International Creditors under the World Dollar Standard: Japan's Liquidity Trap Redux

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Abstract

In any creditor economy with a history of current-account surpluses, the build up of foreign currency claims could lead to deflation and a zero-interest rate liquidity trap if that country is threatened with continual appreciation of its currency. Japan is the most obvious case, but foreign pressure on China to appreciate the renminbi is intense. We build a theoretical model of how this foreign exchange impasse undermines the ability of the domestic monetary authorities to prevent deflation, and then illustrate with data drawn from both the Japanese and Chinese experiences.

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I. Introduction

It is well understood that debtor economies borrowing extensively in foreign currency and lending in local currency are vulnerable to economic shocks that propagate through balance sheets. In this paper, we argue the converse: creditor economies that lend in foreign currency and are subject to exchange rate volatility or appreciation may be in danger of falling into a low interest rate liquidity trap and deflation. In other words, asset dollarization could give rise to perverse economic dynamics that result in a weak macroeconomic environment in which some of the standard stabilization instruments are ineffective.

The argument is as follows. Consider an economy that has run persistent and large current account surpluses and has built substantial claims on the rest of world. If these claims are denominated mostly in foreign currency, then *reverse* balance sheet effects arise. Financial institutions, such as pension funds and insurance companies, that are not subject to stringent currency exposure rules and that are intermediating this surplus will have a degree of asset dollarization: assets will be denominated partly in foreign currency while liabilities will be denominated in the domestic currency. If there is exchange rate volatility, then the foreign currency asset is risky because it may lose value, which would put downward pressure on net worth. Moreover, an anticipation of exchange rate appreciation would put downward pressure on the domestic currency value of the foreign currency asset and, hence, on net worth. As a consequence, domestic interest rates would be lower than foreign interest rates.

If domestic interest rates fall to sufficiently low values, then a number of perverse dynamics arise:

- First, the economy could find itself in a liquidity trap where domestic bonds and domestic money are near perfect substitutes. Monetary policy would be ineffective.[2]
- Second, a credit crunch may result. If interest rates fall below bank operating costs, bank lending would not be profitable and bank credit to the private sector would decline. Small and medium-scale enterprises that rely heavily on bank financing would find themselves credit constrained, and output growth would weaken. Furthermore, banks that have outstanding stocks of non performing loans would not be able to generate sufficient cash flow to re-capitalize themselves. As long as the very low interest environment persists, they would need to rely on bank bailouts and continued efforts to cut operating costs in order to remain in business.[3]
- Finally, when domestic interest rates are low and unable to fall much further, private financial institutions would have incentives to re-allocate their portfolios away from foreign currency assets and into domestic currency assets, especially if they anticipate

[2] Interest rates need not be zero, but could be in some range close to zero. Our working definition is that a liquidity trap arises when long rates are near or below 1.5 percent.

[3] On the other hand, a domestic credit boom may materialize as interest rates fall but remain above or close to bank operating costs. Application of prudential regulations and supervision would be necessary to prevent overheating and a subsequent collapse.

> further appreciation of the domestic currency and/or increased exchange rate volatility. Off-loading foreign currency assets would put pressure on the domestic currency to appreciate. The central bank may intervene to buy these assets and alleviate pressure on currency appreciation, which would result in large increases in foreign reserves of the central bank and a greater role for *public* rather than private intermediation of the current account surplus. In addition, anticipated appreciation (and below-trend economic activity) would contribute to domestic deflation.

This potentially perverse macroeconomic dynamic in which a creditor economy may find itself is what McKinnon (2003) has termed *conflicted virtue*. It is a saver's or creditor's dilemma that arises when the currency in which it saves is different from its domestic currency. In a world on a dollar standard, a creditor has little choice but to save in dollars. However, it risks falling into a trap with several adverse economic consequences.

In a previous paper, we discussed how these ideas apply to Japan.[4] In this paper, we present a model (still incomplete) of conflicted virtue and analyze the policy consequences. We apply the model to Japan and other creditor economies, mainly in East Asia, and discuss the key role of U.S. current account deficits (or U.S. dissavings).

II. Model

This section presents a simple macroeconomic model of conflicted virtue—the (negative) foreign exchange risk premium of creditor economies and the liquidity trap. The model is a slight modification of the standard Mundell-Fleming framework.

A. Setup of the Model

There are markets for bonds (a domestic currency government bond and a foreign currency bond), domestic money, and a composite good.

Asset Market

Asset market equilibrium is given by covered interest parity. Uncovered interest parity is augmented by a foreign-exchange risk premium term, φ, that depends on the share of foreign currency assets (or loans) relative to total assets and on the degree of exchange rate volatility:

$$i = i^* + \Delta s^e + \varphi\,(S\ NfxA/A;\ \sigma_s)$$

[4] See Goyal and McKinnon (2003).

where i is the domestic nominal interest rate, i* is the foreign nominal interest rate, Δs^e is expected depreciation of the domestic currency, S is the nominal exchange rate (or domestic currency price of a U.S. dollar), NfxA is net foreign currency assets denominated in U.S. dollars and held by the domestic private financial sector, A is the total assets of the domestic private financial sector (and equals the sum of net foreign currency assets, domestic bonds, and loans to the private sector), and σ_s denotes the volatility of the exchange rate. Higher values of σ_s imply greater volatility of the exchange rate.

For a creditor economy such as Japan that lends in foreign currency, φ is negative. For a debtor economy that borrows in foreign currency, φ is positive, while, for the United States, which borrows in its own currency, φ is zero.[5] Larger NfxA/A corresponds to more negative values of φ. In addition, higher σ_s implies higher absolute values of φ. For a creditor economy, higher σ_s implies more negative φ, while for a debtor economy, higher σ_s implies a larger, positive φ. If the exchange rate is pegged and expected to remain pegged, $\sigma_s = 0$ and $\varphi = 0$.

Money Market

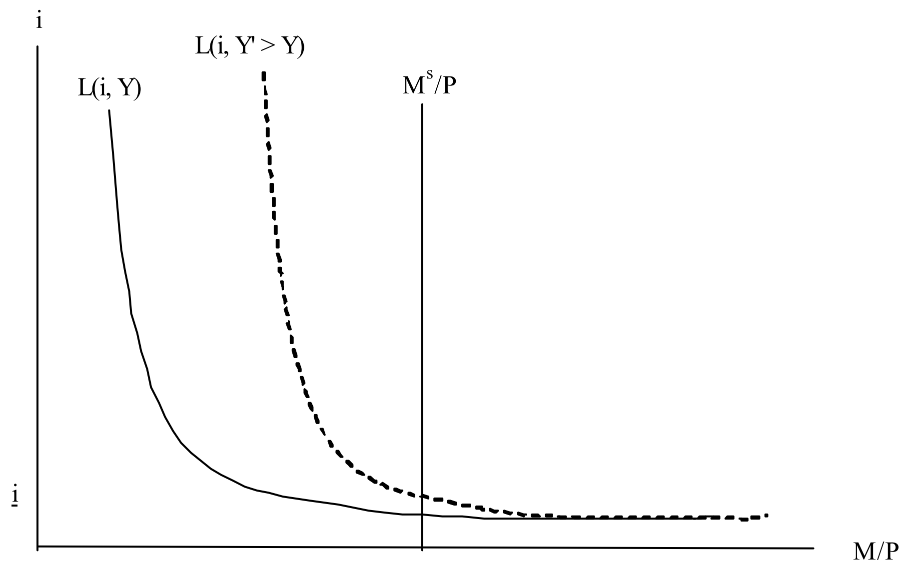
Money market equilibrium is given by:

$$M^s/P = L(i, Y)$$

where M^s is money supply, P is the domestic price level, and L is demand for real money balances that depends negatively on i and positively on income, Y. Real money demand is assumed to be perfectly elastic at low interest rates, where money and bonds are near perfect substitutes (Figure 1).

[5] Goyal (2001) formally derived these relationships in a two Lucas-tree model.

Figure 1. Money market



Note: i >= 0 is the interest rate at which money demand is perfectly elastic.

The real exchange rate, q, is defined as:

$$q = S\ P^*/P$$

where P* is the foreign price of the composite good. From this equation, we can derive relative purchasing power of parity:

$$\Delta q^e = \Delta s^e + \pi^{*e} - \pi^e$$

where Δq^e is the expected change in q, π^{*e} is expected foreign inflation, and π^e is expected domestic inflation. The equation could be re-written to express expected inflation as a function of the other variables:

$$\pi^e = \Delta s^e + \pi^{*e} - \Delta q^e(Y - Y^f)$$

where expected real exchange rate depreciation (or appreciation) is a function of whether the economy is below (or above) full capacity.

The domestic real interest rate, r, is given by $r = i - \pi^e$ while the foreign real interest rate, r*, is $r^* = i^* - \pi^{*e}$.

Goods market

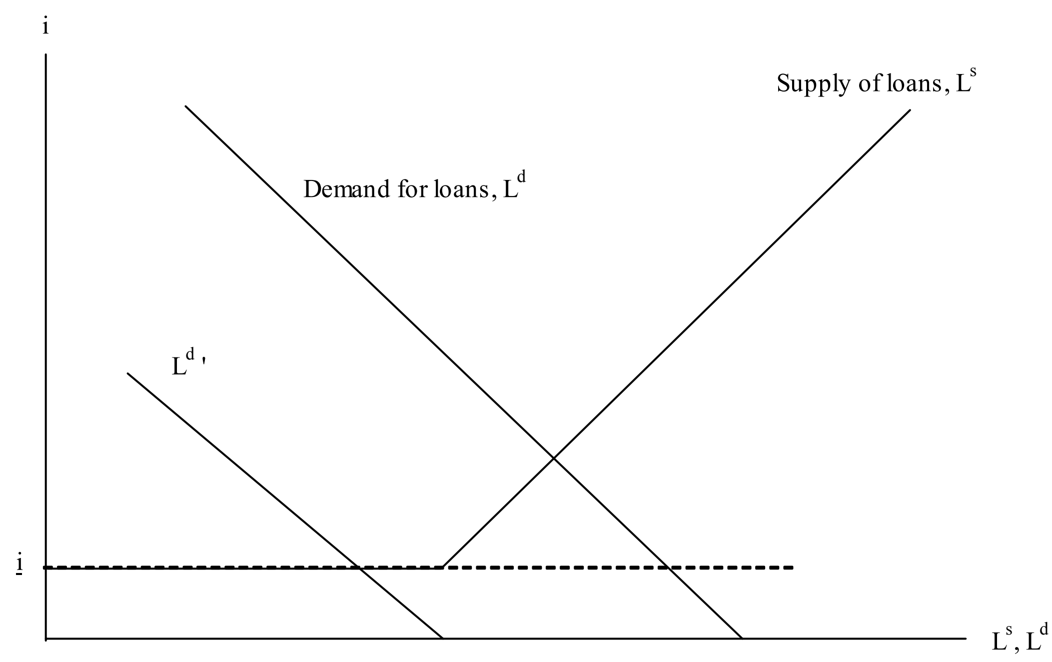
Goods market equilibrium is given by:

$$Y = C(Y-T, i - \pi^e) + I(i, \pi^e) + G + NX(q, Y-T)$$

where C is aggregate consumption, T is taxes, I is investment, G is government expenditure, and NX is net exports. Consumption depends positively on disposal income and negatively on the interest rate. As the interest rate rises, domestic consumption falls while domestic saving increases.

Investment is negatively related to the interest rate. As the interest rate declines, demand for loans rises. However, at very low lending rates, banks may not earn sufficient returns to cover their operating costs on loans. Hence, at these rates, they would be *less* willing to provide loans, and investment would be weak (Figure 2).

Figure 2. Loan Demand, Loan Supply, and the Loan Rate



Note: Supply of loans is limited below $\underline{i}$.

Government expenditure and taxes are exogenously given, while net exports are positively related to the real exchange rate and negatively related to disposable income.

Accumulation of Net Foreign Assets

The accumulation of net foreign assets, F_t, is given by:[6]

$$F_{t+1} = (1+i^*)\, F_t + NX_t\, (P_t/S_t)$$

Foreign assets, F, are assumed to be denominated entirely in foreign currency. F is held in part by the private sector as NfxA; the rest is held as foreign currency reserves, FR, in the central bank:

$$F = NfxA + FR$$

Evolution of Domestic Government Bonds

To complete the basic set up of the model, fiscal and monetary policy and the total assets of the domestic financial sector need to be specified. Let B denote the outstanding stock of domestic government bonds. Then, the evolution of government bonds is given by:

$$B_{t+1} = (1+i)\, B_t + P_t\, (G_t - T_t)$$

The stock of government bonds is held by the central bank, B_G, and by the domestic financial sector, B_P:

$$B = B_G + B_P$$

Central Bank Balance Sheet

The central bank (or monetary authority) holds foreign currency reserves, FR, and domestic government bonds, B_G, in its portfolio, and is liable for the stock of money, M^s:

$$M^s = (S)\, FR + B_G$$

It follows that the total assets of the domestic financial sector, A, are given by:

$$A = (S)\, NfxA + B_P + L_P$$

where L_P refers to loans to the private sector and depends on the interest rate (recall Figure 2 above). Recall also that S NfxA/A affects the risk premium term, φ.

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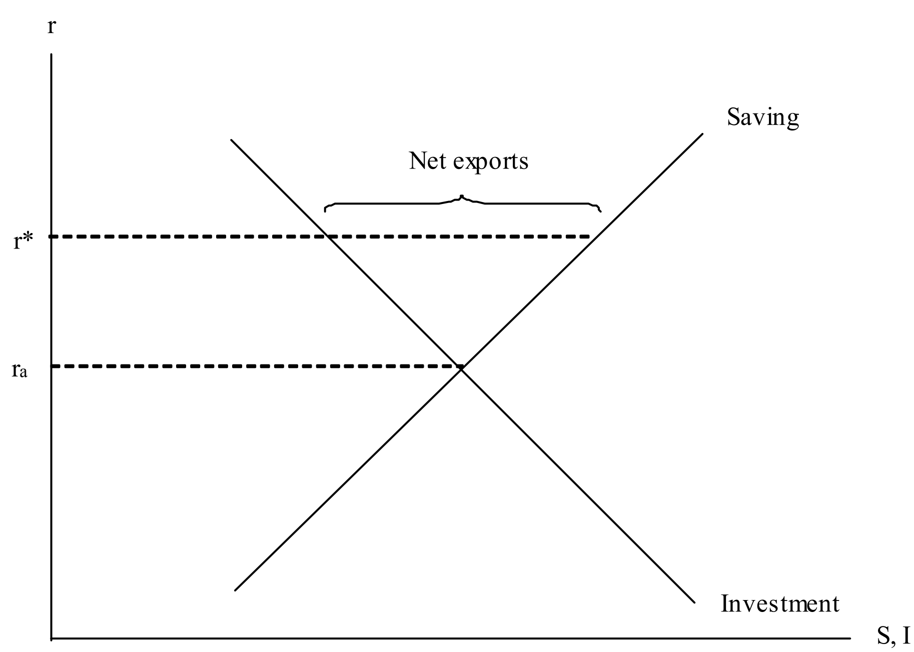
[6] Time subscripts are denoted when necessary for clarity and ignored otherwise.

B. Modeling recurrent current account surpluses

It remains to be shown how the model can capture recurrent current account surpluses. Let r_a be the autarky real interest rate; that is, r_a is the real interest rate at which domestic saving equals domestic investment, or where the economy has zero net exports. If the real interest rate is above the autarky rate, r_a, then the economy will be a net creditor (or saver). Conversely, if the real interest rate is lower than the autarky rate, then the economy will be a net debtor (or dissaver).

This relationship is most clearly seen if we consider the world real interest rate, r*, relative to the autarky rate. That is, assume that $\varphi = \Delta q^e = 0$. Then, $r = r^*$. If r* is persistently larger than r_a, the economy will repeatedly run current account surpluses (Figure 3).

Figure 3. Recurrent current account surpluses (for the case of $\varphi = \Delta q^e = 0$)



Therefore, modeling recurrent current account surpluses (or deficits) entails modifying aggregate demand as follows:

$$Y = C(Y-T, i - \pi^e - r_a) + I(i, \pi^e) + G + NX(q, Y-T)$$

C. Solution of the Model

This completes the basic set up of the model. As noted earlier, it is a modification of the standard Mundell-Fleming framework. To the standard framework, the foreign currency risk premium term has been added, the determinants of the risk premium term have been specified, and investment (or loan) dynamics at low interest rates have been modeled.

The solution of the model is straightforward. There are basically four equations and four unknowns. The four equations are asset market equilibrium, money market equilibrium, goods market equilibrium, and expected inflation:

$$i = i^* + \Delta s^e + \varphi\,(S\ NfxA/A;\ \sigma_s)$$

$$M^s/P = L(i, Y)$$

$$Y = C(Y-T,\ i - \pi^e - r_a) + I(i, \pi^e) + G + NX(q,\ Y-T)$$

$$\pi^e = \Delta s^e + \pi^{*e} - \Delta q^e(Y - Y^f)$$

Given government fiscal and monetary policy, the stock of foreign assets, foreign interest rates, the foreign price level, the domestic price level, and the expected future spot exchange rate, the four unknowns are i, S, Y, and π^e.

III. MODEL DYNAMICS

This section analyzes the model outside and within the liquidity trap. Policy implications are assessed, including the role of sterilized versus unsterilized interventions. The implication of changes in the world real interest rate, through changes in the world saving and world investment schedule (Figure 3 above), are also analyzed. Such changes should serve as a way to understand the effect of changes in U.S. current account deficits.

A. Outside the Liquidity Trap

B. Inside the Liquidity Trap

C. Sterilized and unsterilized interventions

D. Changes in the world real interest rate

IV. Application of the Model

This section applies the model to Japan, China, and other East Asian economies, and illustrates the analysis with data. The effect of large, ongoing U.S. current account deficits is also studied.

A. Japan

Size of the Risk Premium

The foreign exchange risk premium is often computed to be quite small in theoretical models. We present a simple exercise of (slightly) risk-averse financial institutions that generates large risk premia. These financial institutions are assumed to have net worth close to the regulatory minimum. Breaching this minimum would trigger regulatory intervention, which is assumed to be very costly for the owners and managers of the institution. Therefore, the institutions demand large premia for holding risky (foreign currency) assets. The implied risk premia are shown to match the data.

B. China and other East Asian creditor economies

While China does not yet hold large net foreign exchange assets, it has large net *liquid* foreign exchange assets. The variables in the model are re-interpreted accordingly.

C. Ongoing U.S. current account deficits

V. Policy Conclusions

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