financial centers, Great Britain and the United States.[8] We employ the approach taken by Obstfeld and Taylor [2004] and Obstfeld, Shambaugh and Taylor [2004], using the degree of co-movements in domestic and international interest rates as the indicator of sacrificing independent monetary policy.

a. The Time-series Properties of Long-term Interest Rates

We examine the basic time-series properties of long-term interest rates in the three countries selected. Figure 1 shows developments in long-term interest rates from January 1919 to December 1938.

[8] Long-term interest rate data for Britain and the United States, as well as for Japan, are monthly averages. The data for Britain are the yields for 2.5 percent consols, as reported by the Board of Trade in the *Statistical Abstract for the United Kingdom*. The data for the United States are unweighted averages for partially tax-exempt government bonds, which were callable after eight years during the period 1919-25 and after twelve years during the period 1926-38. The data for the U.S. are from the Board of Governors of the Federal Reserve System's *Banking and Monetary Statistics*, 1943, p.429 and pp.468-471.

Figure 1. Long-term Interest Rates



Sources: Tokyo Stock Exchange, *Monthly Report*; Nomura Securities, *Annual Report on Public and Corporate Securities*; NBER, *Macrohistory Database*, http://nber.org/databases/macrohistory/contents/; Board of Governors of the Federal Reserve System, *Banking and Monetary Statistics*.

Table 1. Unit Root Tests for Long-term Interest Rates

(Sample period: Jan.1919-Dec.1938; Number of observations: 240)

	Japan			Britain			United States		
(level)									
ADF	−2.865		(11)	−2.931		(12)	−3.007		(9)
PP	−3.200	*		−2.738			−2.832		
(first difference)									
ADF	−5.836	***	(10)	−4.099	***	(11)	−4.589	***	(8)
PP	−11.225	***		−14.516	***		−11.588	***	

Notes: 1.Tests are employed to examine the formula with a constant and a trend term for level data, and without them for first difference data.

2."***", "**" and "*" indicate rejection of a unit root at the 1, 5, and 10 percent levels of significance, respectively.

3.Numbers in parentheses indicate lag orders for ADF tests. The lag orders are determined by being iteratively reduced from 12 to the order at which the longest lag term is statistically significant.

4.The critical values are from Table 10.A.2 of Fuller [1996] for ADF tests, and from Mackinnon [1996] for PP tests.

Table 1 reports the results of unit root tests for long-term interest rates in the three countries. The results indicate that the order of integration for long-term interest

rates in all three countries is one.[9]

We employ Granger causality tests to examine interest rates in the three countries, using formula (2). This tests whether movements in lagged foreign interest rates are statistically significant in explaining movements in contemporary domestic interest rates.

$$\Delta R_t = a_0 + \sum_{i=1}^{p} a_i \Delta R_{t-i} + \sum_{i=1}^{p} a_{F1,i} \Delta R_{F1,t-i} + \sum_{i=1}^{p} a_{F2,i} \Delta R_{F2,t-i} + u_t, \qquad (2)$$

R_t denotes the domestic interest rate at time t, and $R_{Fj,t}$ denotes the foreign country's interest rate at time t (j=1,2).

Table 2. Granger Causality Tests (F-Statistics)

Dependent Variable	Japan				Britain				United States			
Independent Variables	Britain		United States		Japan		United States		Japan		Britain	
Max lags												
1	4.94	**	6.17	**	0.96		16.82	***	0.99		17.89	***
2	13.87	***	11.58	***	4.70	**	19.10	***	8.71	***	28.03	***
3	12.89	***	10.89	***	9.93	***	20.78	***	8.61	***	29.32	***
4	12.69	***	11.92	***	11.57	***	21.47	***	8.14	***	35.34	***
5	13.16	***	18.53	***	12.62	***	23.33	***	8.50	***	36.73	***
6	17.06	***	18.78	***	17.63	***	32.43	***	13.49	***	44.07	***

Notes: 1.Tests are employed with the formula including self-lags, which are not reported in the table.
2."***"and "**" indicate statistical significance at the 1 and 5 percent levels, respectively.

Table 2 reports the results of Granger causality tests. The results are consistent with the notion of interwar Japan as a small, open economy.

The results indicate that movements in lagged foreign interest rates are statistically significant in explaining movements in contemporary Japanese interest rates. Japanese long-term interest rates are Granger-caused by both British and American rates with a lag of one month. Neither British nor American long-term interest rates are Granger-caused by Japanese rates with a lag of one month. This is

[9] To be precise, the ADF test fails to reject the existence of a unit root for Japan, while the PP test rejects it at the 10 percent level of significance.

consistent with the notion that Japan was a peripheral country.

All three countries' interest rates are Granger-caused by each other with lags of more than two months. This is consistent with the conventional understanding that the international financial market was integrated.

b. Preparatory Tests for Examining the Long-run Relationship

We examine the long-run relationship, defined as cointegration, between interest rates in Japan and in the two major international financial centers from January 1919 to December 1938. Table 3 reports the results of cointegration tests presented by Engle and Granger [1987]. These results indicate that Japanese long-term interest rates were cointegrated with those of Great Britain throughout the interwar period. This implies that Japanese rates had a stable, long-run level relationship with British rates. The table also indicates no such relationship between Japanese rates and American rates.

Table 3. Cointegration Tests (Engle-Granger)

Dependent variable: Japan ("Ko-go" 5 percent bond)
Independent variables: Constant term and Great Britain (Consols) / Constant term and United States (Treasury)
Sample period: January 1919-December 1938, Number of observations: 240

	Long-term interest rate	
	Britain (Consols)	United States (Treasury)
ADF statistics	-2.902 (1) **	-1.949 (11)

Notes: 1. This table shows the results of ADF tests on the residuals of ordinary least square regressions (the Engle-Granger test). The ordinary least square regressions are calculated using the formula below:

$$R_t + \mu + \lambda R_{b,t} + e_t,$$

2. The critical values are from Table IIa of Phillips and Ouliaris [1990]. "**" indicates statistical significance at the 5 percent level.
3. Figures in parentheses show the lag order. The lag orders are determined by being iteratively reduced from 12 to the order at which the longest lag term is statistically significant.

Gregory and Hansen [1996] argue that a simple cointegration test fails to detect cointegration in the event of a structural change in the long-run level relationship between variables. We conduct cointegration tests with a structural change presented by Gregory and Hansen [1996] for the relationship between Japanese and American long-term interest rates. Table 4 reports the results. In contrast with the results derived using the Engle-Granger tests, the results derived using the Gregory-Hansen tests indicate that Japanese long-term interest rates were cointegrated with American rates during the interwar period, and that there was a structural change in the relationship in December 1932 or January 1933. The timing of the structural change indicated by the Gregory-Hansen tests is close to the timing of the American departure from the gold standard (March-April 1933).

Table 4. Cointegration Tests with A Structural Change (Gregory-Hansen)

Dependent variable: Japan ("Ko-go" 5 percent bond)
Independent variables: Constant term and United States (Treasury)
Sample period: January 1919-December 1938, Number of observations: 240

	United States (Treasury)		
ADF*	-4.817	+	[Dec. 1932]
Z_t^*	-4.701	+	[Jan. 1933]
Z_a^*	-38.642		--

Notes: 1. The table shows residual-based cointegration test statistics for "regime change" (C/S) presented by Gregory and Hansen (1996).
The "regime change" (C/S) is described by the expression below;

$$R_t = \mu_1 + \mu_2 D_t + \lambda_1 R_{b,t} + \lambda_2 R_{b,t} D_t + e_t,$$

D_t has a value of zero before and at the time of the structural change; D_t has a value of one after the structural change.
2. Dates in brackets show the time points when the structural change occurs.
3. The critical values are from Table I of Gregory and Hansen [1996]. "+" indicates statistical significance at the 10 percent level.

c. Error Correction Models

An error correction model is applicable when there is a cointegrating relationship among a set of variables (Engle and Granger [1987]). The model allows the variables to converge to the cointegrating relationship, a long-run equilibrium. In the model, the cointegration term is called the error correction term.

We formulate error correction models which explain the difference in Japanese long-term interest rates using lag-difference terms[10] and an error correction term.[11] The formula is expressed by equation (3).

$$\Delta R_t = \alpha + \sum_{j=1}^{p} \beta_j \Delta R_{t-j} + \sum_{j=0}^{p} \gamma_j \Delta R_{b,t-j} + \omega\left(\sigma + R_{t-1} - \theta R_{b,t-1}\right) + u_t, \qquad (3)$$

R_t denotes the domestic interest rate at time t, and $R_{b,t}$ denotes the international base rate at time t. Table 5 reports the regression results.

[10] Lag orders are chosen using Schwarz information criteria.

[11] Cointegrating vectors are calculated using the dynamic OLS method proposed by Stock and Watson [1993]. Lag orders are chosen using Schwarz information criteria.

Table 5. Estimation Results of Japanese Interest Rate on International Base Rate (Error Correction Model)

Dependent variable: Japan ("Ko-go" 5 percent bond)

Estimation formula: $\Delta R_t = \alpha + \sum_{j=1}^{p} \beta_j \Delta R_{t-j} + \sum_{j=0}^{p} \gamma_j \Delta R_{b,t-j} + \omega\left(\sigma + R_{t-1} - \theta R_{b,t-1}\right) + u_t,$

Sample period: January 1919-December 1938, Number of observations: 240

	R_b: Britain (Consols)					
	a)			b)		
α	-0.001	(-0.30)		-0.002	(-0.38)	
β_1	0.287	(4.72)	***	0.299	(4.89)	***
γ_0	0.115	(2.44)	**	--	--	
γ_1	0.053	(1.08)		0.057	(1.14)	
ω	-0.070	(-3.59)	***	-0.074	(-3.79)	***
half-life	9.61			9.01		
	(cointegrating vector)					
σ	-3.161	(-39.63)	***	-3.161	(-39.63)	***
θ	0.549	(28.54)	***	0.549	(28.54)	***
adj. R^2	0.171			0.153		

Notes: 1. Figures in parentheses are t-statistics. "***", "**" and "*" indicate statistical significance at the 1 percent, 5 percent and 10 percent levels, respectively.

2. In all cases of error correction model estimation, lag orders are chosen to be 1 using Schwarz information criteria.

3."Half-life" means the half-life of the shock based on the adjustment speed, ω.

4. Cointegrating vectors are calculated using the dynamic OLS method. Lag orders are chosen using Schwarz information criteria.

Obstfeld and Taylor [2004] and Obstfeld, Shambaugh and Taylor [2004] argue that the cointegrating slope coefficient, θ, represents the long-term level relationship between the domestic interest rate and the international base rate. The expected sign of θ is positive. If the domestic interest rate moves parallel with the international base rate, then $\theta = 1$. They also argue that the absolute value of the coefficient of the error correction term, or the adjustment speed, ω, represents the degree of dependency of the domestic interest rate on the international base rate.[12]

[12] They employ the method developed by Pesaran, Shin and Smith [2001] (PSS test) for testing the significance of the level relationship among a large set of country data. Since the orders of integration in the data for Japan, Britain and the United States are all 1, we do not employ the PSS test and instead directly estimate the error correction model.

We first use the British interest rate as the international base rate. We conduct two patterns of regressions regarding the lag structure. In the formula reported in the first column, (a), we use the same lag pattern as that used by Obstfeld and Taylor [2004] and Obstfeld, Shambaugh and Taylor [2004]. Their formula includes the difference in the base rate at time t ($\Delta R_{b,t}$) in explanatory variables.[13] In the formula reported in the second column, (b), we use the lag pattern used in a standard error correction formula, which does not include the difference in the base rate at time t ($\Delta R_{b,t}$) in explanatory variables.

Different lag patterns give qualitatively the same results. The coefficient γ_1 is not statistically significant. Other coefficients are statistically significant and have the expected signs. The statistical significance of γ_0 indicates the immediate impact of British rates on Japanese interest rates. The cointegrating slope coefficient, θ, is statistically significant, confirming the long-term level relationship between Japanese and British interest rates. The coefficient of the error correction term or the adjustment speed, ω, has the absolute value of .07, indicating that the half-life of the initial disturbing shock to the long-run relationship is 9 to 10 months.

The Gregory-Hansen tests indicate that Japanese long-term interest rates were cointegrated with American rates during the interwar period, and that there was a structural change in the relationship in December 1932 or January 1933.

We now use the American interest rate as the international base rate and run a regression with dummy variables in the error correction term. The formula is expressed by equation (4). We also run a regression without dummy variables, which is expressed by equation (3).[14]

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[13] We assume that Japanese interest rates did not influence British rates because Japan was a small economy, and that there are no simultaneous biases. These assumptions were also applied in Obstfeld and Taylor [2004] and Obstfeld, Shambaugh and Taylor [2004].

[14] The result of the formula without the difference in the base rate at time t ($\Delta R_{b,t}$) in

$$\Delta R_t = \alpha + \sum_{j=1}^{p} \beta_j \Delta R_{t-j} + \sum_{j=0}^{p} \gamma_j \Delta R_{b,t-j} + \omega\left(\sigma + \sigma_{\Pi} D_t + R_{t-1} - \left[\theta R_{b,t-1} + \theta_{\Pi} R_{b,t-1} D_t\right]\right) + u_t, \quad (4)$$

D_t has a value of zero before and during December 1932, and a value of one subsequently. Table 6 shows the results.

Table 6. Estimation Results of Japanese Interest Rate on International Base Rate (Error Correction Model)

Dependent variable: Japan ("Ko-go" 5 percent bond)

Estimation formula in column a): $\Delta R_t = \alpha + \sum_{j=1}^{p} \beta_j \Delta R_{t-j} + \sum_{j=0}^{p} \gamma_j \Delta R_{b,t-j} + \omega\left(\sigma + R_{t-1} - \theta R_{b,t-1}\right) + u_t,$

in column b): $\Delta R_t = \alpha + \sum_{j=1}^{p} \beta_j \Delta R_{t-j} + \sum_{j=0}^{p} \gamma_j \Delta R_{b,t-j} + \omega\left(\sigma + \sigma_{\Pi} D_t + R_{t-1} - \left[\theta R_{b,t-1} + \theta_{\Pi} R_{b,t-1} D_t\right]\right) + u_t,$

Sample period: January 1919-December 1938, Number of observations: 240

R_b: United States (Treasury)							
	a)			b)			
α	-0.002	(-0.41)		-0.002	(-0.42)		
β_1	0.322	(5.25)	***	0.358	(5.90)	***	
γ_0	0.060	(1.24)		0.052	(1.09)		
γ_1	-0.055	(-1.12)		-0.062	(-1.31)		
ω	-0.056	(-3.39)	***	-0.123	(-4.96)	***	
half-life	12.00			5.27			
	(cointegrating vector)						
σ	-3.693	(-46.36)	***	-4.681	(-56.20)	***	
σ_{Π}	--	--		0.068	(0.33)		
θ	0.476	(22.40)	***	0.253	(12.36)	***	
θ_{Π}	--	--		-0.176	(-2.52)	**	
adj. R^2	0.127			0.171			

Notes: 1. Figures in parentheses are t-statistics. "***", "**" and "*" indicate statistical significance at the 1 percent, 5 percent and 10 percent levels, respectively.

2. D_t has a value of zero before and during December 1932; otherwise, D_t has a value of one.

3. In all cases of the error correction model estimation, lag orders are chosen to be 1 using Schwarz information criteria.

4."Half-life" means the half-life of the shock based on the adjustment speed, ω.

5. Cointegrating vectors are calculated using the dynamic OLS method. Lag orders are chosen using Schwarz information criteria.

The result with the dummy variables is reported in column b). Neither γ_0 nor

explanatory variables is similar to that reported in column a).

γ_1 is statistically significant. Other coefficients are statistically significant and have the expected signs. The coefficient of error correction term or the adjustment speed, ω, has the absolute value of .12, indicating that the half-life of the initial disturbing shock to the long-run relationship is 5 months.

The dummy variable for the cointegrating slope coefficient, θ_Π, is statistically significant, indicating a change in the long-term relationship between Japanese and American interest rates in December 1932. According to the regression results, the value of the cointegrating slope coefficient before and during December 1932, θ, is .253, and that after January 1933, $\theta + \theta_\Pi$, is .077. This indicates that the level relationship between Japanese and American interest rates weakened substantially in December 1932.

The cointegrating slope coefficients for American interest rates before, during and after December 1932 are smaller than that for British rates, indicating a weaker relationship between American and Japanese rates than that between British and Japanese rates.

4. Interpretation and Discussion

a. Japanese Monetary Policy During the Early 1930s: An Interpretation

The quantitative analyses indicate that Japanese long-term interest rates had a long-run relationship with British rates throughout the interwar period. In addition, Japanese long-term interest rates had a long-run relationship with American rates until the end of 1932, but lost such a relationship after 1933 following the departure of the United States from the gold standard. We will now interpret the results of our quantitative analyses using narrative analysis.

Obstfeld and Taylor [1997, 2004] utilize the concept of the macroeconomic policy trilemma in historical studies of a number of countries' monetary policies. They claim that any chosen macroeconomic policy regime can succeed in achieving only two

out of the following three policy objectives:

1) independent monetary policy oriented toward domestic objectives;

2) a fixed exchange rate; and

3) full freedom of cross-border capital movements.

They argue that the gold standard is a typical case of a policy regime designed to maintain free capital movements and a fixed exchange rate, while sacrificing independent monetary policy. They also argue that national policymakers became more inclined to control international capital flows after the financial upheavals of the Great Depression.[15]

BOJ Archive materials show that contemporary policymakers were aware of the macroeconomic policy trilemma. Tetsuzo Horikoshi, an executive director of the BOJ, spoke at the fall meeting of directors and branch managers in 1932.[16] He said "If money supply is increased by domestic policy, the exchange rate may fall. If we intend to maintain the exchange rate, we should curb our domestic policy. If we dare to pursue domestic policy, we should sacrifice the exchange rate."

In theory, Japan had several options in the wake of the collapse of the international gold standard system. Japan could have moved toward a flexible exchange rate system to pursue monetary policy independent from international constraints, as some Latin American countries did. Alternatively, Japan could have introduced strict exchange control measures if it needed to prevent capital flight, as some central European countries did.

Japan did not choose either of these options; it sacrificed independent monetary policy to maintain a fixed exchange rate system. Japan chose a kind of hybrid option: a combination of a one-shot devaluation, a fixed exchange rate system at

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[15] Komiya and Suda [1983] look at postwar Japan's choices in terms of monetary policy regime and exchange rate system in the same context.

[16] "Documents on the Biannual Meetings of Directors and Branch Managers, Spring-Fall, 1932," BOJ Archive No.3943.

a new and sustainable level, and mild exchange rate control measures. Japan did not move to implement a flexible exchange rate system or strict capital controls to pursue independent monetary policy.

1) Monetary Policy

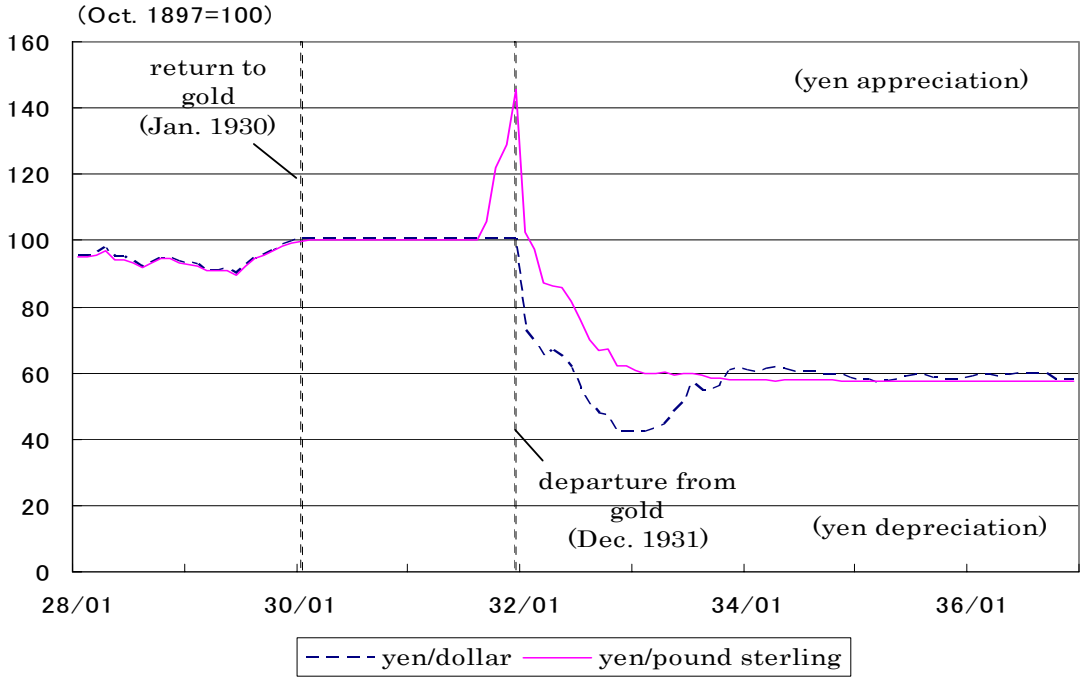
Our quantitative analyses suggest that Japanese monetary policy in the 1930s was not independent from policy in the core country (Great Britain). The existence of a long-run relationship between Japanese interest rates and the core country's rates, namely British rates, suggests that Japanese policymakers did not pursue monetary policy independence after departing from the gold standard. In a sense, Japanese policymakers imposed a kind of self-constraint even after departing from the gold standard, as Temin [1989] and Eichengreen [1992] claim in relation to some Western countries.

2) Exchange Rate Policy

Figure 2 shows developments in the yen rate vis-à-vis the pound sterling and the U.S. dollar before and after the departure from gold. It shows that, for Japan, departing from the gold standard did not necessarily mean moving to a flexible exchange rate system. Rather, it was a one-shot devaluation under a fixed exchange rate system. The yen declined sharply immediately after Japan's departure from the gold standard. The yen depreciated by 40 percent vis-à-vis the pound sterling from the old parity rate. The yen/pound sterling rate stabilized at a new level at the beginning of 1933. In this regard, Japan can be classified as a *de facto* sterling area country similar to British Commonwealth and Scandinavian countries.

Within the sterling area, the yen was not the only depreciating currency vis-à-vis the pound sterling. However, while the Scandinavian currencies also depreciated against the pound sterling in 1932-33, the yen depreciated to a greater extent.

Figure 2. Exchange Rates



Source: Ministry of Finance, *Reference Book of Financial Matters.*

3) Cross-Border Capital Movements

The Foreign Exchange Control Law was issued on March 29, 1933 and came into effect on May 1 of that year. Under this law, the regulations on foreign exchange transactions were extended and tightened. Almost all transactions related to international capital flows were subject to some form of regulation. At the same time, foreign exchange speculation was forbidden by finance ministry ordinance.

Japanese exchange controls were mild in comparison with those imposed in Germany and Austria. In Japan, importers and exporters were able to buy and sell foreign exchange freely via private banks until the end of 1937. Investors were able to buy and sell foreign securities, although they were required to declare that the transaction was "not speculative."[17] In Germany, owners of gold and foreign assets were required to sell them to the Reichsbank. The central bank limited the amount of foreign exchange made available to importers and required exporters to surrender to

[17] Ministry of Finance [1963], pp.135-153.

the bank all foreign currency earnings. In Austria, the authorities rationed foreign exchange and required exporters to surrender foreign currency to the central bank. Gold parity was officially maintained, and the publication of foreign exchange quotations was prohibited (Eichengreen [1992], p.270 and p.310).[18]

b. Why Did Japan Not Pursue an Independent Monetary Policy?

Why did Japan not pursue independent monetary policy to the extent it was able to, but instead sacrificed independent monetary policy to maintain a fixed exchange rate system?

The primary reasons were economic: to maintain relationships with its trading partners and to service its external debts. To this end, Japan had to stabilize its currency at some level. Furthermore, Japan had a political reason for maintaining its position in the international community.

First, Japan needed to stabilize its exchange rates with its trading partners to settle its external transactions.

The Japanese economy depended heavily on trade with regions outside the yen bloc. Table 7 shows the regional breakdown of Japan's trading partners in 1926-36. Japan depended on regions outside the yen bloc for more than 60 percent of its imports and exports. Japan depended on imports of strategic materials such as oil, metals and machinery from outside the yen bloc. Japan also depended on imports of raw materials such as raw cotton and wool for the production of export goods, which had to be exported to earn foreign currency.

[18] Eichengreen [1992], p.270 and p.310.

Table 7. Japan's Foreign Trade, 1926-36

(mil. yen)

Exports	1926	1931	1936	change between 1931-36	change between 1926-36
The yen bloc	469.2	410.0	1389.8	979.8	920.6
China	421.9	143.9	159.7	15.8	-262.2
Other Asia	381.9	283.7	713.2	429.5	331.3
Europe	129.4	104.1	307.7	203.6	178.3
Africa and Oceania	105.0	85.5	295.4	209.9	190.4
North America	890.1	438.9	608.9	170.0	-281.2
Latin America	16.8	13.5	110.0	96.5	93.2
(exports outside the yen bloc as a percentage of total exports)	(80.6)	(72.3)	(61.2)	--	--
Total exports	2414.3	1479.6	3584.7	2105.1	1170.4
Imports					
The yen bloc	697.3	582.5	1116.3	533.8	419.0
China	239.4	103.7	154.8	51.1	-84.6
Other Asia	621.2	258.2	666.0	407.8	44.8
Europe	416.3	199.7	330.1	130.4	-86.2
Africa and Oceania	173.5	135.7	318.6	182.9	145.1
North America	755.5	378.0	920.7	542.7	165.2
Latin America	11.9	7.3	134.0	126.7	122.1
(imports from outside the yen bloc as a percentage of total imports)	(76.1)	(65.0)	(69.3)	--	--
Total imports	2915.1	1665.1	3640.5	1975.4	725.4

Source: Yamazawa and Yamamoto[1979], Table.13, pp.206-213.

Note: The yen bloc consisted of Korea, Taiwan, Kwangtung Province and Manchuria.

Japan had a good reason to peg its currency to the pound sterling rather than to the U.S. dollar. Japan had lost export markets in China and the United States during the late 1920s and early 1930s because of the Great Depression and also because of the

deterioration in its trading relationships with these two countries. While the volume of world trade shrank during this period, the United States introduced protectionist measures through the Smoot-Harley Tariff Act of 1930. Japan was one of the main targets of the Act. In addition, the Japanese invasion of Manchuria and other parts of Mainland China led to boycott movements against Japanese products in China and the United States. Japan was not able to regain these markets during the 1930s. Japan sought new markets in parts of Asia other than China, and in Europe, Africa, and Oceania, a large part of which belonged to the pound sterling area. Japan had an incentive to stabilize the yen/pound sterling rate to settle its external transactions with the pound sterling bloc countries and territories.

Second, Japan needed to stabilize its currency value to service its debts and give relief to international investors because of its indebtedness to foreign investors under foreign-denominated debts. Outstanding Japanese bonds issued externally in 1905, during the Russo-Japanese War, and denominated in pounds sterling, were due to mature in January 1931. Before Japan's return to gold in 1930, the Western investors in these bonds insisted that a stable Japanese currency was a prerequisite to conversion of the debt.[19] Japan returned to gold in January 1930 and successfully issued refinancing bonds in May 1930.[20]

In light of the devaluation of the yen in 1932, Japan needed to stabilize the yen at a certain level to keep servicing its debts. The depreciation of the yen added to the burden of debt servicing. According to official statistics, 20 percent of the total national debt was denominated in foreign currency at a conversion rate of the old parity (1 yen = 1 shilling 0.582 pence). When the foreign debt was converted at the new exchange rate, which became effective in April 1933 (1 yen = 2 shillings 2 pence), foreign-denominated debt accounted for 30 percent of total debt. If the yen had depreciated further, the

[19] Tsushima[1965], p.65.
[20] Tsushima [1965], pp.64-65.

burden of debt servicing would have increased, and Japan might have lost its ability to service its debts. As the Japanese economy depended on international trade and finance, Japan avoided defaulting on its international debts.

Japan had another good reason to peg its currency to the pound sterling, rather than to the U.S. dollar. Japan depended more on the London market than on the New York market as a financial center. From 1870 to 1930, Japan issued government bonds with a total value of 2,843 million yen abroad. Of this amount, 2,148 million yen (220 million pounds), or 75.6 percent, was issued in London. At the end of 1931, 60.7 percent of Japan's total outstanding foreign debt was denominated in pounds sterling.

Third, Japan had a political reason to maintain its pegged exchange rate system. Japanese policymakers made efforts to maintain Japan's position in the international community.[21] One of the criteria for participating in the establishment of the Bank for International Settlements (BIS) in 1929 was to have a "stable currency." Japanese policymakers took seriously the need to meet the criteria for participating in the BIS.[22]

For the above reasons, Japan decided to sacrifice independent monetary policy to peg the yen to the pound sterling.

The Japanese experience provides a good case study of a peripheral country during the Great Depression. After departing from the gold standard, Japanese policymakers did not pursue their potential policy objectives to the fullest extent. They cautiously followed the monetary policy of a core country, Great Britain.

Eichengreen [1992] comments on the policies of countries that had already

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[21] Apparently, for this reason, Finance Minister Takahashi resisted cutting a formal linkage between the yen and gold when departing from the gold standard in 1931. Fukai [1941], pp.260-262.

[22] In the negotiations that took place in the Young Committee, the term "stable currency" referred to maintaining gold parity. Japan succeeded in including an exception clause allowing a victorious country to participate without reference to the stable currency clause. Still, Japanese negotiators regarded joining and staying on the gold standard as a source of power within the BIS. Cho [2001], p.100.

suspended gold convertibility in the transitional year of 1932 as follows: "Hence the initial response of governments to their policy freedom was extremely cautious... Abandoning the gold standard statutes was necessary but not sufficient to spark the resumption of rapid growth. It was also necessary to abandon the ethos of the gold standard that encouraged the continued pursuit of restrictive policies."[23]

This study reveals that the hesitation of monetary authorities during the 1930s, at least in peripheral countries, does not simply reflect the enduring ethos of the gold standard, but may also reflect the reasonable concerns of policymakers in a small open economy.[24]

c. What Policy Made Japan Exceptional in the Early 1930s? A Comparison between Japan and Other Peripheral Countries

The quantitative and narrative analyses undertaken in this study reveal that Japanese monetary policy followed British policy in the early 1930s. This suggests that Japan was unexceptional in terms of monetary policy during that period. If so, what made Japan exceptional in terms of its early recovery from the Great Depression? While it is beyond the scope of this study to explore all Japanese economic policy during this period, this sub-section provides some insight by comparing Japanese economic indicators and policy measures with those of other peripheral countries.

Based on Eichengreen [1992], we divide peripheral countries and regions other

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[23] Eichengreen [1992], pp.287-289. Countries that had not yet abandoned the gold standard had to decide whether to do so. Like Japan, export-oriented countries such as Denmark and New Zealand followed Britain by devaluing their currencies. Less export-oriented countries such as the United States and France retained the gold standard. Countries that were home to international financial centers, such as The Netherlands and Switzerland, had strong incentives to maintain the stability of their currencies and retain international investors' funds, and were the last to go off gold.

[24] In this regard, the Japanese experience during the 1930s resembles that of the emerging economies during the currency crisis of the late 1990s. Once they were forced to depart from a peg system in the wake of the contagious effects of international capital flows, policymakers devalued their currencies in one shot, and then tried to stabilize their currencies at their new levels, which were more favorable for their exports. While doing so, they did not pursue independent monetary policies.

than Japan into four categories: gold standard countries, exchange control countries, sterling area countries, and other depreciating countries (Table 8).[25] Countries such as Albania, Belgium, France, The Netherlands, Latvia, Lithuania and Switzerland remained on gold. Countries with strict exchange controls were Bulgaria, Germany, Hungary and Yugoslavia. The sterling area consisted of the British Commonwealth, Scandinavian countries, Portugal and Thailand. Other depreciators include Latin American countries, Spain, Greece and China.

Table 8. Categories of Countries

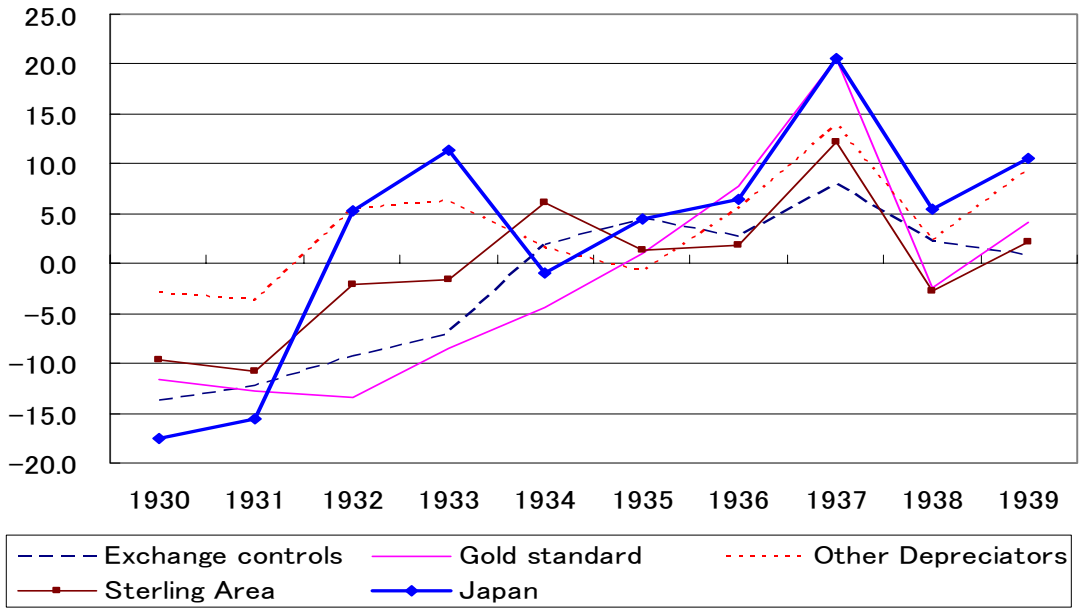
Category	Country and region (numbers of countries/regions)
a. gold standard	Albania, Belgium, Danzig, France*, Latvia, Lithuania, The Netherlands*, Poland*, Switzerland* (9)
b. exchange controls	Bulgaria*, Germany*, Hungary*, Yugoslavia* (4)
c. sterling area	Australia*, Canada, Denmark*, Egypt, Finland*, India, Malaya, New Zealand*, Norway*, Portugal, Sweden*, Thailand (12)
d. other depreciators	Argentina, Bolivia, Brazil*, Chile*, China, Columbia*, Ecuador, Greece, Mexico*, Peru, Salvador*, Spain, Uruguay, Venezuela (14)

Note: "*" indicates countries which appear in Table 10-1 in Eichengreen [1992].

We will now compare Japanese economic indicators with those for the four categories of countries.[26] Figure 3 shows annual price changes in Japan and the four categories of countries. Figure 4 shows annual changes in industrial production. The two figures confirm the earlier recovery of Japan from the Great Depression in comparison with other peripheral countries. Japan experienced higher rates of inflation and growth in 1932-33 than other countries.

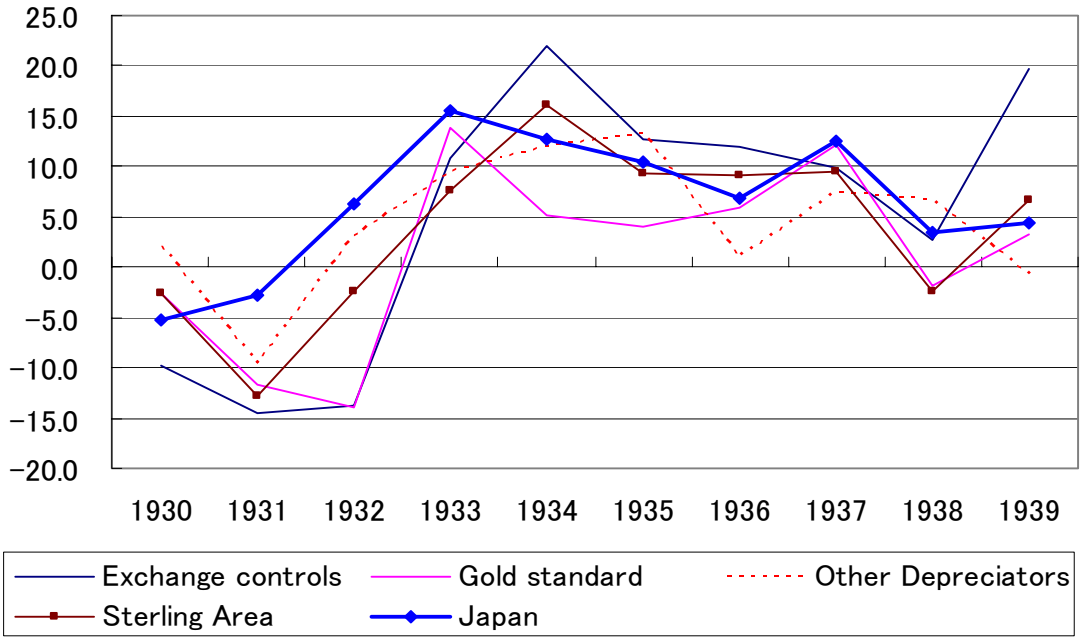
[25] Eichengreen [1992], p.293, Table 10.1, and League of Nations[1940], pp.194-204. We add some peripheral countries and regions to Eichengreen's table, with reference to the League of Nations' description of exchange rate arrangements.
[26] Through this section, we calculate the data for the four categories of countries based on unweighted averages.

Figure 3. Prices (percentage change from previous year)



League of Nations [1940].

Figure 4. Industrial Production
(Percentage change from previous year)



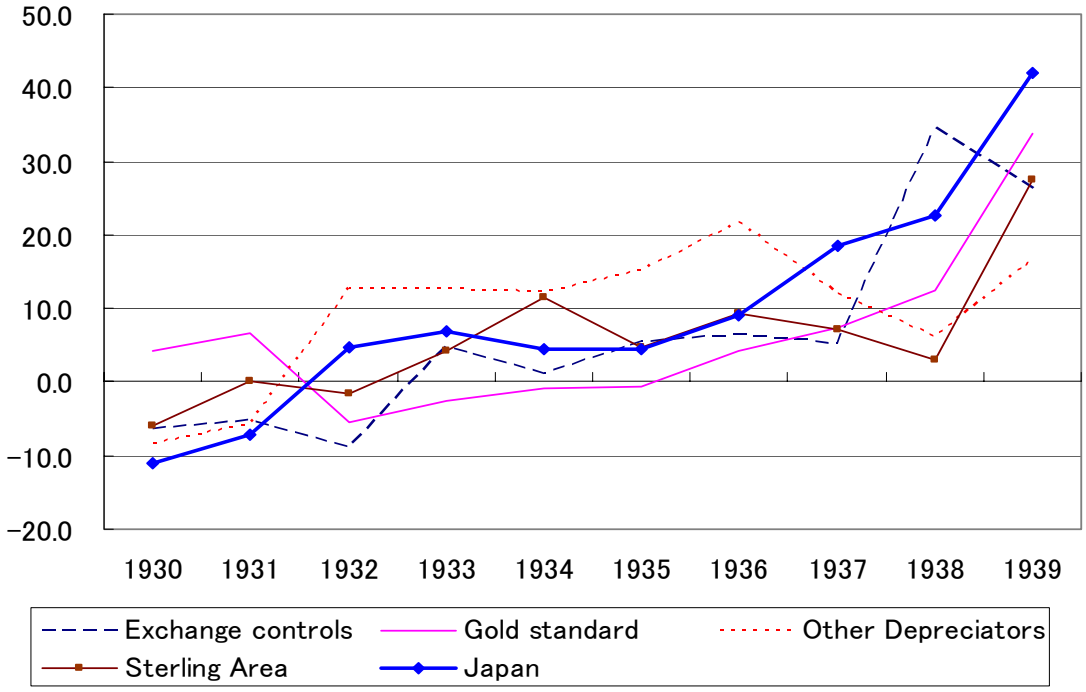
League of Nations [1940].

What kinds of factors, and especially macroeconomic policy factors, contributed to the early Japanese recovery? Figures 5 through 7 indicate that Japan stimulated the

macroeconomy to a remarkable extent through its exchange rate and fiscal policies, but not through its monetary policy.

Figure 5 indicates that the quantity of money in Japan moved largely in line with money supply in sterling area countries until 1936. Japanese money supply increased by 5.9 percent annually from 1931 to 1936, a period during which money supply in sterling area countries increased by 5.5 percent annually. At the same time, money supply in gold standard countries decreased by 1.1 percent annually, and money supply in exchange control countries increased by only 1.6 percent annually. The quantities of money in other depreciating countries increased by 14.8 percent per annum over the same period. This indicates that Japanese monetary policy, at least in terms of money supply, was comparable to the policies adopted in sterling area countries. In a sense, Japanese money supply was restrained in line with sterling area countries. This is consistent with the results of our quantitative analysis of interest rates.

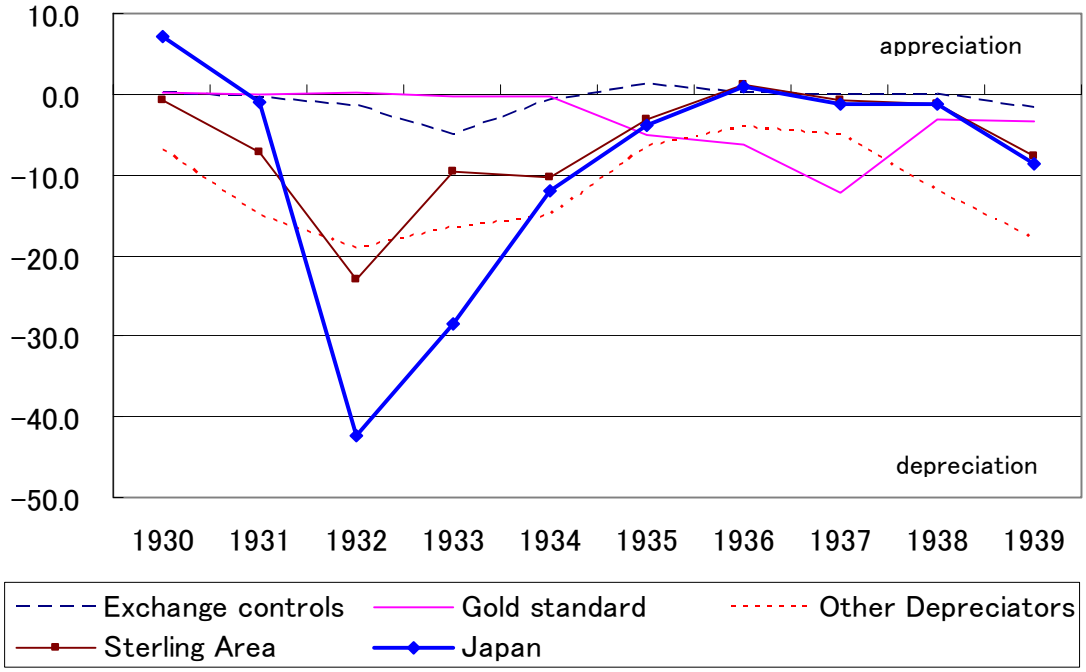
Figure 5. Currency in Circulation



League of Nations [1940].

We plot exchange rates in terms of gold parity (Figure 6) and fiscal balances (Figure 7).

Figure 6. Exchange Rates to Their Respective Gold Parities
(percentage change from previous year)



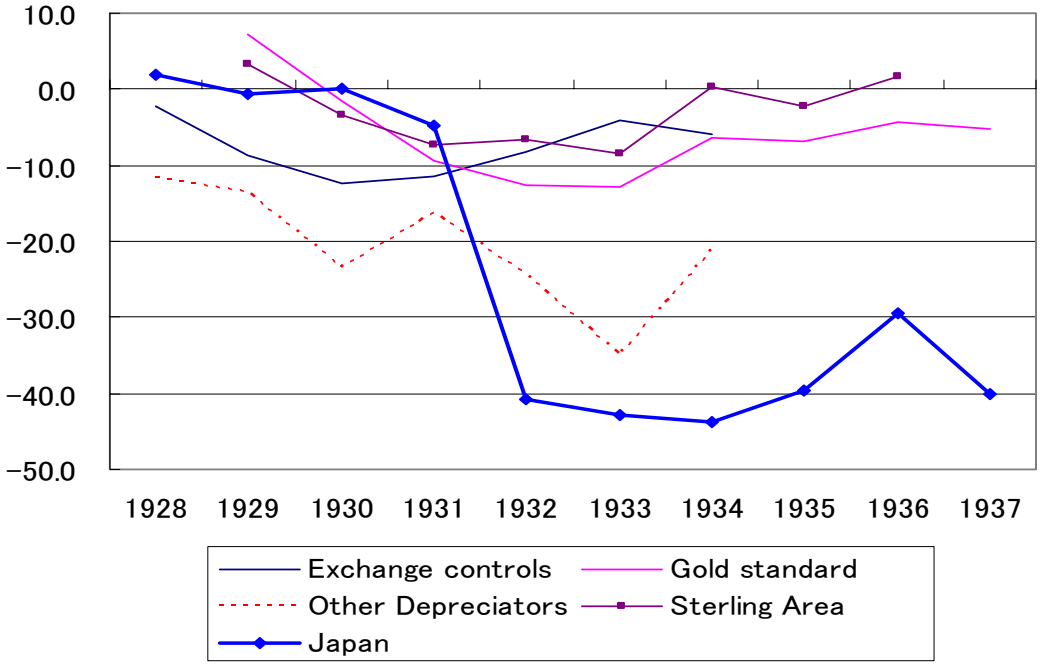
League of Nations [1940].

Figure 6 indicates that the Japanese yen depreciated further than any of the currency categories in 1932-33, and that the yen moved in line with sterling area currencies during and after 1934.

It is conceivable that the depreciation of the yen gave a big boost to the Japanese economy. This view is consistent with Nanto and Takagi [1985], who emphasize "the importance of price factors -- primarily brought about by Takahashi's exchange rate policies -- in the subsequent economic recovery."[27]

[27] Nanto and Takagi [1985], p.374.

Figure 7. Fiscal Balance (as a percentage of fiscal revenue)



Economic Intelligence Service, League of Nations [1937-38], *Public Finance.*

Figure 7 indicates that Japan ran large fiscal deficits during and after 1932, and never returned to a balanced budget in the period until 1937. Japan's fiscal deficits were larger than those of other peripheral countries. This result is consistent with Cha [2003] in terms of the effect of debt-financed fiscal policy. Cha [2003] claims that "Takahashi's deficit spending was indeed crucial in ending the depression quickly."[28]

This comparison of the Japanese economy with the economies of other countries suggests that the depreciation of the currency and debt-financed fiscal stimulus contributed to the early recovery of the Japanese economy from the Great Depression. The comparison suggests that Japanese monetary policy stayed in line with monetary policies adopted in the sterling area, and that monetary policy did not contribute significantly to the early recovery of the Japanese economy.

[28] Cha [2003], p.136.

5. Conclusion

We have found evidence supporting the view that Japanese policymakers followed the decline in foreign interest rates rather than pursuing an autonomous monetary policy after Japan's departure from the gold standard. In other words, Japanese policymakers sacrificed autonomy in monetary policy in order to stabilize the exchange rate.

In theory, a national policymaker is able to conduct autonomous monetary policy under a flexible exchange rate system. In reality, Japan imposed a restrictive monetary policy on itself even after departing from the gold standard. Japan did so because as a small, open economy, it needed to maintain its ties both with its trading partners and with the international financial markets.

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