JAPAN'S IMBALANCE OF PAYMENTS

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Abstract

During the past three decades, Japan's current account experienced five large swings. The yen appreciated considerably in periods when the current account boomed, and it depreciated whenever Japan's external performance weakened. However, there has always been a certain lag in the adjustment of the exchange rate. This paper tries to explain these empirical regularities. It argues that as a result of the large movements of the current account, the flows of cash between Japan and ist trading partners fluctuated considerably, which in turn influenced the demand for yen relative to other currencies. To the extent that these cash flows were lagging the current account—primarily because of the Japanese lending abroad—the exchange rate's response to external imbalances occurred with a delay. Based on the estimated maturity structure of Japan's foreign lending, the paper constructs a measure of payment flows across Japanese borders, which is shown to follow the movements of the exchange rate very closely. The empirical findings raise doubts regarding the feasibility of proposals to depreciate the yen in order to help Japan out of its current economic crisis.

JEL Classification: F31, F32, F34.

Keywords: yen exchange rate, cash flow, current account, foreign lending maturity structure.

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1 Introduction

The rise of the yen. During its rise to the world's largest export and creditor nation, Japan has witnessed a substantial appreciation of its currency, the yen. There are many stories about the driving forces behind the Japanese exchange rate, which often share the following characteristics: First, theories seek to explain the yen's real, rather than nominal, appreciation. Second, they are concerned with the yen's behaviour in the longer term. And third, they link the level of the exchange rate to stock variables, such as the relative level of productivity or the stock of foreign assets.

Take the Balassa-Samuelson effect. This theory predicts a real exchange rate appreciation for countries who experience strong productivity growth over time (Obstfeld and Rogoff, 1996). Most economists consider Japan as the best example for this theory, if not as its proof. However, the long-term appreciation of the yen is cited, too, as empirical evidence in favour of theories that regard the net foreign asset position as a long-term driving force behind the real exchange rate (Lane and Milesi-Ferretti, 2000). These theories vary in their economic motivation. Some of them focus on the relative prices of nontradable goods, others on the presence of a home preference for domestic tradables, and again others on the impact of wealth effects on labour supply.

The nominal exchange rate. This paper takes on a different perspective. It argues that the sum of commercial and financial transactions across Japanese borders over the years has resulted in a flow of international payments between the country and its trading partners, which determined the demand for yen relative to other currencies. The paper's emphasis is on these international payment flows, and on the corresponding currency flows in the foreign exchange market, which are perceived as the driving force behind the yen's nominal exchange rate.

Japan's nominal and real effective exchange rates have been almost perfectly correlated over a long span of time. The yen appreciated less in real terms than in nominal terms over time, due to the fact that the inflation rates of Japan's trading partners were always slightly above Japan's own inflation rate, but the inflation differential has kept remarkably constant. Given that—as this paper shall demonstrate—the demand for yen has risen substantially over the past thirty years, it appears that the long-term real appreciation of the yen may have been caused by its even stronger nominal counterpart, rather than vice versa.[1]

[1]For the period from 1980Q1 to 2000Q1, Japan's annual inflation rate has kept 1.7% below the weighted inflation rates of its trading partners on average . By contrast, Japan's nominal effective exchange rate rose by an annual average of 4.5% during the same period, implying a substantial real appreciation of the yen over the years.

International cash flow. How are international payments measured? The problem is that they do not enter the published balance of payments statistics as a separate item, in Japan as little as elsewhere (Kenen, 1996). International payments comprise changes in bank balances and other cash flows and are scattered across the portfolio balance. There is no simple way to infer their movements from the fluctuations of the portfolio balance or its subcomponents.

This paper proposes an indirect way to estimate international cash flow. It focuses on Japan's current account and its debt securities balance. Current account transactions are in part debt-financed. They thus induce both immediate and deferred payments. To assess their relative importance, it is crucial to have an idea about the maturity structure of net foreign debt. As this paper demonstrates, this can be inferred from the joint evolution of the current account and the debt balance. Once an estimate of the debt maturity structure is obtained, it becomes possible to construct a simulated series of cash flow vis-à-vis Japan and to compare it to the movements of the Japanese exchange rate.

Plan of the paper. The paper is organized as follows. Section 2 investigates the empirical link between the current account and the exchange rate. Section 3 presents the empirical model for simulating cross-border payment flows for Japan. Section 4 considers economic implications of the previous analysis for Japan's current economic crisis. Section 5 provides overall conclusions.

2 Large swings in the yen

2.1 Time series evidence

Over the last half-century, the yen has been appreciating persistently, in nominal and in real terms. This development has attracted considerable attention, and various theories for it are on offer. What has also been remarkable—and what consequently merits an explanation as well—is that there have been massive fluctuations of the Japanese currency over the years. For instance, between 1985Q3 and 1988Q4, the yen's value shot up by 61% in trade-weighted terms (39% in the year from 1985Q3 through 1986Q3 alone). Or take the 1990s, when the yen rose by 52% from 1992Q3 through 1995Q2, then dropped by 35% in the following three years through 1998Q3, only to be pushed up once more by 40% in the two years thereafter. Fluctuations of these magnitudes can be observed all the way back to the early 1970s when the yen started to float.

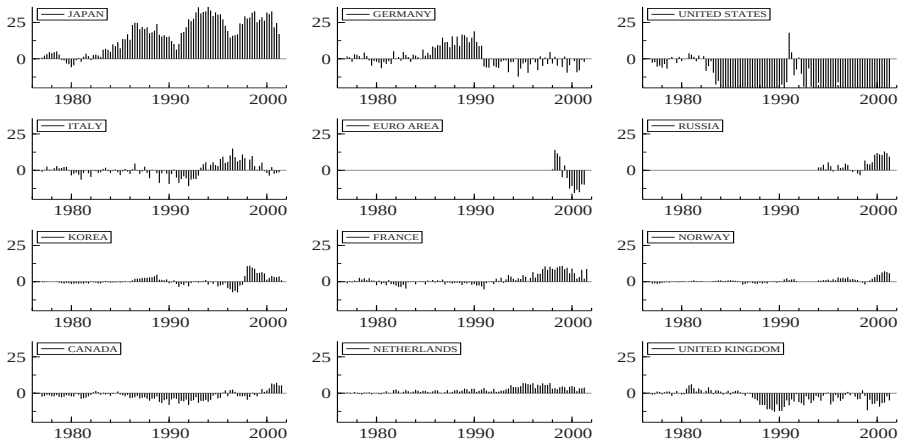

Figure 1: **Large current account surpluses.** Current account balances of countries with large current account surpluses (in billions of US dollars). Countries are selected and ordered according to the highest current account balance they have achieved in any single quarter in the period from 1977Q1 to 2001Q3. *Source: International Financial Statistics (IMF).*

2.1.1 Parallel fluctuations

This paper argues that the large swings in the yen were primarily the result of similarly impressive movements of the Japanese current account. Consider Figure 1, which plots the current account balances (in US-dollar terms) of a number of countries that have, at some stage, achieved high surpluses during the past twenty-five years. It is evident that Japan's surplus—which mirrored the equally impressive current account deficit of the United States—has dwarfed the surpluses of all its competitors; even Germany's export boom of the 1980s appears modest compared with what Japan achieved during the last two decades.

Figure 2 illustrates the link between the current account and the nominal effective exchange rate in Japan. It plots the time series of both variables over a period of more than thirty years. As in the rest of this paper, the nominal exchange rate is defined as the foreign-currency price of the domestic currency, that is, a rise in the nominal exchange rate implies an appreciation of the domestic currency. A remarkable feature of the data are the recurrent swings in both of these variables. The current account, in particular, witnessed five large upswings and downswings, with clear turning-points. The exchange rate went through similar upward and downward movements, which were maybe not quite as marked, but still visible. In general, the exchange rate seems to have followed the movements of the current account, normally with a lag of up to two years. Another way to see this is by noting that it was usually in the years when the current account reached a peak that the

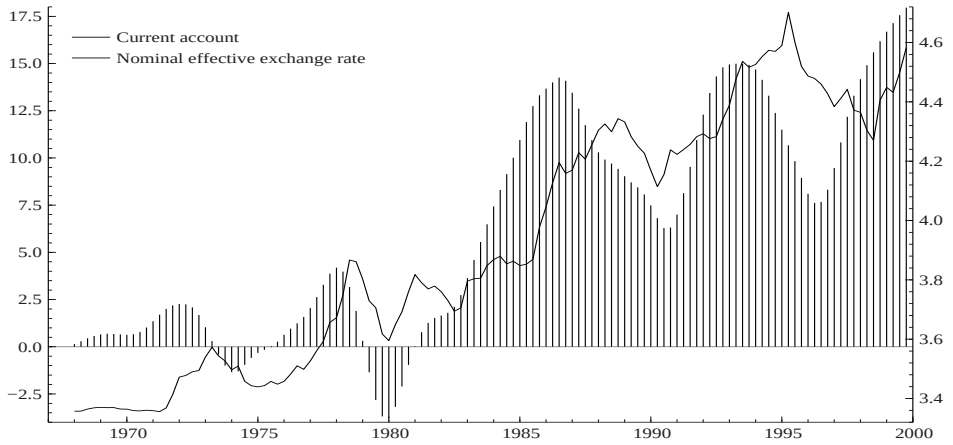

Figure 2: **Japanese current account and exchange rate.** Japanese current account (left scale, in trillions of yen, transformed from biannual to quarterly frequency using a natural cubic spline smooth) and nominal effective exchange rate (right scale, in logarithms), period from 1968Q1 to 1999Q4. *Source: Economic Outlook (OECD), IFS (IMF).*

exchange rate increased most strongly. This occurred in 1971–1972, 1977–1978, 1985–1986, 1992–1993 and in 1999.

This paper considers a fairly basic explanation of the observed empirical regularities. It argues that the current account has offset large and volatile flows of international payments between Japan and its trading partners, which pushed the relative demand for yen in the foreign exchange markets up during some years and reduced it during other years. However, Japan has continuously used the proceeds from its external surpluses to invest abroad, thus taking pressure off the yen.

Yet it is likely that a large part of the capital outflows acted only as a temporary, and thus imperfect, buffer. The most significant part of Japan's capital account is the country's debt securities balance. For instance, after the financial liberalization of the late 1970s and early 1980s, Japan began to invest heavily in foreign debt securities, mainly in the United States. Such lending helped to keep the yen low, or at least to make its appreciation less steep. However, since foreign lending tended to be temporary, current account movements fed into the exchange rate sooner or later.

2.1.2 Similar experiences

It is interesting to note parallel developments in other countries. In the United States, a massive current account deficit emerged in the early 1980s, while the US dollar was strongly appreciating. It was not until 1985 that the dollar started to

depreciate, but then the slide of the currency was dramatic. An even larger deficit developed in the latter half of the 1990s, which again did not seem to do harm the dollar, which kept on appreciating. Yet things eventually changed in early 2002 when the dollar started to depreciate rapidly.

The story is similar in countries hit by currency crises. Often, these countries run large current account deficits prior to their crises, which are only sustained due to large capital inflows. When capital inflows dry up, however, the national currencies tend to get into trouble. Eichengreen (2003, chapter 8) and Bussiere and Mulder (1999), for instance, have shown that a small set of variables—including the current account as a percentage of GDP, export growth, international reserves and short-term foreign debt relative to reserves—do a very good job in predicting the EMS crisis in 1992–1993, the Mexican crisis in 1994–1995 as well as the Asian crisis in 1997.

2.1.3 Related findings

The claims made here find support in the evidence provided by Brooks, Edison, Kumar and Sløk (2001), who find that the yen exchange rate has remained closely tied to the current account over recent years; portfolio flows appear to have been less relevant for the yen-dollar exchange rate in their view than, say, for the euro-dollar exchange rate. Hau and Rey (2003) report that international equity flows and repatriations of dividends appear to be highly correlated with exchange rates. However, Japan appears to be one of the few exceptions, which Hau and Rey attribute to the higher share of bonds, as opposed to equity, in portfolio flows.

The argument presented here is closely related to the traditional flow market model to exchange rate determination (which is also being referred to as balance of payments flow approach; for a review, see Mussa, 1979; Rosenberg, 1996). It also offers an interesting macro perspective on the recent literature on exchange rate microstructure (Evans and Lyons, 2002).

2.2 A bivariate Markov-switching model

2.2.1 Setup of the model

Taking the above observations as a starting-point, I have recently investigated a bivariate Markov-switching model in order to see how the pronounced swings of Japan's current account translated into similar swings of the yen. The remainder of this section reports on the main findings of this study (Müller-Plantenberg, 2003*b*). Section 3 will then extend the analysis by investigating in greater detail the role played by the capital account in the determination of the Japanese exchange rate.

In the paper mentioned, I find that the Japanese current account, z_t, and its nominal effective exchange rate, s_t, are cointegrated and thus propose to model their joint dynamics using a vector error correction model. However, the model is modified in an important respect in that the intercept of the current account equation is allowed to switch between two states, or regimes, according to an unobservable Markov process. This is to take account of the recurrent structural breaks in the current account variable, which is upward-trending in certain periods and downward-trending in others. It is less obvious why the exchange rate should alter its behaviour abruptly, except when fundamentals induce such shifts. Thus, the exchange rate is modelled without a Markov-switching intercept.

The model takes the following form:

$$\begin{aligned}\begin{bmatrix} \Delta s_t \\ \Delta z_t \end{bmatrix} &= \begin{bmatrix} 0 & 0 & 0 \\ \psi_{z,1} & \psi_{z,2} & \psi_{z,3} \end{bmatrix} \begin{bmatrix} d_{1,t} \\ d_{2,t} \\ d_{3,t} \end{bmatrix} \\ &+ \begin{bmatrix} \pi_{0,1} \\ \pi_{0,2} \end{bmatrix} + \begin{bmatrix} 0 \\ \nu_z \end{bmatrix} R_t + \sum_{i=1}^{h-1} \begin{bmatrix} \pi_{i,11} & \pi_{i,12} \\ \pi_{i,21} & \pi_{i,22} \end{bmatrix} \begin{bmatrix} \Delta s_{t-i} \\ \Delta z_{t-i} \end{bmatrix} \\ &+ \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} \begin{bmatrix} \beta_1 & \beta_2 \end{bmatrix} \begin{bmatrix} s_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{s,t} \\ \varepsilon_{z,t} \end{bmatrix}\end{aligned} \tag{1}$$

where

$$\begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} \begin{bmatrix} \beta_1 & \beta_2 \end{bmatrix} = \alpha\beta' \equiv \begin{bmatrix} \pi_{11} & \pi_{12} \\ \pi_{21} & \pi_{22} \end{bmatrix}$$

$$\nu_z > 0$$

$$\text{Prob}\,(R_t = 1 | R_{t-1} = 1) = p, \quad \text{Prob}\,(R_t = 0 | R_{t-1} = 0) = q$$

In this representation, $[d_{1,t}, d_{2,t}, d_{3,t}]'$ is a vector of seasonal dummies.

In period t, the system is in one of two regimes, 0 or 1, according to the unobserved regime variable R_t. The variable R_t follows a Markov process with transition probabilities p and q. The regime affects the intercept of the current account equation, which switches between a lower level, $\pi_{0,2}$, and a higher level, $\pi_{0,2} + \nu_z$. The current account is drifting downward whenever the system is in regime 0; it is drifting upward whenever the system is in regime 1. The transition probabilities are assumed constant here in order to avoid a too complex setup, as is done in most applications of Markov-switching models.

By collecting both variables into a vector $y_t = [s_t, z_t]'$, the model can be writ-

ten as follows:

$$\begin{aligned}\Delta y_t &= \Psi d_t + \pi_0 + \nu R_t + \sum_{i=1}^{h-1} \Pi_{t-i} \Delta y_{t-i} + \Pi y_{t-1} + \varepsilon_t \\ &= \Psi d_t + \pi_0 + \nu R_t + \sum_{i=1}^{h-1} \Pi_{t-i} \Delta y_{t-i} + \alpha \beta' y_{t-1} + \varepsilon_t \\ &= \Psi d_t + \pi_0 + \nu R_t + \sum_{i=1}^{h-1} \Pi_{t-i} \Delta y_{t-i} + \alpha \eta_{t-1} + \varepsilon_t,\end{aligned} \tag{2}$$

$$\varepsilon_t \sim \text{ i.i.d. } \mathrm{N}(0, \Sigma).$$

As equation (2) indicates, the matrix of long-run responses, Π, is the product of the feedback vector, $\alpha = [\alpha_1, \alpha_2]'$, and the cointegrating vector, $\beta' = [\beta_1, \beta_2]$. The vector α is called feedback vector since it measures the system's response to the error from the long-run equilibrium relation. This error is given by $\eta_{t-1} = \beta' y_{t-1}$.

Since the vector error correction model contains a Markov-switching intercept only in one of its equations, namely in that of the exchange rate fundamental, statistical inference becomes a bit more involved. However, estimation is feasible in a Bayesian context using a Gibbs-sampling procedure (for details, see Müller-Plantenberg, 2003*b*). Here, we shall turn directly to the empirical results.

2.2.2 Empirical results

The model has been estimated for quarterly data from 1978Q1 to 2001Q1. Consider Figure 3, which plots the estimated probability of being in regime 1. Periods when the current account, and thus the exchange rate, are strengthening (regime 1), are clearly distinguished from other periods when the current account is drifting downward (regime 0).

To what extent have external imbalances contributed to exchange rate instability in Japan? Of course, the model cannot give a final answer to this question, but it can provide us with some idea.

For this purpose, two sets of random series for the two variables were generated from the estimated model (with an identical sequence of random shocks hitting the variables in both cases). The simulation period is sixty years, not taking into account an initial warming-up period. In the first simulation, artificial time series for the current account and exchange rate were generated from the estimated equations. In the second simulation, the regime-switching intercept of the current account was set to its time-invariant average, which was evaluated on the basis of the estimated values for $\pi_{0,2}$, ν_z, p and q. Thus, this exercise shows us what would happen to the exchange rate if all structural breaks of its economic fundamental

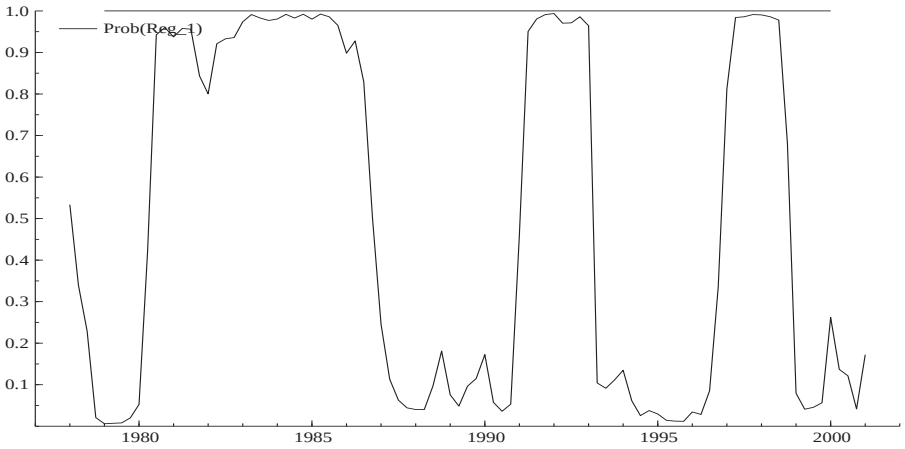

Figure 3: **Regime probabilities (informative prior).** Probability of regime with high current account intercept, using an informative prior for transition probabilities.

were eliminated. The results, which are shown in Figure 4, indicate that without the long swings in the current account, exchange rate fluctuations over the longer term could have been much smoother.

2.3 The flow market model revisited

Starting with the influential paper by Meese and Rogoff (1983), researchers have routinely used out-of-sample forecasting contests to assess the validity of their exchange rate models. While it would be tempting follow this approach here, there are also reasons why one might not want to do so.[2]

This paper follows a different route and takes instead a closer look at the balance of payments forces that impact currency values. As has been noted, the economic motivation underlying the Markov-switching model analyzed here is closely related to the flow market model of the foreign exchange market. For a long time, the conventional method for analyzing exchange rates was to monitor the flow supplies of, and demands for, foreign currencies in the foreign exchange markets.

[2]First, the bivariate Markov-switching model presented above provides insights into the possible data-generating process underlying the movements of the Japanese current account and exchange rate. It is not suggested, however, that this model will capture the behaviour of those two variables into all future. For instance, while the current account exhibited large swings in the past—which allowed us to study the exchange rate response to these swings—it may evolve in different ways in the future. Second, a crucial test would be whether current account reversals help to predict changes in the trend of the exchange rate. However, since the sample contains only a relatively small number of current account swings, such a test would not be very reliable. Finally, while it is reasonable for the purpose of estimation to assume fixed transition probabilities, it is not clear how much this simplifying assumption will hamper the model's out-of-sample forecasting ability.

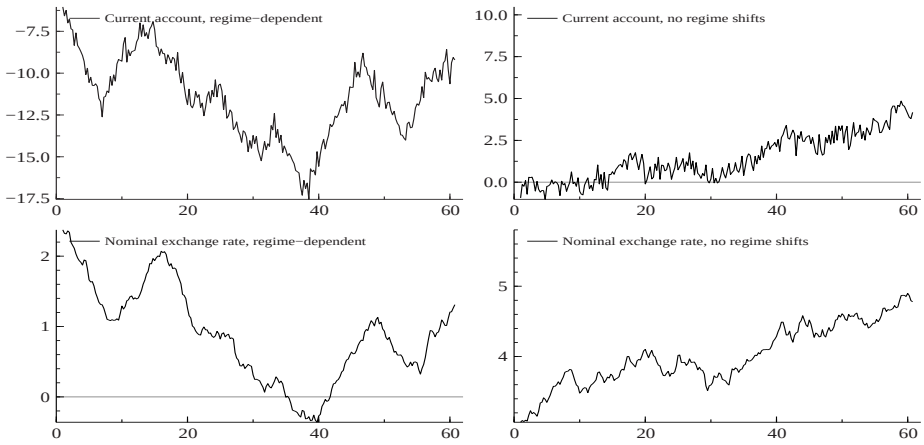

Figure 4: **Simulating exchange rate dynamics.** Simulation of current account (top) and nominal exchange rate (bottom) from the estimated model, over a period of 60 years. Simulations of the original model with switching regimes (panels on the left), and of a single-regime version of the model where the stochastic trend of the current account variable is set to its estimated average (panels on the right).

Since supplies of, and demands for, foreign currencies are generated by current account and capital account transactions, balance of payments flows were used to explain movements in exchange rates.

Originally developed in the 1930s and 1940s, the flow market model fell out of fashion among academic economists in the 1970s when monetary and portfolio balance approaches to exchange rate determination came into vogue (Rosenberg, 1996). In addition to the advent of those modern exchange rate models (which, paradoxically, soon failed in the early empirical tests by Meese and Rogoff (1983)), a problem facing the flow market model was that it was difficult to link the behaviour of floating exchange rates to the movements of different components of the balance of payments (Mussa, 1979).

Thirty years after the major industrial countries began to float their exchange rates, it might now be the right time for a reassessment of the flow market model (on which, as should be pointed out, market participants nowadays still rely in their analysis of exchange rate behaviour). Japan is a particularly interesting case to study: First, current account movements have been very large. Second, the country began to liberalize its capital account relatively late, namely in the late 1970s and the 1980s; for this reason, among others, speculative capital flows, in particular equity flows, have played less of a role for the exchange rate in Japan than, say, in the United States. And finally, Japan has tended to invest large parts of its current account surpluses in debt securities abroad (see Figure 5).

Figure 5: **Japan's lending abroad.** Japanese current account and debt securities balance. Both variables in US-$. Debt securities balance as a moving average with two leads and lags. Period from 1977Q3 to 1999Q2. *Source: International Financial Statistics (IMF).*

The large share of the debt securities balance in Japan's capital account is of great advantage as it enables us to determine the cash flow associated with the flow of debt securities to and from Japan. The next section will measure these cash flows and will show that the flows of payments resulting from the current account and the debt securities balance together can already explain a large part of the movements of the yen over the years.

3 Simulating currency flows

3.1 A cash flow model

This section attempts to simulate the flows of payments between Japan and the rest of the world. For this purpose, the following model has been set up. Let z_t denote the current account, d_t the debt securities balance and c_t the flow of cross-border payments, or cash flow (more specifically, the cash flow that arises from transactions that are recorded in the current account and the debt securities balance). Suppose that current account transactions in a given period are either

immediately paid for or financed through debt of different maturities:

$$\begin{aligned} c_t^0 &= -\mu_0 z_t \\ d_t^1 &= -\mu_1 z_t \\ d_t^2 &= -\mu_2 z_t \\ d_t^3 &= -\mu_3 z_t \\ &\dots \end{aligned} \tag{3}$$

where debt issued in period t is indexed by its maturity and denoted as d_t^i, with $i = 1, 2, \dots, \infty$. Debt maturity is defined here as the actual, or ex-post, maturity. For example, if foreign debt held by Japanese investors has a 1-year maturity and is rolled over twice, the actual maturity is taken to be 3 years.

Consequently, cash payments in any given period have to be made for part of the current commercial transactions as well as for any debt falling due:

$$\begin{aligned} c_t^0 &= -\mu_0 z_t \\ c_t^{-1} &= d_{t-1}^1 \\ c_t^{-2} &= d_{t-2}^2 \\ c_t^{-3} &= d_{t-3}^3 \\ &\dots \end{aligned} \tag{4}$$

Here, c_t^{-i} represents that part of the cash flow in period t that results from debt issued i periods ago. It follows from equations (3) and (4) that the overall cash flow in period t depends on all the present and past current account balances:

$$c_t = \sum_{i=0}^{\infty} c_t^{-i} = -\mu_0 z_t + \sum_{i=1}^{\infty} d_{t-i}^i = -\sum_{i=0}^{\infty} \mu_i z_{t-i}. \tag{5}$$

The debt balance, d_t, is the sum of the debt incurred in period t, less all debt settled in the that period:

$$\begin{aligned} d_t &= \sum_{i=1}^{\infty} d_t^i - \sum_{i=1}^{\infty} c_t^{-i} \\ &= -\sum_{i=1}^{\infty} \mu_i z_t + \sum_{i=1}^{\infty} \mu_i z_{t-i}. \end{aligned} \tag{6}$$

The debt balance is thus also a function of present and past current account balances:

$$d_t = \sum_{i=0}^{\infty} \alpha_i z_{t-i} = \alpha(L) z_{t-i}, \tag{7}$$

where

$$\alpha_0 = -\sum_{i=1}^{\infty} \mu_i \quad \text{and} \quad \alpha_j = \mu_j, \quad \text{for } j = 1, 2, \ldots. \tag{8}$$

L is the lag operator and $\alpha(L) = \alpha_0 + \alpha_1 L^1 + \alpha_2 L^2 + \ldots$

The problem is that the cash flow variable, c_t, is not directly observed. The reason is that payment flows across international borders do not enter the balance of payments as a separate item. Instead, they enter various subcomponents. For example, some cash flows, such as changes in bank balances, appear in the "other investment" item in the financial account. However, "other investment" also includes trade credits and loans, thus making it difficult to infer cash flow movements from the movements of the "other investment" balance.

With knowledge of μ_i, $i = 0, 1, \ldots$, however, c_t can be indirectly obtained from equation (5). For $i = 1, 2, \ldots$, the parameters μ_i coincide with the parameters α_i of the infinite lag polynomial in equation (7).

The current account, z_t, and the debt balance, d_t, can theoretically fluctuate independently over time, as long as the gap between the two is made up by movements in other components of the capital account. Figure 5 shows, however, that both the current account and the debt securities balance have moved quite closely together over time. This suggests that other balance of payment components cancelled each other out, at least roughly; thus, to keep things simple, they are not further considered here.

Augmented Dickey-Fuller tests (not reported) show that the null hypothesis of a unit root cannot be rejected for z_t, nor for d_t. While individually I(1), the Japanese current account and debt securities balance appear to be cointegrated, that is, a linear combination of both variables exists that is I(0). To test for cointegration, Johansen's (1988) procedure is applied, and it is found that the null hypothesis of no cointegration cannot be rejected at the 1% significance level (see Table 1).

H_0	H_A	Trace test	p-value
$r = 0$	$r > 0$	22.750	[0.003] **
$r \leq 1$	$r > 1$	2.2928	[0.130]

Table 1: **Testing for cointegration.** *Testing for the number of distinct cointegrating vectors, using 2 lags. Double asterisks (**) mark significance at the 1% level.*

Based on these results, the relationship between the two balance of payments

components can be modelled as an autoregressive distributed lag (ARDL) model:

$$d_t = \kappa + \sum_{i=1}^{p} \gamma_i d_{t-i} + \sum_{i=0}^{q} \beta_i z_{t-i} + \varepsilon_t, \qquad \varepsilon_t \sim \mathrm{N}(0, \sigma^2). \tag{9}$$

The infinite lag polynomial in equation (7) can then be obtained by dividing the distributed lag polynomial by the autoregressive lag polynomial of the ARDL model:

$$\alpha(L) = \frac{\beta(L)}{\gamma(L)}, \tag{10}$$

where $\gamma(L) = 1 - \gamma_1 L - \gamma_2 L^2 - \ldots - \gamma_p L^p$ and $\beta(L) = \beta_0 + \beta_1 L + \ldots + \beta_q L^q$.

Quarterly data from 1977 to 2002 were used in the estimation. The data was taken from the IMF's Balance of Payments Statistics. The lag lengths, p and q, in the ARDL model were both set to 3.

3.2 Simulation results

The values of c_t were now simulated, based on equations (5), (8) and (10). Note that we do not have an estimate of μ_0. The solution adopted here is to simply set it equal to α_0, suggesting that current accounts are financed to one half by direct cash payments, to the other half by debt. This is but a convenient assumption, but it was found that raising μ_0 above or below this value did not affect the results too much.

Quarterly data on the Japanese current account from 1968Q1 to 1999Q4 were used in the simulation; these had previously been constructed from a biannual current account series contained in the OECD's Economic Outlook database. Only the first 8 lags of the polynomial $\alpha(L)$ were used for the simulation, which helped to avoid loosing too many observations for the simulation.

The outcome of the simulation is shown in Figure 6. The movements of the international flows of payments across Japan's borders coincide remarkably closely with those of the Japanese exchange rate. The mean lag of $\alpha(L)$, which indicates the average maturity of foreign debt, is 1.653 quarters. The figure also plots net sales of Japanese reserve assets, which appear relatively small compared with the aggregate cash flow facing the Japanese economy.

4 Japan's economic stagnation

If the proposition underlying the previous two sections is correct—namely, that the yen's nominal exchange rate was, by and large, driven by trade and capital flows over the years—what does this imply for the analysis of Japan's current economic

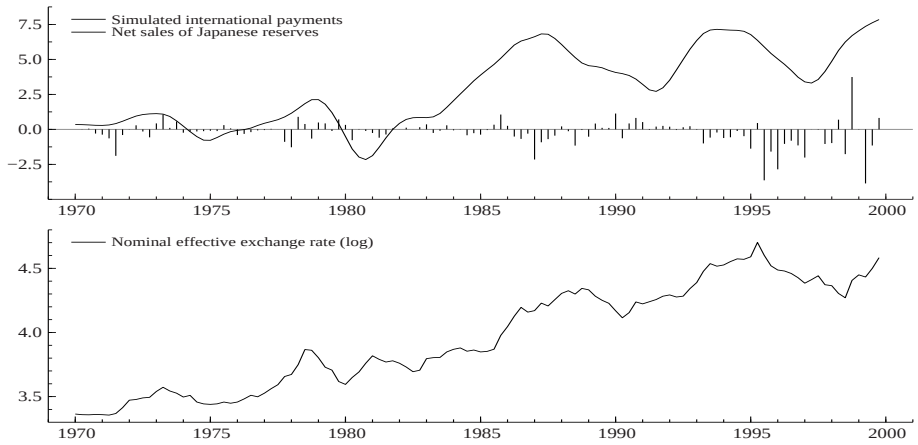

Figure 6: **Japan's imbalance of payments.** Simulated net international payments to Japan, as an indicator of yen order flow, shown together with net sales of reserves (top panel, in trillions of yen, reserve sales drawn as index bars), and nominal effective exchange rate (bottom panel, in logarithms). *Source: Economic Outlook (OECD), IFS (IMF), own calculations.*

problems? And what should we think of proposals to devalue the yen to revive the Japanese economy?

4.1 The downside of success

4.1.1 A hard landing

Japan has for a long time been admired across the globe for its economic performance, in particular for its international competitiveness and export strength. The traditionally high saving rate helped Japan to become the largest creditor nation in the world. The unhappy end of this success story is now evident to everyone. The analysis of this paper can shed some light on where the downside of success lies.

This paper suggests that, notwithstanding other factors, Japan's large and sustained current account surpluses are at the root of its current economic problems. By pushing up the yen very strongly over decades, they have contributed to the deflationary pressures, from which the economy has been suffering from for quite some time.

Of course, removing the external surplus would fix the problem according to the logic applied here. Yet the current account is not a policy variable, and at any rate a strong demand for Japanese exports seems to provide a welcome stimulus for the economy at this moment. Policy-makers naturally look for other kinds of remedies, namely for measures they can control (at least in principle).

4.1.2 What scope for monetary policy?

Consider monetary policy. With interest rates hitting zero, the Bank of Japan's only way to induce money growth is to keep printing money. But the bank has already bought government bonds, and thus created money, on a large scale. The monetary base has increased at an annual rate of almost 25% over the past two years (The Economist, 19 June 2003). Yet this has not led to higher growth in broad money. Instead, bank lending has continued to fall. Banks are reluctant to lend, as they are already piled up with bad loans. Moreover, indebted firms are unwilling to borrow in the present deflationary environment.

An equally important question is whether monetary policy has been too strict prior to the crisis, and thus to what extent it may have been contributing to the overly strong yen. This paper cannot give a detailed answer to this question. However, an examination of the data suggests that money growth in Japan was actually quite strong in comparison with other countries. According to the OECD's Economic Outlook, the money stock in Japan grew at an annual average of 9.1% from 1970 to 2000, compared with 7.3% and 7.8% in the United States and Germany, respectively. For comparison, the volume of GDP in Japan rose on average by 3.2% per year, whereas in the US and Germany, it increased by 2.9% and 2.7%, respectively.

There is an interesting parallel to currency crises. In the aftermath of such crises, it is tempting to put the blame on fiscal and monetary policies for being too loose. Yet during the currency crises of the 1990s, the macroeconomic policies prior to the crises had been considered sound in many of the countries affected. Instead, it has often been sharp withdrawals of foreign funds after long periods of foreign lending that made currencies collapse. There is thus a lesson for Japan. When external imbalances start to shift the relative demand for national monies, it can be just as hard to defend a currency as to keep it from rising.

4.2 Devalue the yen?

Many economists advocate a big depreciation of the yen through intervention in the foreign exchange markets in the current situation (see, for example, Svensson, 2001). Japanese prices have been falling since 1995, and devaluation is viewed by many as one of the few policy tools left to fight deflation. First, a cheaper yen would boost exports, and this would stimulate the economy. Second, through higher import prices, it would presumably push up inflation, stimulating consumption and investment and decreasing the real value of debt in the economy. However, given that Japan's imports account for only 10% of GDP, an ordinary devaluation wouldn't suffice—it would have to be substantial.

The rest of this section will address two questions: Is a devaluation of the yen feasible? How much would it help, or might it even be harmful?

4.2.1 Magnitude of intervention

Using foreign exchange intervention to lower the yen seems straightforward. All there is to do for the Japanese authorities is to print large amounts of yen to buy dollar bonds. So isn't this the point where the parallels with currency crises end? When a central bank tries to support a currency, it quickly runs out of reserves. In Japan, however, it would appear that intervention does not face similar limitations.

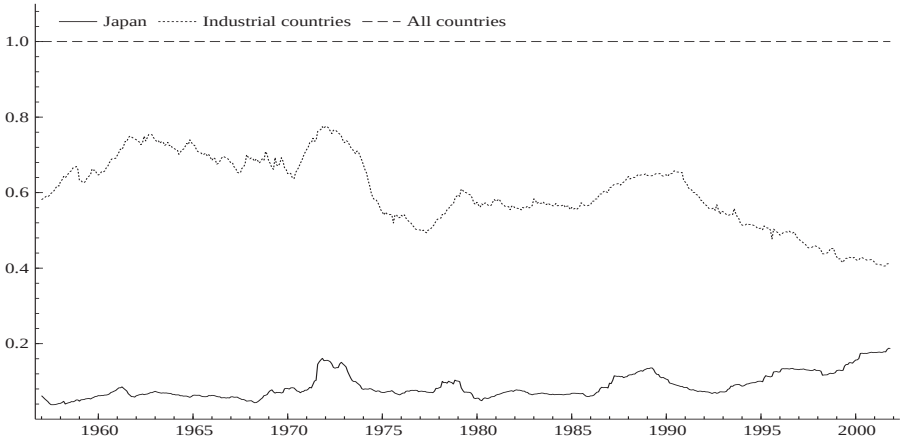

Figure 7: **Japan's share of world reserves.** Japan's share of total reserves of all countries, plotted alongside the industrial countries' share of world-wide reserves (monthly data, excluding gold reserves). *Source: International Financial Statistics (IMF).*

Yet the facts are that Japan has been acquiring reserves on an unprecedented scale in recent years. What's more, Japan's share of all reserves held world-wide has risen substantially since 1993, as can be seen from Figure 7. Interestingly, reserve holdings by other industrial countries have declined sharply over the same period. Out of industrial countries' reserves, Japan now holds a share of 45.6% (2001M11), up from only 12.0% nine years back (1992M9).

In the past, appreciations of the yen have almost always been associated with increases in reserves. Yet even large interventions do not appear to have helped much to prevent the yen from rising. From the empirical analysis in this paper, it seems clear why. Consider once more Figure 6, which plots the simulated cash flow together with the changes in Japanese reserves. The impression is that intervention has seldom been more than a small fraction of the economy-wide payments across the border. It is therefore not surprising that their impact should have been limited.

What do the actual market participants think? Cheung and Wong (2000) have recently carried out a survey of practitioners in the interbank foreign exchange markets of Hong Kong, Tokyo and Singapore. They find that the participants in the Tokyo market "have the most pessimistic views on intervention in terms of restoring equilibrium values, being conducted at the right moment, and achieving the goal". Of the respondents in the Tokyo market, 68.1% did *not* think that central bank intervention achieved its goal, whereas in the Hong Kong and Singapore markets, 60.8% and 58.7%, respectively, believed that it *did*.

4.2.2 Undesired effects

When Japan hit an export boom in the past, it usually sent the inflowing proceeds abroad straightaway, for example by investing in US Treasury bonds. It was not until the foreign debt became due that the exchange rate appreciated. This is what needs to be kept in mind when contemplating a large-scale intervention to bring down the yen. Intervention needs to be perpetuated if it is to be effective; otherwise, interest and amortisation payments will soon undo its initial effects.

There is also another potential "boomerang" effect that could take effect after a devaluation and that one needs to take into account. If efforts to devalue the yen succeed, this may spur exports and thus create another wave of incoming cash flow. The relationship between the real exchange rate and current account is not a simple one for Japan—after all, its current account surplus has kept rising despite the long-term appreciation of the yen. However, Müller-Plantenberg (2003*a*) has shown that large real exchange rate changes did tend to bring about reversals of the temporary trends of the current account (rather than its level). Thus once devaluation succeeds to create another export boom, an appreciation of the yen might soon follow. It would not have to come immediately—as we know by now. But it would come.

5 Conclusions

Over a long period of time, the Japanese exchange rate has followed the movements of the current account quite closely. Long swings in the current account translated into similar swings in the exchange rate. In general, export booms pushed up the yen, while slumps in net exports made it fall. However, it often took some time—usually up to one or two years—until the exchange rate had fully adjusted.

This paper suggests that flows of international payments between Japan and the rest of the world have been a crucial driving force behind the yen. Importantly, these flows are related to the balance of payments. For instance, current account transactions that have to be paid for straight away lead to an instantaneous flow of

cash, whereas debt-financed transactions can give rise to a flow of payments that is spread-out over time.

Japan, the world's largest creditor, has used the proceeds of its current account surpluses primarily to lend abroad, investing heavily in foreign debt securities. This paper shows how it is possible to estimate the maturity structure of this lending based on the information contained in the current account and debt balances. It uses the maturity structure of foreign lending to simulate international payment flows and shows that their movements are remarkably similar to those of the Japanese exchange rate.

These findings lead directly to the question of whether the present economic crisis in Japan could have been averted or whether something can be done to overcome it. Here, the answer is a cautious one. It is pointed out that the strong yen and the deflationary pressure to which it contributed are not necessarily the result of bad policy-making. A parallel is drawn to experiences in the 1990s when countries were hit by currency crises even though they had, in more than one instance, followed sound fiscal and monetary policies. Likewise, it is found that the large-scale acquisition of reserves is unlikely to fix the problem. Japan has, as a matter of fact, amassed foreign exchange reserves on an unprecedented scale over recent years.

Going beyond Japan, the findings of this paper point to a number of potential economic fallacies. They concern fundamental questions such as whether the real exchange rate is driven by the nominal exchange rate, particularly at longer horizons, or vice versa; whether and how exchange rates are linked to economic fundamentals (Meese and Rogoff, 1983); or why it is that deviations from purchasing-power parity are so large and persistent (Rogoff, 1996).

In recent decades, the world has witnessed an ever greater integration of its national economies and financial markets. At the same time, industrial countries have reduced their inflation rates and committed themselves to inflation levels close to zero. A conclusion from this paper is that large external imbalances can have a strong and persistent impact on the exchange rates of different monies. Differences in inflation rates are both an outcome of this—as a result of the pass-through of exchange rates on import prices—and a requirement to overcome lasting real exchange rate misalignments. Thus Japan's inflation rate has stayed almost two percent below the weighted inflation rate of its trading partners for many years. While low international inflation rates are widely welcomed, one should not overlook that they have likely contributed to Japan's present condition, which is marked by deflation and stagnation.

Appendices

A Data

The data used in this paper were taken from the Balance of Payments Statistics and International Financial Statistics of the IMF and from the Economic Outlook of the OECD.

B Software

The computations for this paper were carried out using Ox, version 3.0 (see Doornik and Ooms, 2001), and PcFiml (see Doornik and Henry, 1997). The programs are available from the author upon request.

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