

Japan's Deflationary Hangover: Wage Stagnation and the Syndrome of the Ever-Weaker Yen

Ronald McKinnon¹
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Abstract

Japan still suffers a deflationary hangover from the great episodic yen appreciations of the 1980s into the mid-1990s. Money wages are still declining, and short-term interest rates remain trapped near zero. After Japan's "lost decade" from 1992 to 2002, however, output has begun to grow modestly—but through export expansion and associated investment rather than domestic consumption. This export-led growth has been helped by a passive real depreciation of the yen: prices and wages in Europe and the United States have grown, and are growing, faster than in Japan. As the yen becomes weaker in real terms, American and European industrialists and politicians are again complaining that the yen is too weak (Japan bashing II?)—although the pressure on Japan to appreciate is not yet as great as it now is on China.

But Japan is trapped. If it does appreciate the yen, its fragile economy will be driven back into outright deflation. The only solution is to stabilize the nominal dollar value of the yen over the long term, but this step won't necessarily be immediately effective in placating foreign mercantilists. Under foreign pressure to appreciate the renminbi, China, with its booming economy, is now in a similar position to Japan's of more than 20 years ago. Policy makers in China should resist pressure to go down the same deflationary road as Japan.

¹ William Eberle D. Professor of Economics, Stanford University, Stanford California
mckinnon@stanford.edu. Many thanks to Dennis Kuo and Brian Lee for excellent research assistance.

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By

Ronald I. McKinnon

Introduction

In early February 2007, a phalanx of incoming Democratic committee chairmen—Levin, Rangel, Frank, and Dingel—worrying particularly about a 32 percent increase in automobile imports from Japan from 2005 to 2006 and which continue to increase strongly in 2007, wrote a letter to U.S Treasury Secretary Paulson:

“The weak yen reflects (Japanese) monetary and fiscal policies, including setting low interest rates and failing to stimulate consumer demand. We believe that the weak yen is a reflection of Japanese government policy. It reflects the Japanese government’s massive intervention earlier in the decade, an intervention which still reverberates in the value of its currency”.

On March 30, the *Financial Times* reported: “A lobbyist for GM, Ford, and Chrysler said the Treasury Secretary needed to be pushed into spearheading a co-ordinated international effort that would lead to Japan selling down its excess reserves to stimulate a stronger yen”.

On July 16, *The Japan Times* reported that The Bank for International Settlements has issued a warning against the current trend of yen undervaluation. Its Annual Report states, “There is clearly something anomalous in the ongoing decline in the external rate of the yen”.

In Europe, the financial press has also been full of quotes from politicians complaining about the yen being unduly weak against the euro and pound sterling making Japanese exports too competitive. In its 10 February 2007 issue, *The Economist* pontificated: “A country with one of the world’s largest current-account surpluses and low inflation (but no longer deflation) should have a much stronger currency. Japan’s economy is no longer flat on its back. Last year it grew by an estimated 2.3% and is forecast to maintain a similar pace this year. As a result Japan does not need such low interest rates or a super-cheap currency any more. Indeed, Japan’s abnormally low interest rates (the short-term interbank rate is just one quarter of one percent) could be viewed as a form of intervention to hold down the yen” (page 77).

The Economist produced a graph showing a sharp fall in the real trade-weighted yen of more than 30 percent over the last eight years. (The euro and pound have appreciated even more against the yen in real terms.) *The Economist* also showed that, by February 2007, the “real” yen had depreciated just below where it was in 1970—just

before the Nixon shock of August 1971 drove the dollar down against all the major currencies.

Without contradicting any of these statistics, I will show that the Japanese have been rather hapless victims of international monetary events. Foreign exchange risk (fear of yen appreciation) has kept Japanese interest rates mired close to zero for more than a decade, and still prevents the Bank of Japan from properly stimulating domestic consumption demand. Even though output resumed growing modestly from 2003 to 2007 after the preceding “lost decade”, wages continue to stagnate. The recovery remains so fragile that the Japanese government is divided and uncertain on the question of raising interest rates and strengthening the yen. In this paper, the historical roots of Japan’s continuing macroeconomic fragility, resulting in today’s syndrome of the ever-weaker yen, are examined.

The Historical Origins of Japan’s Deflationary Trap

Should the Bank of Japan, and the Japanese government more generally, now be faulted for striving for a deliberately undervalued (beggar-thy-neighbor) currency? Are they cheating in the international money game? Essentially no to both questions. The Japanese authorities are trapped into allowing an ever-weaker yen to continue.

The roots of today’s trap go back to the 1970s. Worried about Japan’s increasing mercantile competitiveness and rising trade surpluses, the United States pressured Japan—by numerous threats of trade sanctions arising out of industry-specific disputes—to keep appreciating the yen. The yen rose from 360 to the dollar in August 1971 (at the end of the Bretton Woods period of fixed exchange rates) to touch 80 in April 1995, before Treasury Secretary Robert Rubin announced a new “strong dollar” policy and ended overt Japan bashing to appreciate the yen. The Bank of Japan and the U.S. Federal Reserve intervened several times in the summer of 1995 to put a ceiling on further appreciations of the yen. Rubin’s new policy was, in the main, successful. In the late 1990s, the yen retreated from its extraordinary 1995 high, and has averaged about 118 to 120 yen per dollar over the past eight years—albeit with the fairly wide fluctuations shown in figure 1.

<Figure 1 about here>

However, the deflationary damage, including heightened fear of foreign exchange fluctuations, had been done. In 1997, McKinnon and Ohno in *Dollar and Yen: Resolving Economic Conflict between the United States and Japan* described what they called “the syndrome the ever-higher yen”, which arose arising from recurrent mercantile (protectionist) pressure from the United States to get the yen up (chapter 1). Yen appreciation began forcing down the yen prices of tradable goods in the mid-1980s. The expectation of an ever-higher yen led first to reduced nominal interest rates on yen assets, and contributed to the great bubbles in Japanese stock and land prices in the late 1980s (chapter 5). When the bubbles burst in 1990-91, the deflationary pressure was reinforced

by the further sharp appreciation of the already overvalued yen through to April 1995. The combination of an overvalued yen and the aftermath of collapsed asset bubbles forced Japan's economy into a deflationary slump from which it has yet to fully recover.

Japan's surprisingly long deflationary hangover can be better understood by looking at relative wholesale (tradable goods) prices in Japan and the United States arising out of yen appreciation (figure 1). By the mid-1970s, inflation in Japan's WPI fell below the high inflation rate in the U.S. but was still positive. However, when the American price level stabilized in the mid-1980s, Japan's WPI inflation turned sharply negative from the massive appreciation of the yen over 1985-87—coming out of the 1985 Plaza Hotel Accord to depreciate the dollar. Subsequently Japan's WPI drifted down more slowly until the international price of oil increased after 2002. But Japan's WPI inflation remained (and remains) far below that in the U.S.

Another measure of Japan's deflationary hangover is how long land prices continue(d) to fall after the property bubble burst in 1991. Figure 2 shows the sharp rise in Japanese land prices from 1986 to 1990 when they more than doubled, and then fell by two-thirds—albeit more gradually—from 1990-91 through 2005. Although urban land prices turned up slightly in 2006, land prices continue to fall elsewhere. Unsurprisingly, residential construction remained virtually dormant over this deflationary period.

< Figure 2 about here >

Wage Growth and the Exchange Rate

What does the historical record tell us about the link among alternative exchange rate arrangements and growth in nominal wages? From 1950 to 1971, Japan provided a useful case study of wage behavior in a very high-growth economy with its exchange rate securely fixed at 360 yen per dollar—the dominant international money.

First, keeping the fixed rate anchored Japan's price level for tradable goods as Japanese wholesale prices rose at about the same speed as those in the U.S.—only 1 percent per year (table 1). Because the bulk of world trade was (is) invoiced in dollars, fixing the exchange rate to the dollar was (is) a stronger anchor for the price level than the size of Japan's bilateral trade with the United States would suggest.

<Table 1 about here >

Second, Japanese money wages in manufacturing grew substantially faster—about 10 percent per year in Japan versus only 4.5 percent in the U.S. From the 1950s into the 1970s, Japan's catch-up phase, productivity growth in manufacturing was much higher than in the U.S. But international competitiveness was roughly balanced by Japan's much higher wage growth when the yen-dollar exchange rate was fixed. (In China from 1994-2005 when the renminbi-dollar exchange rate was fixed, the same phenomenon was observed: the much higher productivity growth in Chinese

manufacturing was matched by much higher growth in money wages relative to those United States (McKinnon and Schnabl 2006). Thus a rough balance in international competitiveness was preserved.

Why, in a rapidly growing open economy, should wage growth better match productivity growth when the nominal exchange rate is fixed? From the old Scandinavian model of wage determination in high export-growth-led economies (Lindbeck 1979), the tradables sector—with its much higher growth in productivity than in nontradables—naturally becomes the leading sector in wage setting. Employers in export activities bid vigorously for skilled and unskilled workers, subject to remaining internationally competitive at the fixed exchange rate. Thus workers in export-oriented manufacturing receive the main fruits from the high productivity growth there. But then, from “labor solidarity” (as the Scandinavian model would have it), these high wage settlements spread into the rest of the economy, largely nontradable services where productivity growth was much lower.

In Japan, the price of services rose relative to goods prices over 1950-71: Japan’s CPI, which includes services as well as goods, increased more than 4 percentage points faster per year than its wholesale price index (which contains only goods) and faster than the U.S. CPI (table 1). However, under the fixed yen/dollar exchange rate leading to rapid wage increases, Japan’s international competitiveness in its high-growth tradables sector remained balanced with the United States—as reflected in the similar rates of price inflation in tradable goods measured by their respective WPIs.

In this bygone high-growth era, finding a purely domestic monetary anchor for Japan’s price level would have been difficult. As in China today, restrictions on domestic interest rates and capital controls proliferated, and growth in the money supply was high and unpredictable as Japanese households rebuilt their financial assets after World War II. Thus having the Bank of Japan simply key on the dollar exchange rate conveniently anchored Japan’s tradable goods price level while promoting high growth in money wages. By the end of the 1960s, however, American monetary policy became too inflationary for the dollar to provide a stable anchor, and the Bretton Woods system of fixed exchange rates collapsed.

How did the switch to a “floating” but ever appreciating yen affect relative wage growth in the two countries? After 1971, episodic Japan bashing led to ongoing yen appreciation as reflected in the dashed line in figure 3. The expectation of an ever-higher yen (from recurrent U.S. pressure) eventually undermined the system of relative wage adjustment. As employers began to anticipate further yen appreciation, growth in Japanese wages slowed—albeit with a lag. Before 1975, money wage growth in Japan remained much higher than in the United States; but then in 1975-76, Japan’s money wage growth slowed sharply—the bold line in figure 3. Since then, wage growth in Japan has been even *lower* than that in the United States. While imposing general deflationary pressure on the Japanese economy, *the erratically appreciating yen undermined the natural process of adjustment in relative wages for balancing international competitiveness.*

<Figure 3 about here>

In addition, the slump in Japanese absorption reduced imports, which offset the slower growth in exports from the higher yen. Thus Japan's large trade surplus, measured as a share of its own GDP, did not decline (McKinnon 2007, Qiao 2007). Although this earlier episode of Japan bashing to push the yen up failed in its principal objective of reducing Japan's trade surplus, it did cause severe deflationary disorder within Japan's macro economy that continues to the present day.

But why should wage stagnation continue 12 years after Secretary Rubin announced his strong dollar policy and the end of American arm twisting to get the yen up? The answer is twofold. First is the stagnation in Japanese GDP growth until from 1992 to 2002—its “lost decade”—with only weak growth subsequently. Second, because of a currency mismatch within Japan's financial system (to be explained below), the threat of sudden upward ratchets in the dollar value of the yen is still very much alive—and heightened by the return of U.S. and European Japan bashing in 2007. Employers could face bankruptcy if they granted a generous wage settlement and the yen then shot upward. Thus risk-averse Japanese employers remain unduly timid in granting higher wage settlements—leading to the phenomenon of an ever-weaker yen, i.e., real exchange depreciation.

Parsing the Yen's Real Depreciation

Changes in real exchange rate depends both on relative rates of price inflation and changes the nominal exchange rate. Consider first the underlying rates of price inflation. Figure 4 plots the paths of the consumer price indexes (CPIs) for Japan, the Euro Zone, and the United States, from 1 January 1999—when the euro officially came into existence—to the last quarter of 2006. Over this eight-year period, inflation was 22.8% in the United States, 18.5% in the Euro Zone, and *minus* 2.3% in Japan.

<Figure 4 about here>

Figure 5 then plots the nominal (undeflated) exchange rates for the yen/dollar, the euro/dollar, and the yen/euro. Despite a few ups and downs, the nominal yen/dollar rate was little changed: the dollar had appreciated just 4.7% against the yen from January 1999 through January 2007. By adding the CPI inflation differential to the change in the nominal exchange rate, 29.8% approximates the real appreciation of the dollar against the yen. More precisely, if we double deflate the nominal yen/ dollar rate by the Japanese and U.S. CPIs, figure 6 shows the actual real appreciation of the dollar against the yen to be 28.7%. Either way, the real appreciation of the dollar came mainly from the 25.1% inflation differential, i.e., the higher inflation in the U.S., and not from the dollar's modest nominal appreciation against the yen.

<Figure 5 about here >, <Figure 6>

The story of the yen/euro rate is somewhat different. From January 1999 to the last quarter of 2006, the euro appreciated 19.2% against the yen in nominal terms—as shown in figure 5. If the CPI inflation 20.8% differential between Japan and the Euro zone (figure 1) is added to this nominal euro appreciation, the approximate real appreciation of the euro against the yen is close to 40%. When the real exchange rate is calculated more precisely by double-deflating the nominal exchange rate by the CPIs in Japan's and the Euro Zone, figure 6 shows the euro's real appreciation against the yen to be 43.7%. Thus the euro's more visible nominal appreciation was almost as important as the inflation differential in explaining the euro's large real appreciation against the yen, which now so irritates European mercantile interests and their governments.

Changes in the euro/dollar exchange rate have been less dramatic. From January 1999 to January 2007, the euro also appreciated against the dollar by 12.1% in nominal terms (figure 5), and by 10.4% in real terms (figure 6). This real appreciation of the euro against the dollar was slightly muted because CPI inflation in Europe was moderately lower than in the United States (figure 4). Although some Europeans—notably the makers of Airbus aircraft—are worried about the relatively small decline in the dollar, most see Japan with its weak yen to be the greater mercantile threat to European heavy and high-tech industries.

Unit labor costs. To check on these calculations of “real” exchange rates deflated with broadly based CPIs, consider the OECD's estimated unit labor costs more narrowly in manufacturing—the only sector for which comparable quarterly data are available across all three areas. Unit labor costs are wage costs in local currencies less productivity growth per unit of output.

Figure 7 compares the course of manufacturing wages in Japan, the Euro Area, and the United States from the first quarter of 1999 through the fourth quarter of 2006. American nominal wages in manufacturing rose by 24%, European by 27.8%, and Japanese by only 7.9%. Figure 8 then shows that Japanese unit labor costs fell by 24.2%, whereas those in the Euro Area fell by just 3% and those in the U.S. by 5.9%. (Although this general fall of unit labor costs in manufacturing is striking, it need not hold in other sectors within our three economies.) Thus, manufacturing unit labor costs in the Euro Area rose relative to those in Japan by 21.3% percentage points. But on top of this, the euro appreciated in nominal terms against the yen by 19.2%. (figure 5). To be more precise, double-deflating the nominal yen/euro exchange rate with manufacturing unit labor costs, figure 9 shows *the “real” appreciation of the euro against the yen to be a remarkable 55% from early 1999 through the fourth quarter of 2006.*

<Figure 7>, <Figure 8>, and <Figure 9>

Can this increase in Japan's international competitiveness be explained by its superior productivity growth? Somewhat surprisingly, from first quarter 1999 to fourth quarter 2006, manufacturing productivity growth rates across all three areas were similar. Changes in labor productivity can be backed out of the OECD data on wages (figure 7)

and unit labor costs (figure 8) to show that growth in labor productivity was 32.1% in Japan, 29.9% in the U.S., and 30.8% in the Euro Area. Although the euro zone's slightly lower productivity growth (1.3 percentage points in manufacturing) contributed to its loss of competitiveness relative to Japan, this effect was dwarfed by the euro's nominal appreciation of 19.2% against the yen, and by European wage growth being 19.9 percentage points higher than Japan's.

Based on unit labor costs, the dollar's real appreciation against the yen was "only" 22.7% (figure 9), but still very substantial. However, most of the loss in U.S. competitiveness relative to Japan came from the faster growth in U.S. wages, or, to put it differently, wage stagnation in Japan. From 1999 through the fourth quarter of 2006, American wages grew by 16.1 percentage points above their Japanese counterparts in manufacturing when U.S. productivity growth was only 1.2 percentage points less.

To erase any doubt about the persistent deflationary pressure on prices and wages in Japan, figure 4 showed a 2.3 percent fall in Japan's CPI from 1999 to fourth quarter 2006. Beyond just manufacturing, Figure 10 provides comparable wages across the whole of the private sectors of Japan, the United States, France, and Germany. (No such general series was available for the euro area as a whole.) Japanese nominal wages actually *fell* by 3.4% while those in the U.S. rose by 27.8%, by 33.4% in France, and by only 16.5% in Germany. And wage deflation in Japan continues. *The Economist Intelligence Unit* (June 2007, p. 27) reports that in April 2007, monthly cash wages per worker in Japan actually fell 1.4% compared with a year earlier. Wage deflation in Japan continues to be unique relative to the other large industrial countries.

<Figure 10>

Does this persistent wage stagnation simply reflect Japan's low or non-existent GDP growth during its lost decade after the stock and land bubbles burst in 1990-91? Perhaps not. Remarkably, from 2003 through 2006, when Japan's real output and GDP growth finally began to grow a modest 2 percent per year (figure 11 shows nominal GDP growth), Japanese money wages still fell in private industry generally. Because Japan's unit labor costs continue to fall from wage stagnation, Japanese exports became even more competitive in world markets—thus triggering the return to Japan bashing in 2007.

<Figure 11>

Intra-European Differences in Wage and Productivity Growth: An Aside

The euro's real appreciation against the yen (and even against the dollar) affects some countries within the euro area much more than others. Before the advent of the euro in January 1999, all the potential member countries had to show substantial convergence in their CPI inflation rates (which they did) and to keep their nominal exchange rates stable for a year or more before entry. After the change to a common currency, wage costs and productivity within the Euro Area—and more generally in the European Union—were expected to gradually converge. For a fringe of the least developed, low per

capita income, smaller countries—led by Ireland and some in eastern Europe—rapid growth in their catch-up phases has led to some convergence.

Surprisingly, however, measures of competitiveness among some of the more mature industrial countries in the euro zone have *diverged*. Based on unit labor costs in manufacturing, figure 12 compares the evolution of unit labor costs from 1999 through 2006 for Germany, Italy and France to the United States and Japan. Within the euro group, unit labor costs ranged from a rise of 20.8% in Italy to a fall of 13.5% in Germany. France was about the euro zone average: its manufacturing unit labor costs fell about 4%. The experiences of Greece, Portugal and Spain's are closer to Italy's, whereas Austria's is similar although not quite as good as Germany's (De Grauwe 2006). Germany, with its large current account surplus, much better in retaining its international competitiveness in the face of an appreciating euro.

<Figure 12>

Unsurprisingly, German politicians have been relatively silent about the problems of a strong euro (weak yen), whereas their Italian and French counterparts have openly criticized the European Central Bank for letting the euro get too strong because European interest rates are too high, and the Bank of Japan for letting the yen get too weak because Japanese interest rates are too low. Just what was the origin of “unduly low” interest rates in Japan, and why have they persisted for so long?

Interest Rates and Japan's Currency Mismatch

Like wage setting in labor markets, interest rates in financial markets are also forward-looking and sensitive to currency risk—perhaps more immediately so. When future changes in exchange rates are well signaled from some easily identifiable source, such as continual foreign mercantile pressure, interest rates begin to adjust.

After the yen first appreciated, about 17% from the “Nixon Shock” of 1971, most analysts felt that this was a one-time devaluation of the dollar against the currencies of all the major industrial countries. However, by the late 1970s, the United States began to single out Japan, its foremost mercantile competitor, for applying overt political pressure to appreciate the yen. In 1977, in the midst of trade disputes and the threat of U.S. trade sanctions on imports from Japan, U.S. Secretary of the Treasury Michael Blumenthal stated that the yen should be appreciated. This contributed to a run on the “Carter dollar” in 1978 with a sharp yen appreciation. At this point, the financial markets began to behave as if the yen would continually appreciate into the indefinite future.

Long-term interest rates on 10-year Japanese government bonds (JGBs), which are not directly controlled by the government, best reflect this big change in exchange rate expectations. Figure 13 shows the interest rate on JGBs before 1978 to be about the same as that on 10-year U.S. Treasuries—and if extended back into the 1950s and 1960s, interest rates on JGBs were typically one to two percentage points higher than those on U.S. Treasuries. But by 1978, the relationship turned around. Since then, JGB

rates have averaged 3 to 4 percentage points *less* than on U.S Treasuries. In July 2007, the interest rate on U.S Treasuries was about 5.04% and that on JGBs was 1.97%.

<Figure 13>

From 1978 to 1995-96, this interest differential can be readily explained by the principle of *open-interest parity*. Figure 13 also shows logarithmically the trend of the appreciating yen against the dollar from 1971 to 1995, about 3 to 4 percentage points per year. Since 1995, however, the yen has not appreciated on net balance—although it has fluctuated widely against the dollar. But the large interest differential remains. To explain this apparent anomaly, the growing *currency mismatch* within Japan generates a growing *negative risk premium* in interest rates on yen assets. To make this concept clearer, consider the following equation linking interest rates in American and Japanese financial markets in the absence of capital controls:

$$i = i^* + E(\hat{e}) + \varphi \quad (1)$$

where i is the interest rate on yen bonds, and i^* that on dollar bonds at the same term to maturity. The interest differential, $i - i^*$, between yen and dollar bonds is partitioned into two components: $E(\hat{e})$ is the expected change in the yen/dollar rate (negative if appreciation is expected), and φ is the risk premium (negative in the Japanese case). Because both these components are negative, $i < i^*$.

In the Japan bashing period before April 1995, one could reasonably expect that the yen would continue to appreciate so that the $E(\hat{e})$ term was dominant. Similarly, today's China bashing to appreciate the renminbi is forcing down nominal interest rates on renminbi assets within China (McKinnon 2007). Because entrenched expectations often change with a lag, after 1995 the expectation of a secular appreciation of the yen may have decayed only gradually so that $E(\hat{e})$ remained important while slowly losing its dominance.

However, for the interest rate differential to remain so large today, one must appeal to the value of the negative risk premium φ . Although Japan is the world's largest creditor country, it does not lend much in yen because of the currency asymmetry associated with the dollar standard. Instead, the country's large current account (saving) surpluses are partially financed by outward foreign direct investment but mainly by building up foreign currency claims (mainly dollars) on foreigners (table 2). This leads to a currency mismatch within Japan's economy.

< Table 2 about here >

In the private sector in particular, financial institutions such as insurance companies or banks acquire higher-yield dollar assets even though their liabilities are mainly in yen—as are their annuity obligations to policyholders or to depositors. Although these financial institutions have come to depend on the higher yield on dollar over yen assets, they fear any fluctuation in the yen/dollar exchange rate that would

change the yen value of their dollar assets relative their yen liabilities. Even a random upward blip (appreciation) in the yen could wipe out their net worth. So they will hold dollar assets only if they are given a substantial risk premium for doing so.

Because American interest rates are mainly determined in world markets, portfolio equilibrium within Japan's economy requires that interest rates on yen assets be bid down (as in equation 1) by the amount of the negative risk premium to make Japanese investors at the margin willing to hold dollar assets. Because of the currency mismatch, this negative risk premium will be higher (more negative) the greater the fluctuations in the yen/dollar rate and the larger are Japan's private holdings of dollar assets. Figure 13 shows that, in the absence of secular appreciation of the yen since 1995, the yen/dollar rate has still fluctuated very substantially.

Japan's current account (saving) surpluses only became significant in the early 1980s. But more than 20 years later, the cumulative total of liquid dollar claims held by the economy is now much greater relative to GNP than it was back in the 1980s—and it is continually growing (table 2). Private sector finance for acquiring counterpart dollar claims is always chancy because of ongoing high volatility in the yen/dollar exchange rate—the risk that offsets the higher yield on dollar assets relative to yen assets. For the private sector to keep acquiring dollar claims, the interest rate differential may have to increase—i.e., the risk premium becomes more negative so as to depress yields on yen assets (equation 1). But what happens when Japanese short rates approach zero?

The Liquidity Trap and Portfolio Instability

Japanese banks, insurance companies, trust funds, and even some individuals hold dollar assets over a wide spectrum maturities. But interest rate adjustment for currency risk is more difficult at the shorter end of the maturity structure than for the 10-year bonds shown in figure 13. First, governments in industrial countries tend to target some short-term interbank rate—federal funds in the U.S., *gensaki* in Japan—as an instrument of monetary control, thus leaving it rigid for extended periods. Consequently, these rates cannot change to counteract short-term shifts in currency risk. Second, if the currency risk is sufficiently great, nominal interest rates on yen assets—particularly those at short term—are eventually forced toward zero. Figure 14 shows the near-zero interest rate on short-term yen assets, the so-called liquidity trap, that has persisted since early 1995.

<Figure 14>

The liquidity trap has major implications for economic policy.

(1) During Japan's lost decade and even today, the central bank has not been able to stimulate domestic demand by the traditional technique of lowering short-term interest rates when they are bounded from below by zero. Once deflation was set in motion by the greatly overvalued yen in the early 1990s, within the liquidity trap there was (is) nothing the central bank could do to stop it. Engineering a major devaluation of the yen against

the dollar in nominal terms, if technically possible, was and is out of the question after the previous episodes of Japan bashing to get the yen up.

(2) Having short-term interest rates compressed toward zero greatly reduced(s) the profit margins, the spread between loan and deposit rates, of Japanese commercial banks. After the real estate and stock market bubbles burst in 1990-91, numerous defaults on bank loans led to a rash of non-performing loans (NPLs) on bank balance sheets. No surprise there. What is surprising, however, is that the banks had not grown out of their NPL problem more than a decade later—even after several subsidized re-capitalizations. Goyal and McKinnon (2003) attributed this anomaly to the artificially reduced bank profit margins arising out of the persistent liquidity trap.

(3) Once yen interest rates fall near zero, greater portfolio instability in the holding of dollar versus yen assets within Japan is generated. Because yen interest rates cannot be forced below zero, the condition for portfolio stability—equation (1) above—is violated at shorter terms to maturity, with echo effects at longer terms. With private Japanese financial institutions fearful of another big yen appreciation, episodic runs out of dollars into yen become more likely. And, to prevent the yen from appreciating sharply, the BoJ becomes the residual buyer of the surplus dollars—resulting in a substantial build up of official exchange reserves.

Points (1) and (2) are obviously important for understanding Japan's past economic malaise and deflationary hangover into the present, but point (3) is less obvious. For any given interest rate on a dollar asset, in the low-interest liquidity trap the rate on the same-maturity yen asset cannot be forced low enough for Japanese financial institutions to hold the riskier dollar asset at the margin. But where the margin is depends on how large the existing stocks of dollar assets are in Japan's private sector. If, from the ongoing current account surplus, private holdings of dollar assets become large relative to the net worth of Japanese financial institutions, then the system becomes very vulnerable to a run.

On the other hand, once there is a run, during which the BoJ buys dollar assets from the private sector on a large scale, Japanese insurance companies, banks, and so forth, eventually become happy holding their remaining smaller stocks of dollar assets if and when they finally decide that the BoJ can hang on without letting the yen appreciate (further). After a run, these institutions may even be willing to rebuild their depleted stocks of higher-yield dollar assets for many months or years—thus providing finance for the ongoing current account surplus without the BoJ's intervening at all.

Figure 15 captures the remarkably episodic nature of (internal) runs from dollars into yen since 1980 by simply plotting the monthly percentage changes in the BoJ's official foreign exchange reserves—which we know to be mainly dollars, although the authorities don't reveal the exact currency composition of the reserves. The episodes of concentrated upward spikes in official reserves clearly indicate the presence of runs—often followed by quiescent periods, sometimes with some reserve decumulation. However, a single satisfactory metric for measuring runs is not easy to find. Indeed, the

absolute scale of the official intervention from late 2002 to early 2004 of \$330 billion was much greater than previous interventions (table 2). But it was not particularly large in monthly percentage terms, as reflected in the spike in reserves for 2003-04 (figure 15).

<Figure 15 about here >

With Japanese short-term interest rates mired close to zero and without overt Japan bashing to appreciate the yen, the behavior of U.S. interest rates becomes the biggest determinant of whether or not there will be a run. After the collapse of the high-tech bubble in 2001, U.S. short-term interest rates came down very sharply, with the rate on federal funds touching the unprecedented low level of 1% in January 2004 (figure 14). Because Japanese short-term interest rates were bounded from below by zero, the differential of American over Japanese rates narrowed sharply. Consequently, net dishoarding of dollar assets by Japan's private sector led to a sharp jump in official exchange reserves. From the end of 2002 though early 2004, official reserves almost doubled (table 2). These episodic runs into official reserves, followed by quiescent periods, were also part of Japan's earlier experience (McKinnon 2005, ch. 3).

In their letter to Secretary Paulson in 2007, American lawmakers and Michigan automobile executives in particular were harking back to this three-year-old intervention episode as evidence that Japan has been unfairly manipulating its currency. On March 9, 2007, the Bloomberg Press reported "Democrats say a book, *Global Financial Warriors* (January 2007) by former U.S. Treasury Undersecretary John Taylor proves that the Bush Administration went along as Japan tried to hold down the foreign exchange value of the yen, hurting American manufactures. Taylor writes that he acquiesced as Japan sold yen to buy dollars in 2003-04 to help the world's second largest economy pull out of a decade of anemic growth."

However, after March 2004, U.S. interest rates started increasing back to "normal" levels so as to increasing the interest differential at shorter maturities with yen assets. Japan's private financial institutions have returned to acquiring most of the dollar assets generated by Japan's current account surpluses and the BoJ has hardly intervened at all—figure 15. But this is only a lull. Because dollar assets continue to accumulate in private Japanese portfolios, the currency mismatch will again cumulate to a point where the risk premium on yen assets can't be sufficiently negative (because yen interest rates are bounded from below by zero) for Japanese private investors to keep adding to their stocks of dollar assets. Then any mere rumor of currency appreciation will prompt another run out of private portfolios into official exchange reserves.

The Yen Carry Trade

In the liquidity trap, Japan's ultra-low short-term interest rates lead to a phenomenon popularly referred to as the "yen carry trade". Defined narrowly, carry trade refers to transactions that combine term-structure risk with currency risk. Suppose a speculator, who need not be a Japanese national, borrows short in Tokyo in yen at less than 1% in order to invest long-term in 10-year Australian government bonds bearing

6.27%. That is hyper risk taking beyond the ordinary course of business or household behavior. There is the risk that short-term rates will increase relative to long everywhere, or that long rates in Australia increase further so as to reduce the capital value of the bonds, and then there is the specific risk that the yen will appreciate against the Australian dollar. In this last case, our speculator could have trouble re-paying or rolling over his short-term yen loan.

How much of Japan's large current account surplus today is intermediated by the yen carry trade so narrowly defined is anybody's guess. But I suspect that it is much less than that done through the more traditional forms of international financial intermediation associated with insurance companies and the like—and thus much less than what the financial press thinks.

However, the carry trade does contribute to the potential volatility of the yen/dollar exchange rate. With any hint of, or rumor that, the yen might appreciate, carry-trade speculators with their short-term yen liabilities may well react first. They rush to cover their short positions in yen by not renewing loans or simply buying offsetting yen assets. This quickly adds to the upward pressure on the yen so as to trigger a run that induces mainline financial institutions to start selling off their dollar assets as well, which the BoJ buys as per the positive spikes of official reserve accumulation in figure 15. By making the yen/dollar rate more volatile, carry traders heighten the exchange risk to mainline financial institutions. Thus, indirectly, do carry-trade speculators widen the interest differential between dollar and yen assets necessary to maintain (an uneasy) portfolio equilibrium where mainline Japanese financial firms hold some of both.

But our concern here with the mechanics of runs and negative risk premia in interest rates should not detract from how expensive foreign exchange instability has been for Japan's economy. The extraordinary appreciations of the yen through the mid-1990s threw the economy into a deflationary slump. The subsequent low interest rate liquidity trap prevented the Bank of Japan from re-inflating the economy to escape from the slump. And, during Japan's lost decade from 1992 to 2002, massive fiscal deficits have also failed to stimulate private spending while leaving the Ministry of Finance very leery of increasing today's huge public debt even further.

Fragile Export-Led Recovery: 2003-07

Fortunately, since 2002, the world economy has been sufficiently buoyant to attract Japanese exports and stimulate investment in export-related activities. In 2003, Japan's economy began recovering: real GDP has been increasing about 2.3% per year. Table 3 shows GDP's various components from 2002 to 2006 in undeflated nominal terms—which, because of mild ongoing deflation, tends to understate real growth rates. Overall *nominal* GDP grew from 2002 to 2006 by just 3.33%.

<Table 3>

Figure 16 summarizes the relative contributions to overall GDP growth over these four years as proportion of Japanese GDP in 2002. What is remarkable is the lack of growth in private consumption. Despite being a “normal” 57% of GDP, consumption was just 30% of the overall GDP growth from 2002 to 2006. Moreover, private residential investment was virtually stationary. In contrast, corporate investment (which is normally just 17% of GDP) contributed an astonishing 100% of the increment in Japan’s overall GDP. To square the accounts, government spending was the big negative—falling 1.14 percentage points or 34% of the incremental growth in GDP. And table 3 shows that the bulk of this fall in government spending was in public sector investment.

<Figure 16>

Exports also made a substantial contribution to Japan’s modest recovery. But the standard presentation of the GDP accounts (the bars to left of the first vertical broken line in Figure 16) shows growth in Japan’s *net* exports to be slightly *negative*. However, this masks the huge increase in *gross* exports from Japan after 2002 when the price of oil and related petroleum products began to increase substantially—and Japan is completely dependent on oil imports. Without any significant change in the quantity of oil imported, the yen cost of oil imports rose almost 150% through 2006. (table 3). Thus Japan had to export more in real terms just to pay for the more expensive oil.

But the problem is more general than just oil. The prices of many important basic inputs—iron ore, copper, various minor metals, agricultural raw materials, as well as mineral fuels—sharply increased after 2002. Thus, without any increase in Japan’s net trade surplus, manufactured exports had to expand dramatically—if only to offset the adverse change in Japan’s terms of trade. Figure 16 and table 3 show gross exports of manufactured goods expanding by even more than GDP from 2002 through 2006.

The large increases in Japan’s domestic corporate investment can now be better understood. Although both consumption and public expenditures have languished since 2002, increased investment was induced by, and supported, expanding manufactured exports. Reinforcing this effect, the depreciation in Japan’s *real* exchange rate against both the euro and the dollar, and against other Asian currencies with exchange rates more closely tied to the dollar, makes investment in Japan look relatively inexpensive (McKinnon 2005, ch. 2). In particular, Japanese multinational firms, which normally engage in outward foreign direct investment (FDI), may instead be investing more at home—mainly in export activities.

This result is neatly portrayed in Chart 1 taken from the *Wall Street Journal* article “Japan Inc. comes back home”, by Yuka Haysashi. Since 2002, it shows a virtual doubling of new factory construction within Japan while factory construction in Japanese companies (and their affiliates) overseas has declined. “Japanese companies registered to build 1,782 factories in Japan last year, up from 844 four years ago, and the highest number in 14 years according to government figures. Meanwhile, they are building fewer plants abroad—182 in the year ended March 31, down from 434 four years earlier, according to a government survey of 19,000 companies.” (Hayashi, page 14).

<Chart 1 about here.>

While it is all well and good to analyze the decline in the real exchange rate of the yen against the dollar and the euro as presented earlier in the paper, Hayashi's article also compared the changes in hourly nominal compensation costs for manufacturing workers from 1995 to 2005 across the broader spectrum of countries shown in chart 2. Notably "the average dollar denominated wage for a Japanese manufacturing worker was \$21.76 in 2005, down 7.3% from a decade earlier according to the U.S. Bureau of Labor Statistics. During the same period, the average wage in the U.S soared 38% to \$23.65, while the German average climbed 9.6% to \$33". Chart 2 also shows wages in other East Asian countries rising faster than in Japan. Korean wages rose a remarkable 86% while a guesstimate for China is 211%. However, China's absolute wage level of \$1.33 is still so low relative to Japan's that this high percentage increase is less meaningful.

<Chart 2 about here>

The data on which Hayashi drew from the U.S. Bureau of Labor Statistics provides another striking perspective on the relative stagnation of money wages in Japan, falling 7.3% from 1995 to 2005, compared to its neighbors (chart 2). Figure 4 shows the official Japanese CPI fell about 2.3 percent over a comparable period—implying that Japanese real take home wages have been falling about 0.5% per year. But this weakness in Japanese wage setting, including the surprising quiescence of trade unions, could be partly a statistical illusion.

In a recent intriguing paper by Christian Broda and David Weinstein (2007), they show that Japan's official CPI could well be overestimating Japan's inflation, i.e., *underestimating* the rate of deflation, by 0.8 percent year. Japan's statistical bureau still uses an old fashioned fixed-weight Laspeyres price index rather than the more modern cost-of-living index (COLI) used by the United States. The Japanese method fails to take substitution effects into account when relative prices in the consumer basket change, and does not allow sufficiently for improved product quality from technical progress.

In a complex statistical exercise, Broda and Weinstein re-calculate Japan's CPI inflation rate using the American COLI methodology. Their result is shown in figure 17. From 1998 to 2006, the COLI methodology shows Japan's CPI falling by 8%, whereas the official (Laspeyres) methodology shows a fall of just 3%. Referring back to chart 2 showing the 7.3% fall in money wages, the COLI methodology is consistent with approximately stable real wages—whereas the official CPI shows them in decline. Real wage stability, rather than persistent decline, is easier to accept intuitively.

True enough. But the COLI methodology shows that Japan's deflationary hangover is worse than the official statistics show—and remains very puzzling indeed.

Stabilizing the Yen: A Concluding note

Japan is many years away from working itself out of its deflationary trap without relying on “excessive” export expansion. But a necessary first step would be to reduce the foreign exchange risk that causes the low-interest-rate liquidity trap and undermines the ability of the BoJ to expand the domestic economy, and causes international financial intermediation to finance Japan’s current-account surpluses to be excessively volatile.

Counterintuitive as it may seem from today’s low real valuation of the yen, stabilizing the nominal dollar value of the yen is the preferred strategy. If the yen is credibly fixed within a narrow band over the long run, Japanese nominal interest rates must rise to American levels as the negative risk premium vanishes and fear of future deflation erodes. The dollar exchange rate would again be the nominal anchor—as in the 1950s and 60s. Moderately higher nominal interest rates need not have a deflationary impact if risks in capital and labor markets are reduced, and if fears of future deflation are eliminated. Once Japanese employers became more confident that that the yen would not again ratchet upwards, they would feel freer to grant more generous wage settlements (McKinnon and Schnabl, 2006). Then private consumption could well increase more generally along with personal disposable income and residential construction.

Credibly fixing the yen dollar rate, with the BoJ allowing domestic nominal interest rates to rise, would spring the liquidity trap and restore some—albeit limited—power to the central bank. The yen carry trade would disappear and be replaced by a more normal international financial intermediation: private purchases of overseas financial assets by Japanese insurance companies, banks, and pension funds would increase, while the government’s role in acquiring foreign exchange reserves would diminish. With surplus saving even if somewhat lessened by greater private consumption, Japan would remain a large international creditor. But once foreigners knew that the yen could not ratchet up, they would become more willing to borrow in yen, and would complain less once the BoJ stopped accumulating dollar reserves.

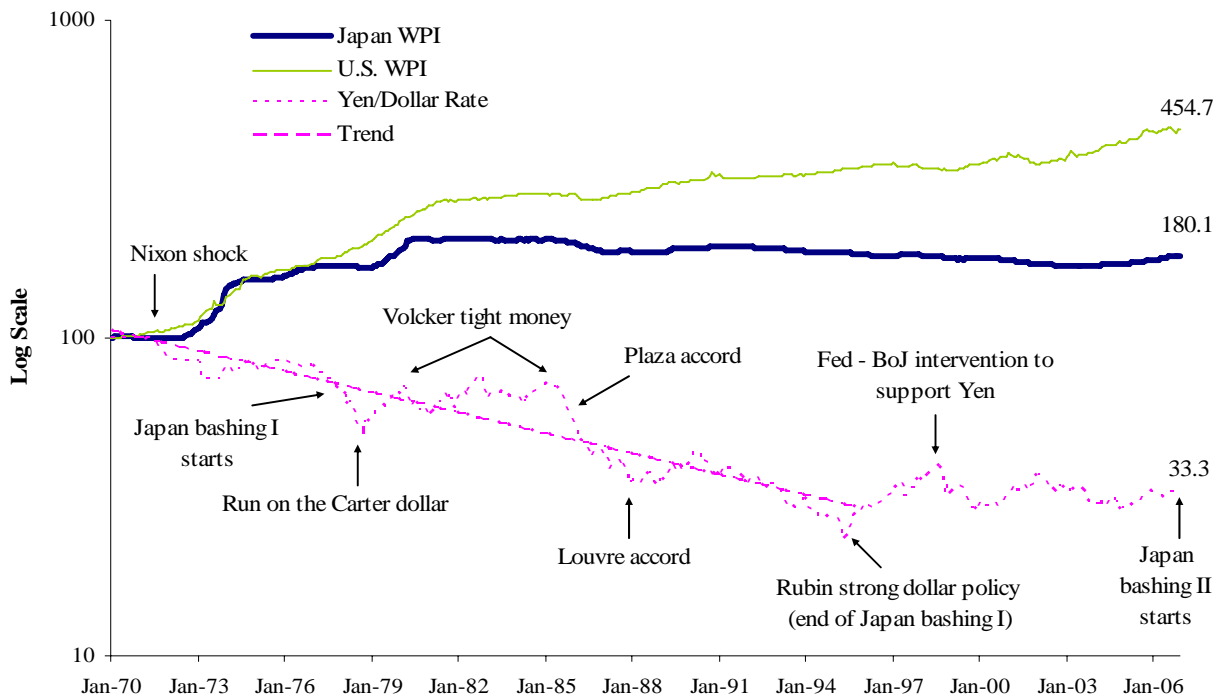
While technically feasible, a credible stabilization of the yen/dollar rate presents a major political problem. It conflicts with recent calls in both Europe and the United States to appreciate the yen—either directly by the BoJ selling dollars to buy yen in the foreign exchange markets, or indirectly by raising domestic interest rates to attract more foreign capital. But officially induced nominal yen appreciations with the fear of more to come would accentuate the deflationary pressure that Japan now faces. As in the 1980s and 1990s, declines in domestic wages and prices would eventually offset any nominal appreciation in its effect on international competitiveness, and Japan would become more deeply mired in its deflationary trap.

To be credible, however, a new policy to stabilize the yen would require explicit cooperation with the United States. How it could work was described 10 years ago in of McKinnon and Ohno (1997, chs 10 and 11). The prescription developed there is also relevant today for China’s current exchange rate dilemma. But those who do not learn from history are condemned to repeat it.

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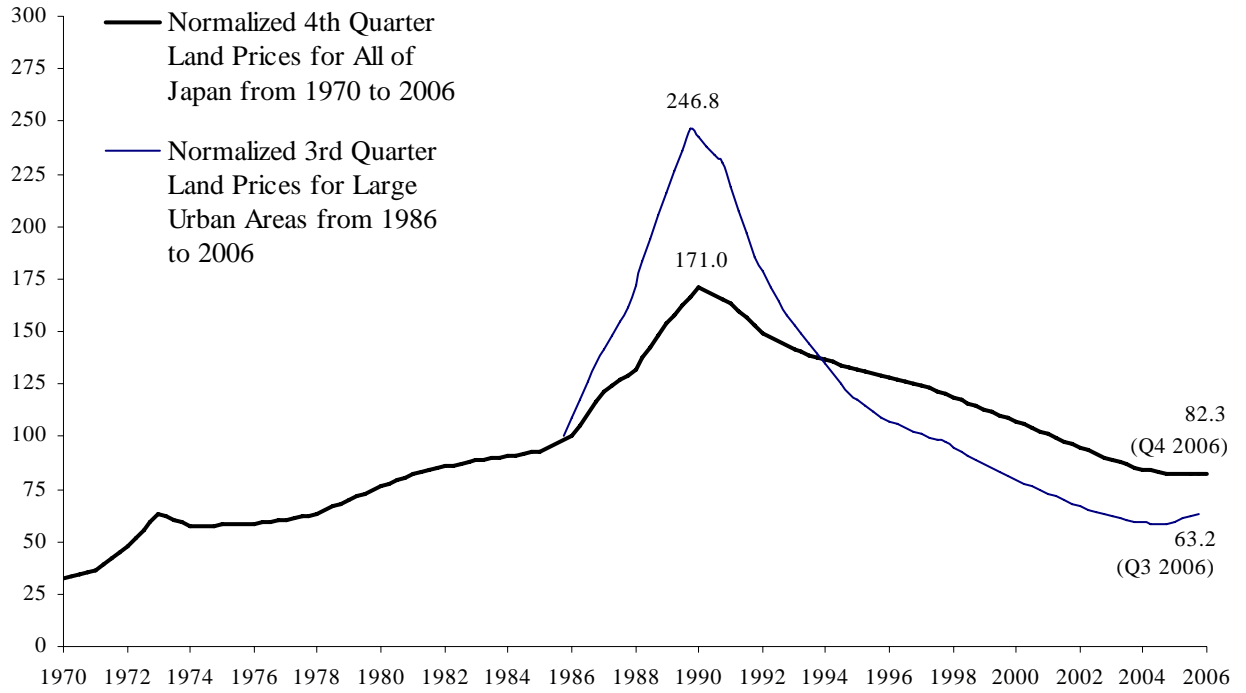
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Figure 1: Wholesale Price Indexes for Japan and the U.S. versus the Yen/Dollar Rate from 1970 to 2006
(1970 = 100)



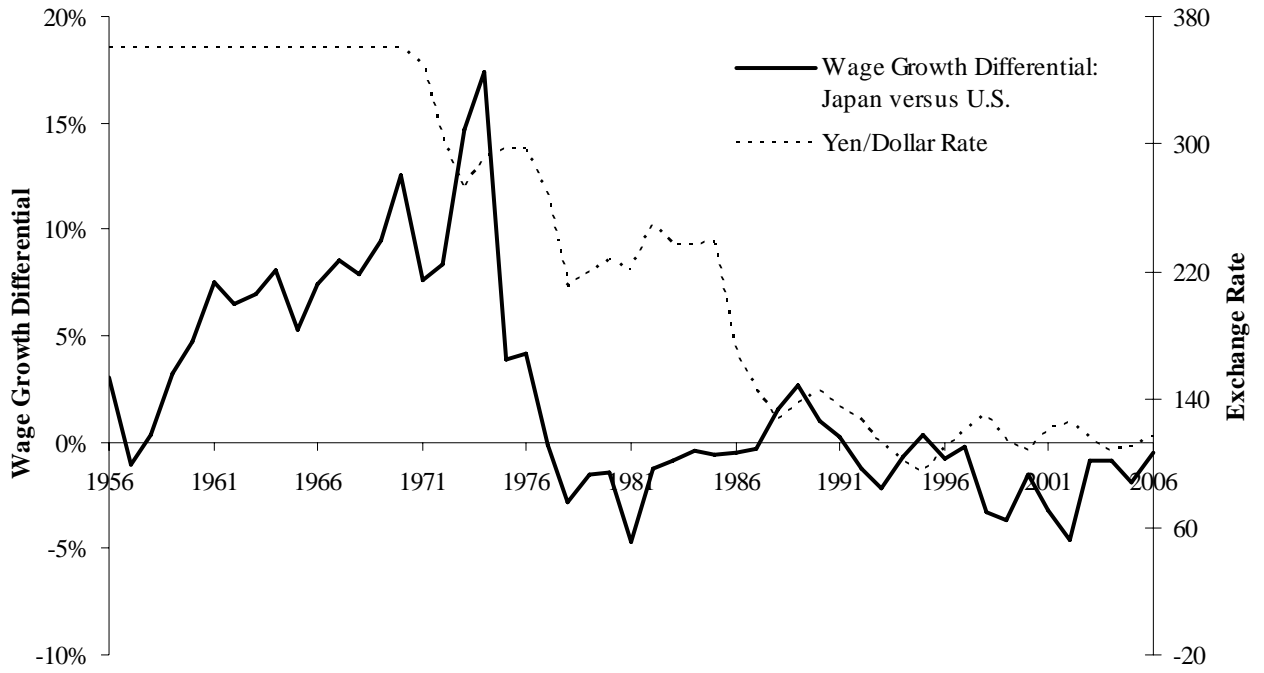
Source: *IFS*.

Figure 2: Index of Land Prices for All of Japan versus Large Urban Areas
(1986 = 100)



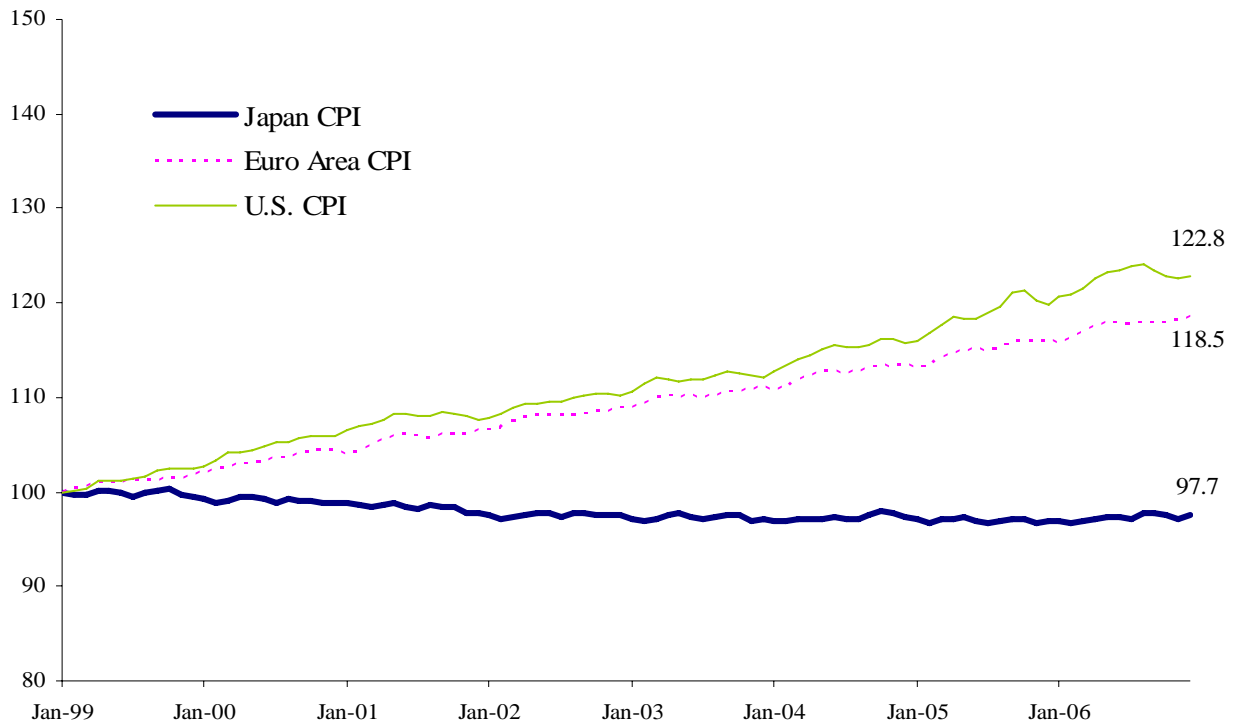
Source: Bank of Japan.

Figure 3: The Yen/Dollar Exchange Rate and Differential Manufacturing Wage Growth between Japan and the U.S., 1956-2006



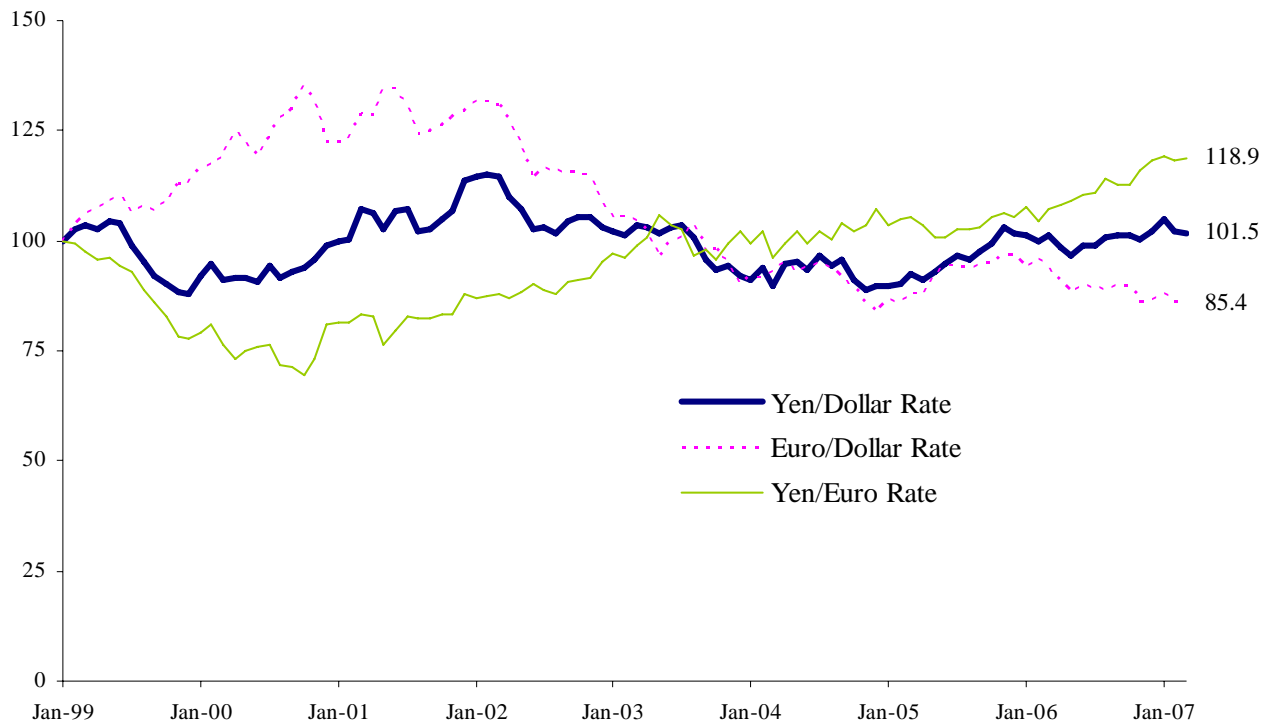
Source: *IFS*, OECD.

Figure 4: Consumer Price Indexes for Japan, the U.S., and the Euro Area from 1999 to 2006
(1999 = 100)



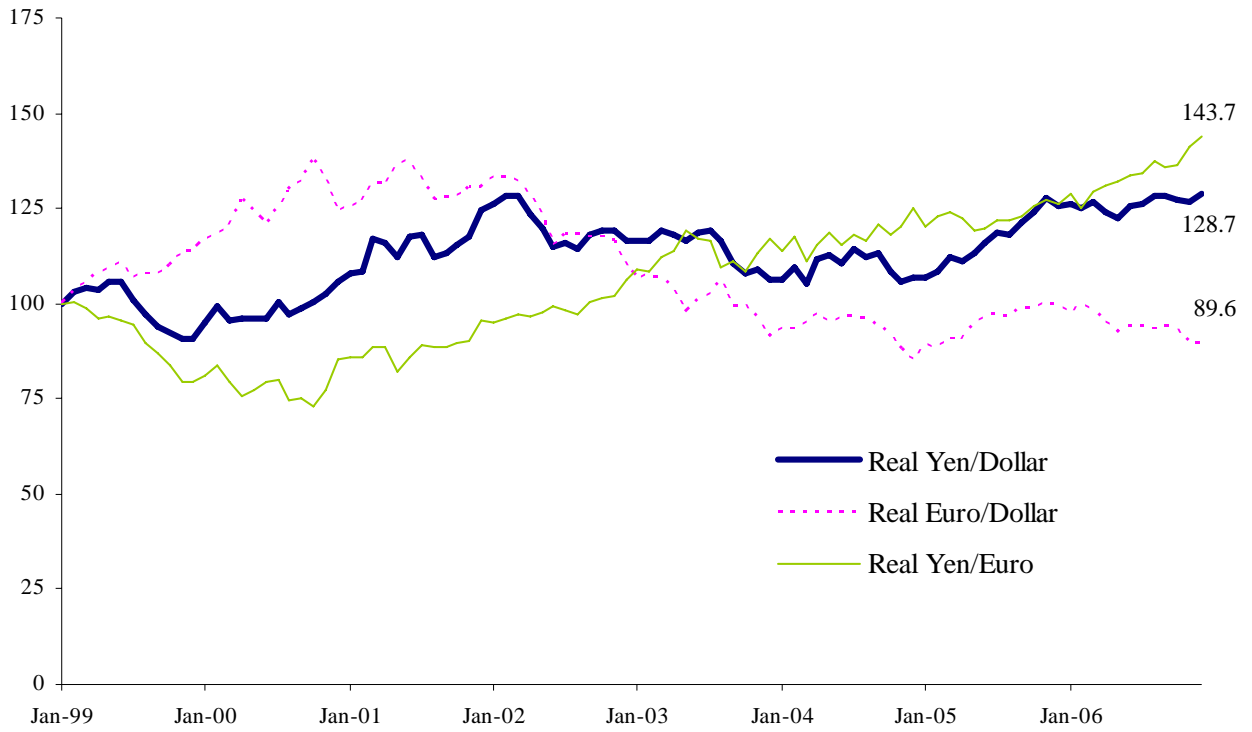
Source: *IFS*.

Figure 5: Nominal Yen/Dollar, Euro/Dollar, and Yen/Euro Exchange Rates from January 1999 to March 2007
(1999 = 100)



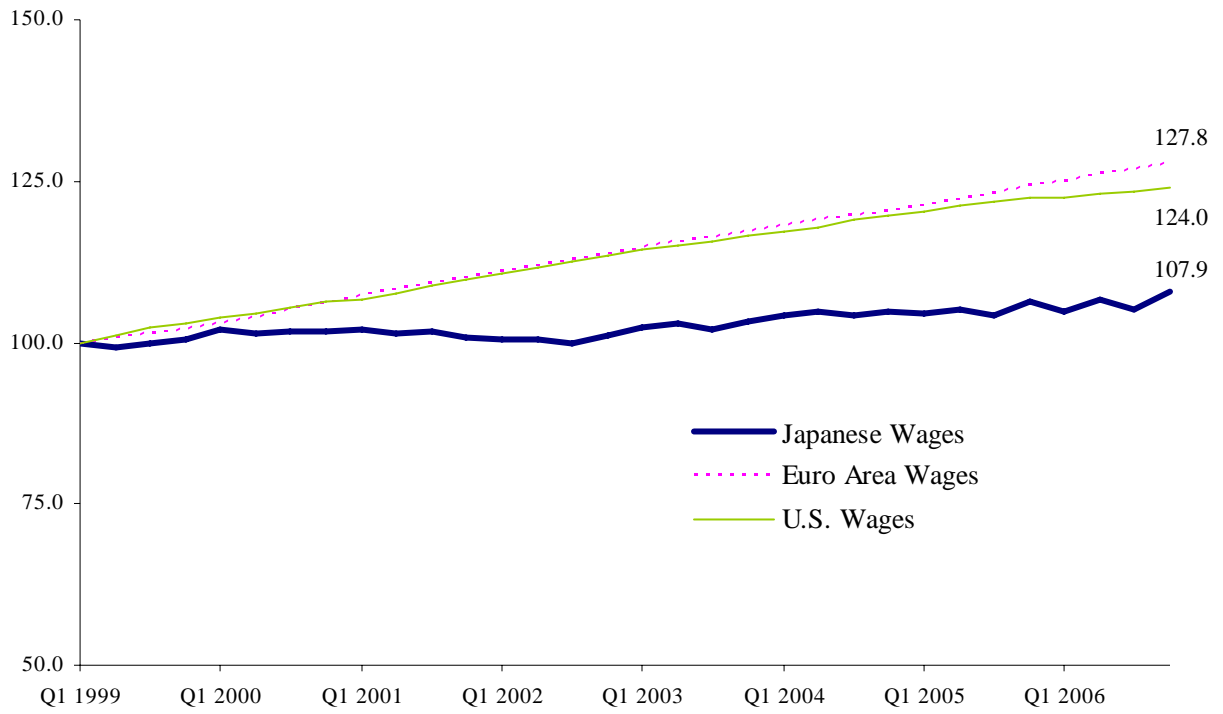
Source: *IFS, The Economist*. Actual market rates as of March 31st, 2007: Yen/Dollar: 117.93. Euro/Dollar: 0.750. Yen/Euro: 157.23.

Figure 6: Real Exchange Rates for Yen/Dollar, Euro/Dollar, and Yen/Euro as Deflated by CPI from 1999 to 2006 (1999 = 100)



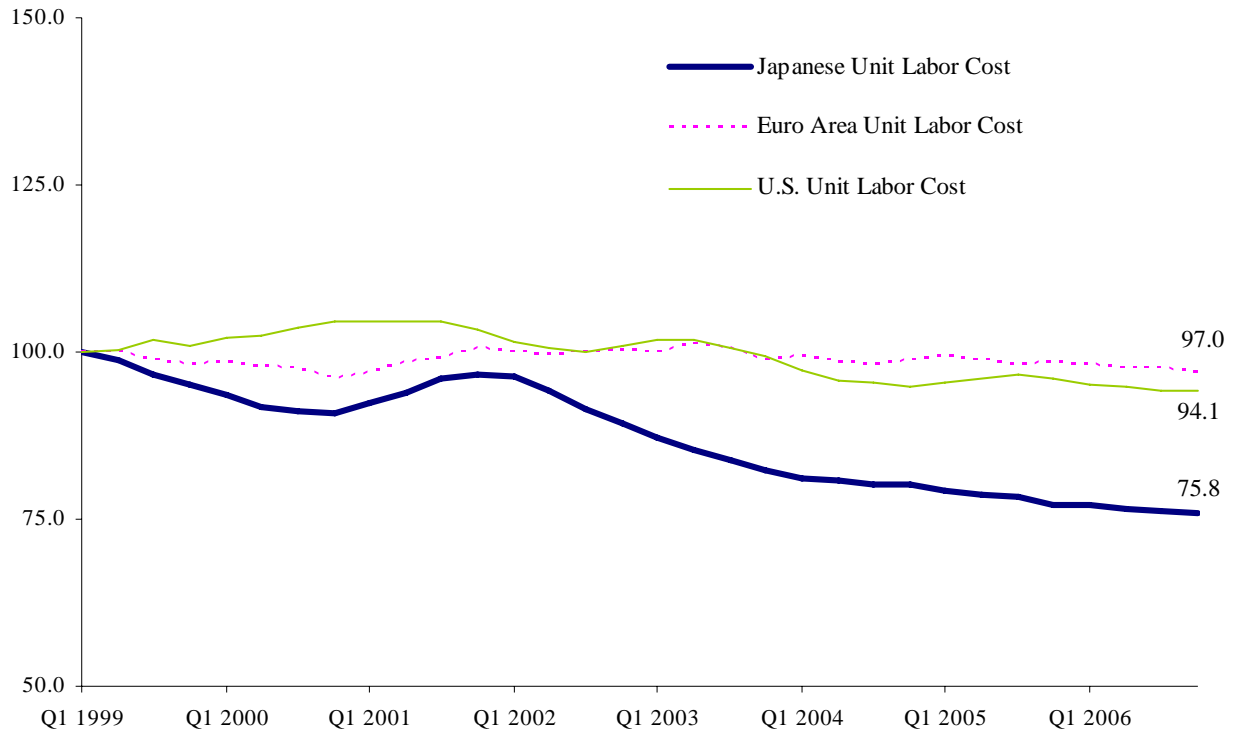
Source: *IFS*.

Figure 7: Japan, Euro Area, and U.S. Manufacturing Wages from Q1 1999 to Q4 2006
(1999 = 100)



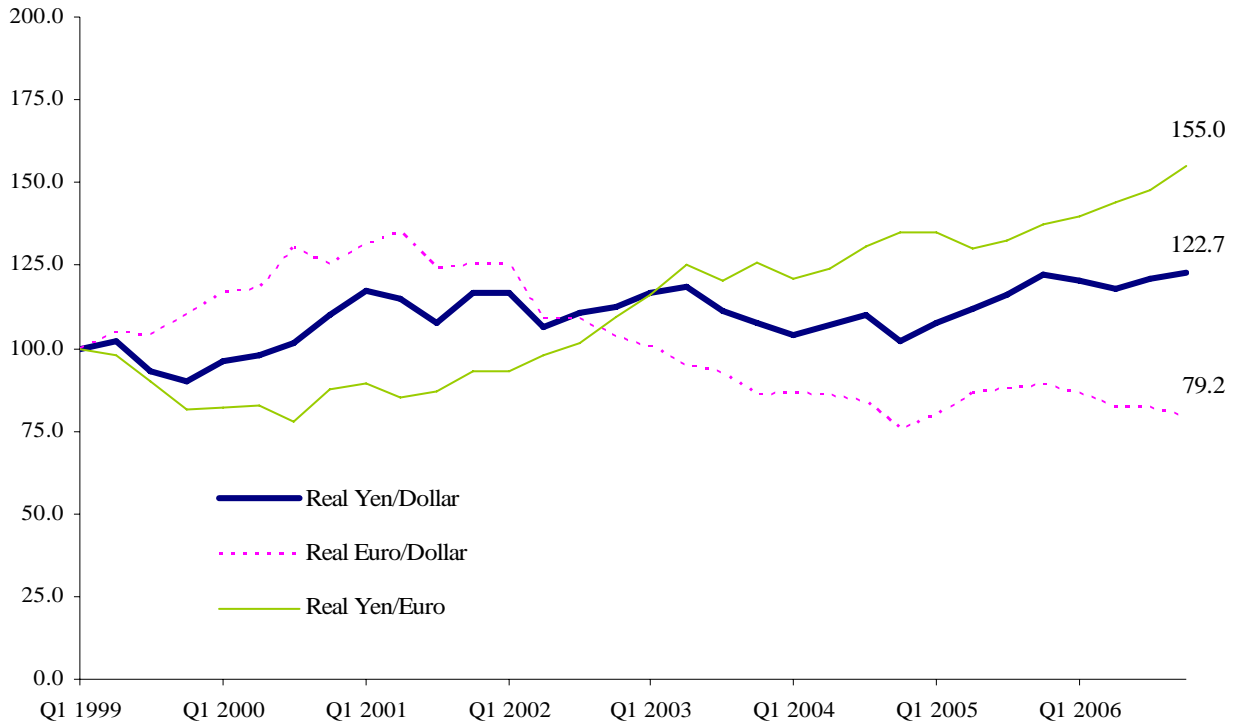
Source: OECD.

Figure 8: Japan, Euro Area, and U.S. Manufacturing Unit Labor Cost from Q1 1999 to Q4 2006
(1999 = 100)



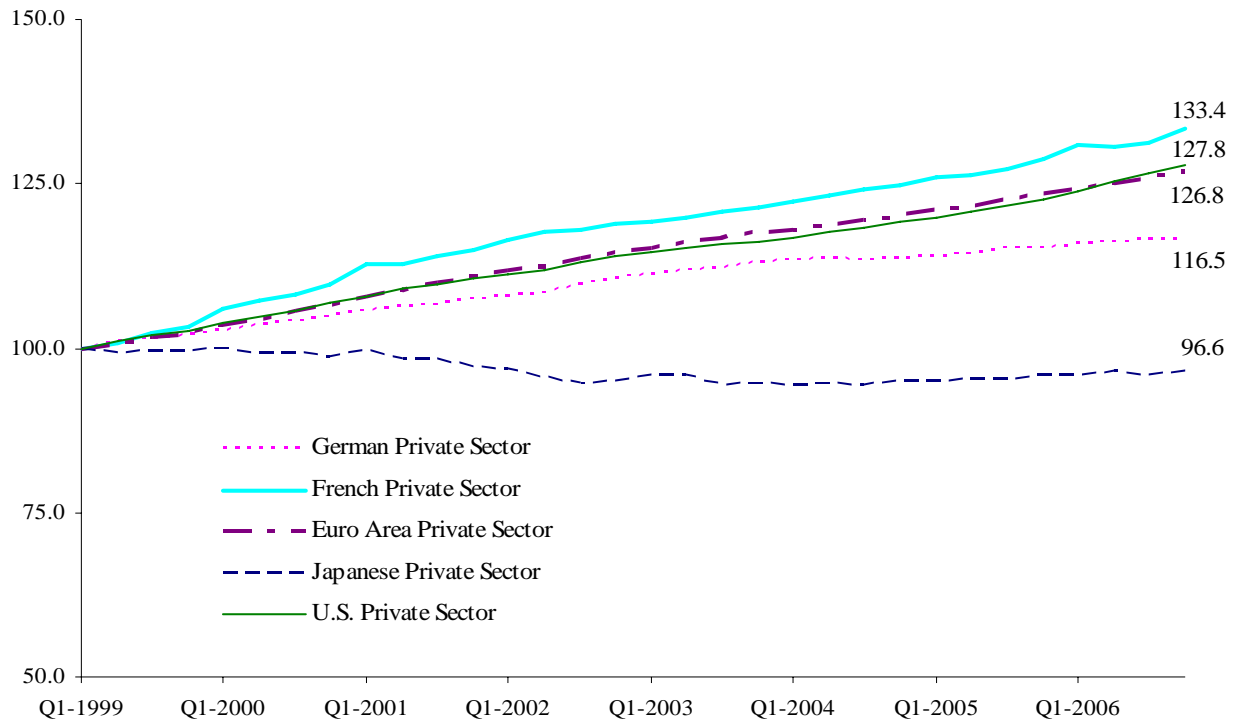
Source: OECD, European Central Bank.

Figure 9: Yen/Dollar, Euro/Dollar, and Yen/Euro Real Exchange Rates as Deflated by Relative Manufacturing Unit Labor Costs, Q1 1999 to Q4 2006
(1999 = 100)



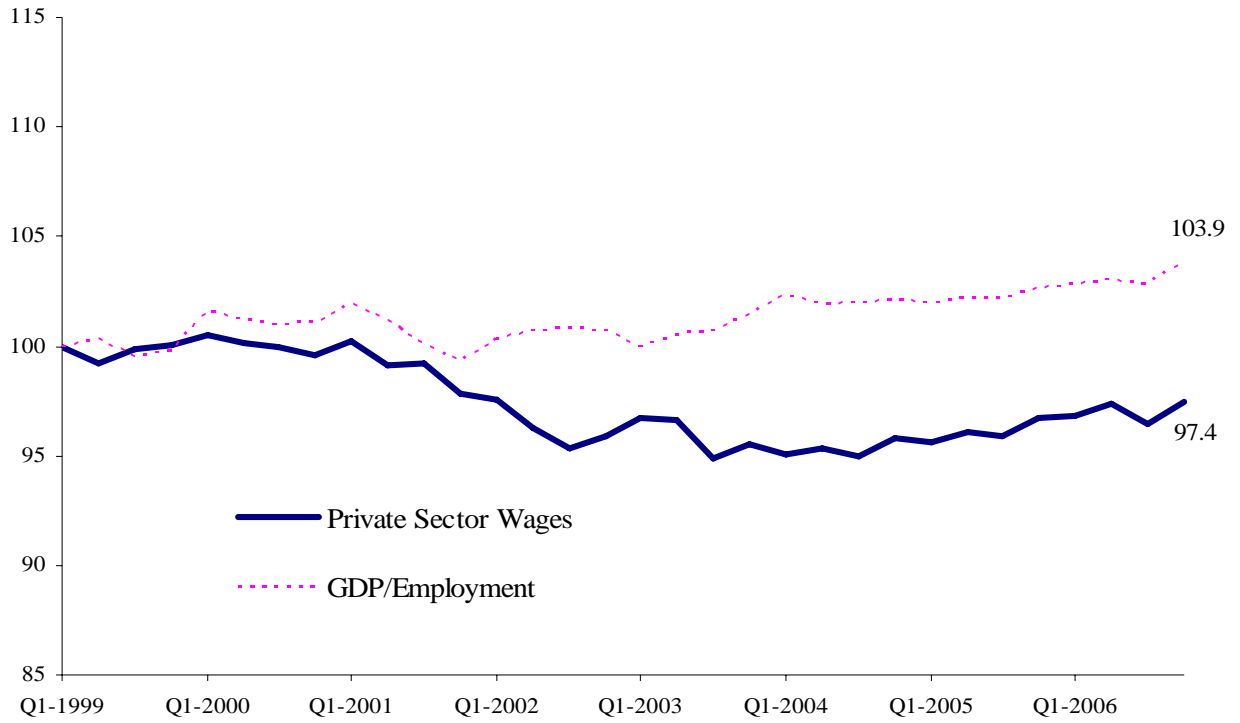
Source: *IFS*, OECD, European Central Bank.

Figure 10: Private Sector Wages for Germany, France, the Euro Area, Japan, and the U.S. from Q1 1999 to Q4 2006
(1999 = 100)



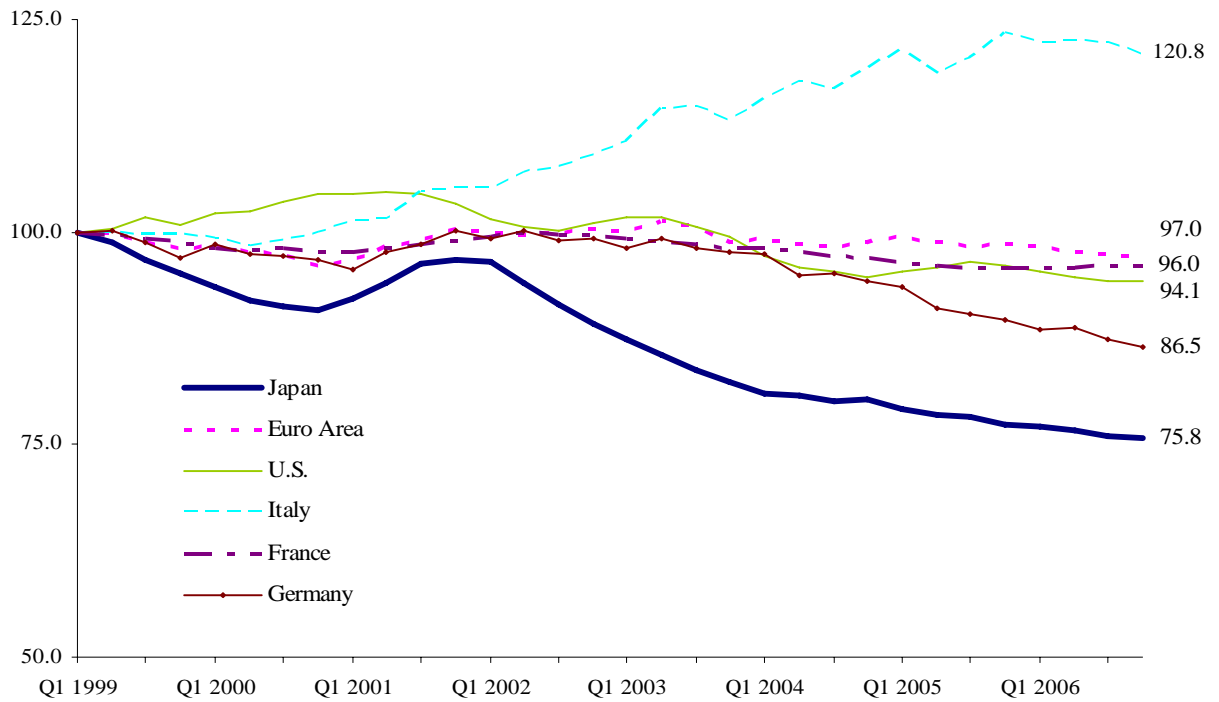
Source: OECD.

Figure 11: Japan: Private Sector Wages versus GDP Divided by Civilian Employment, from 1999 to 2006
(1999 = 100)



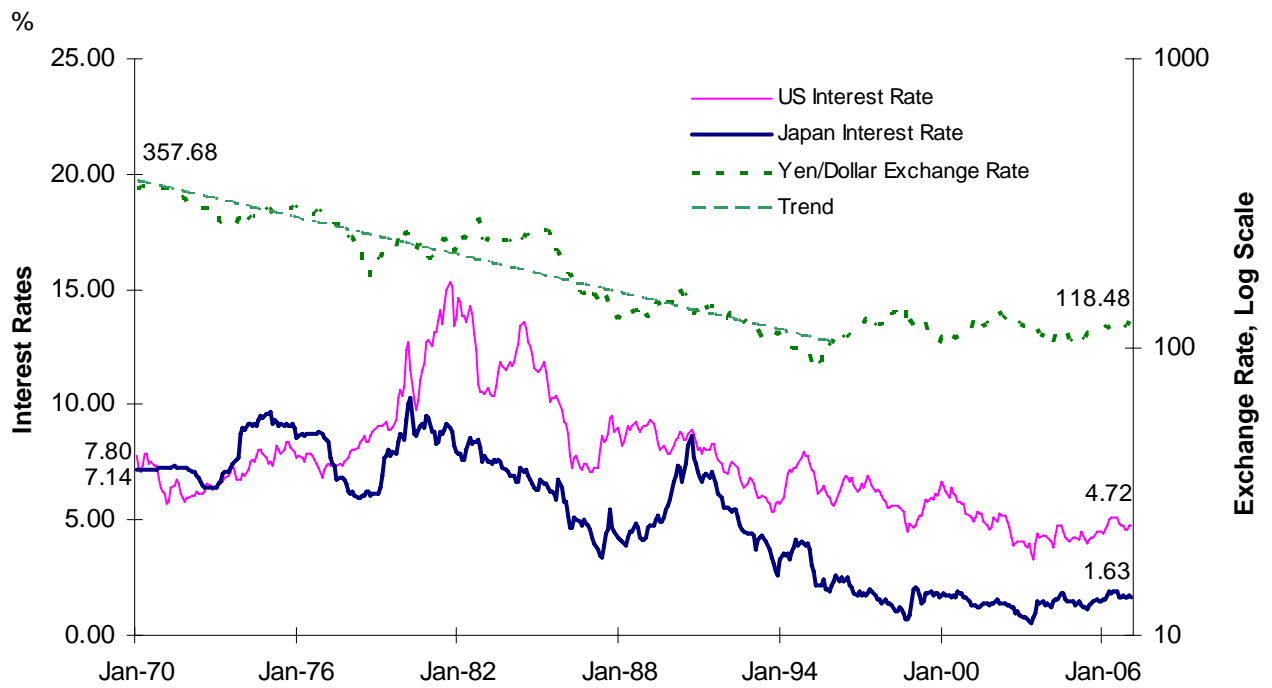
Source: OECD, Cabinet Office (Government of Japan).

Figure 12: Italy, France, Germany, Euro Area, Japan, and U.S. Manufacturing Unit Labor Costs from Q1 1999 to Q4 2006
(1999 = 100)



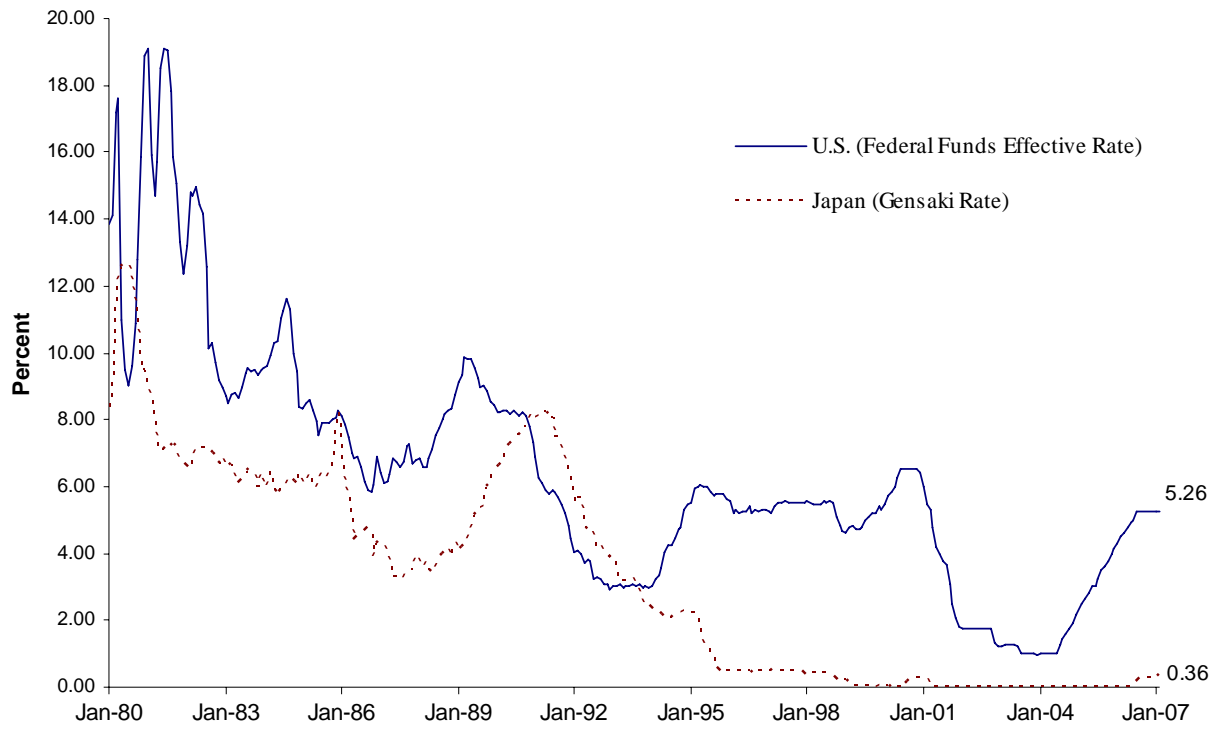
Source: OECD, European Central Bank.

Figure 13: The Yen/Dollar Exchange Rate and Long-Term Interest Rates (10-Year Bonds) in the United States and Japan
 (January 1970 to February 2007)



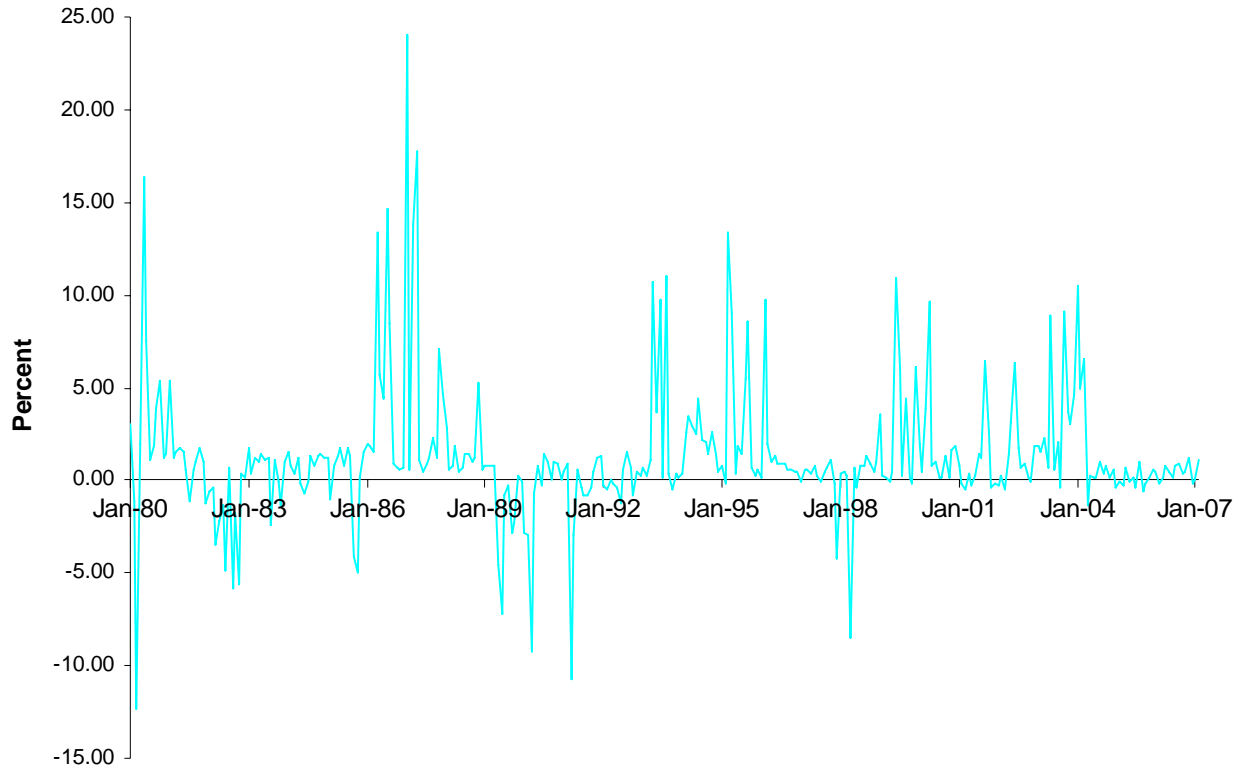
Source: *IFS*.

Figure 14: U.S. Federal Funds and Japan Gensaki Rates (Overnight) from January 1970 to February 2007



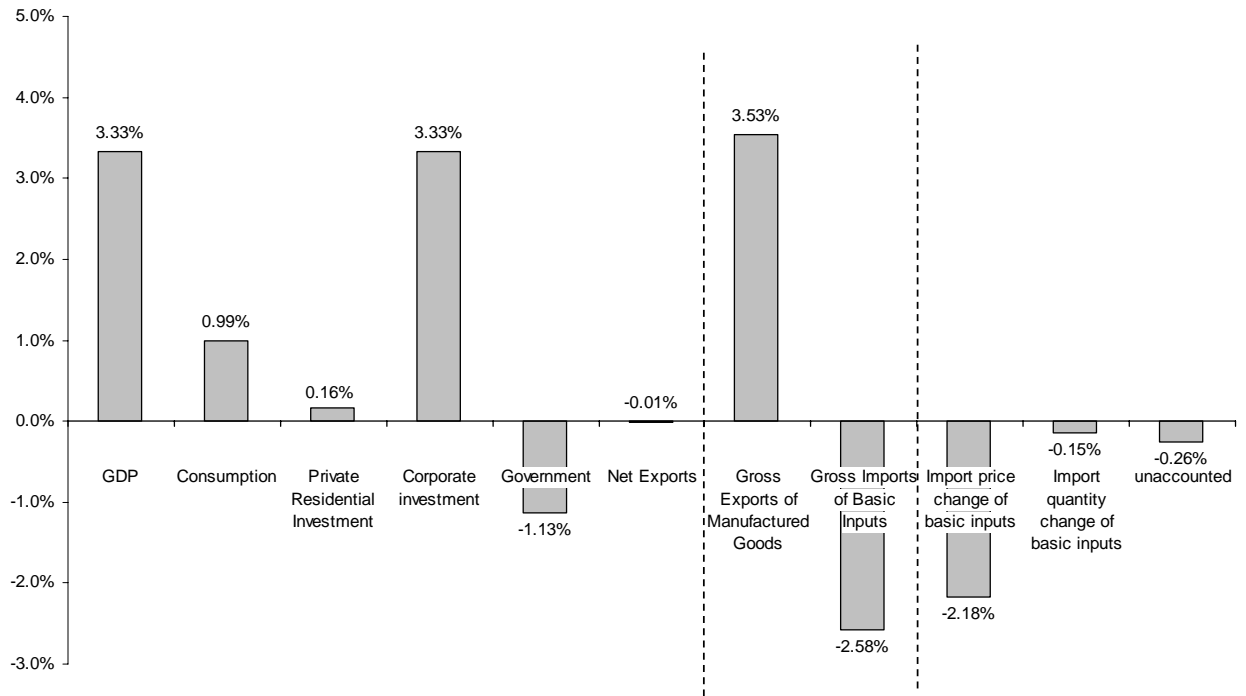
Source: *IFS*, Federal Reserve.

Figure 15: Monthly Percentage Changes in Japanese Official Foreign Exchange Reserves from January 1980 - February 2007



Source: *IFS*.

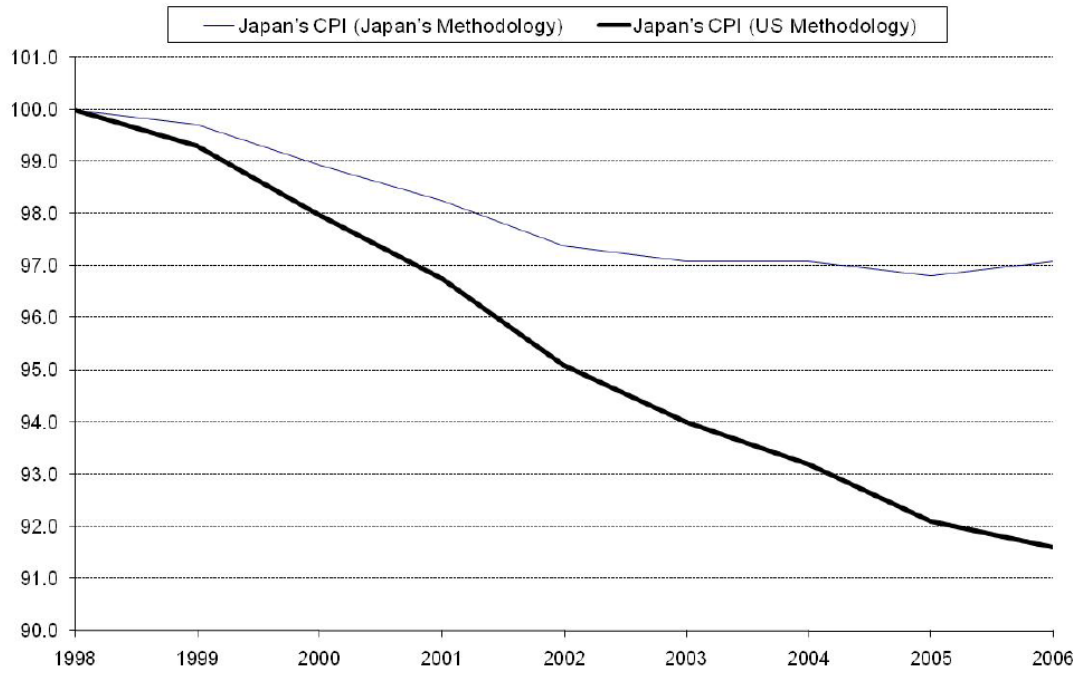
Figure 16: Change in Components of GDP from 2002 to 2006 as a Percentage of 2002 GDP



Source: Japanese Cabinet Office, Japanese Statistics Bureau and Japanese Ministry of Finance

Note: Basic Inputs includes raw materials and mineral fuels (which includes crude oil).

Figure 17: Japanese Prices Computed with US and Japanese CPI Methodologies (1998-2005)



Source: Broda and Weinstein (2007)

Table 1: Japan and the United States, 1950-1971, with the Yen Fixed at 360 per Dollar
(average annual percent changes)

Wholesale prices		Money wages (Mfg)		Consumer prices		Industrial production	
U.S.	Japan	U.S.	Japan	U.S.	Japan	U.S.	Japan
1.63	0.69 ^a	4.52	10.00	2.53	5.01	4.40	14.56
Real GDP		Nominal GDP		Narrow money		Labor productivity	
U.S.	Japan	U.S.	Japan	U.S.	Japan	U.S.	Japan
3.84	9.45 ^a	6.79	14.52 ^a	3.94	16.10 ^b	2.55	8.92 ^c

Source: *IFS, Japan Economic Yearbook, Economic Survey of Japan, OECD Economic Surveys*, and Bureau of Labor Statistics.

a1952-1971.

b1953-1971.

c1951-1971.

Table 2: Estimates of Japanese Net Liquid International Assets, 1980-2006

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Cumulative Current Account Surplus	Cumulative Net Outward FDI	Estimate of Liquid Foreign Assets	Official Foreign Exchange Reserves	Net Foreign Assets of Banking Institutions	Estimate of Non-Bank Private Foreign Assets	Private Sector NFA as % of Total
			(1)+(2)			(3)-(4)-(5)	[(3)-(4)]/(3)
1980	-10.8	-2.1	-12.9	21.6	-39.1	4.7	NM
1981	-6.0	-6.8	-12.8	24.7	-37.8	0.2	NM
1982	0.9	-10.9	-10.1	19.2	-38.7	9.4	NM
1983	21.7	-14.1	7.6	20.4	-35.9	23.1	NM
1984	56.7	-20.1	36.6	22.3	-48.3	62.6	39%
1985	107.8	-25.9	81.9	22.3	-77.6	137.2	73%
1986	193.7	-40.4	153.3	37.7	-148.2	263.8	75%
1987	278.0	-59.5	218.5	75.7	-256.6	399.5	65%
1988	357.3	-95.5	261.8	90.5	-265.3	436.6	65%
1989	420.5	-142.6	277.9	78.0	-241.8	441.8	72%
1990	464.6	-191.3	273.3	69.5	-283.9	487.7	75%
1991	532.8	-221.6	311.2	61.8	-175.4	424.8	80%
1992	645.3	-236.2	409.1	61.9	-88.4	435.6	85%
1993	777.0	-249.9	527.1	88.7	223.9	214.4	83%
1994	907.2	-267.1	640.1	115.1	273.8	251.2	82%
1995	1018.3	-289.6	728.7	172.4	335.2	221.0	76%
1996	1084.1	-312.8	771.3	207.3	210.7	353.2	73%
1997	1180.9	-335.7	845.2	207.9	280.7	356.6	75%
1998	1299.6	-357.0	942.6	203.2	249.9	489.5	78%
1999	1414.2	-367.0	1047.2	277.7	227.1	542.4	73%
2000	1533.9	-390.3	1143.6	347.2	205.5	590.9	70%
2001	1621.7	-422.6	1199.0	387.7	187.1	624.3	68%
2002	1734.1	-445.6	1288.6	451.5	196.1	641.0	65%
2003	1870.3	-468.1	1402.2	652.8	199.5	550.0	53%
2004	2042.4	-491.3	1551.1	824.3	227.5	499.3	47%
2005	2208.2	-533.5	1674.7	828.8	348.2	497.7	51%
2006	2379.0	-591.7	1787.3	874.9	357.7	554.7	51%

Source: *International Financial Statistics*, Bank of Japan, and *The Economist*. All values in billions of USD.

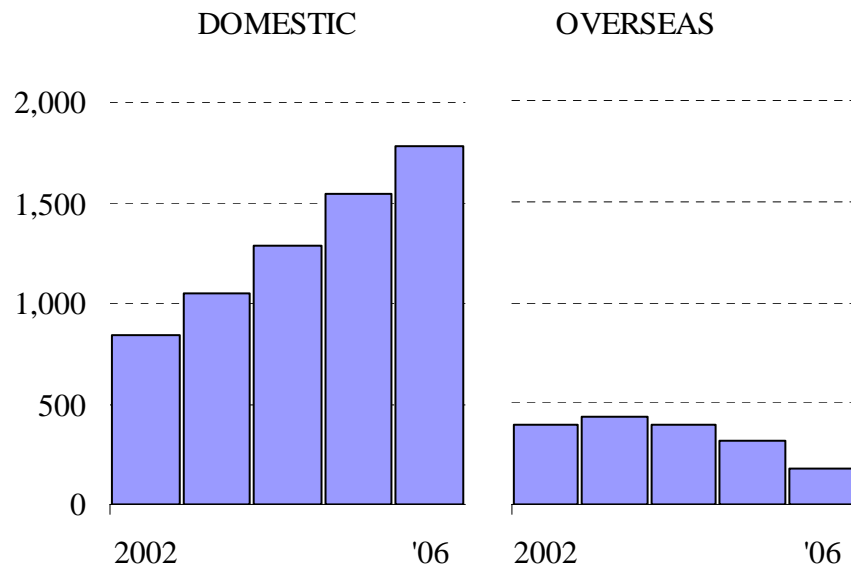
Memo: Official Foreign Exchange Reserves reported to be 888.3 billion USD as of March 2007.

Table 3: Components of Annual Japanese GDP (2002 – 06)
(not deflated)

In Billion of Yen	2002	2003	2004	2005	2006
GDP					
(Expenditure approach)	491,312	490,294	498,328	501,342	507,653
Private Consumption	283,254	281,791	284,428	286,530	288,096
Private Residential Investment	18,031	17,844	18,367	18,280	18,815
Coporate investment	64,431	66,747	71,048	74,718	80,777
Government Expenditures	119,184	115,937	114,859	114,859	113,616
Government Consumption	88,306	88,503	89,468	90,684	90,920
Public Investment	30,751	27,310	25,215	23,918	22,445
Net Exports	6,412	7,976	9,626	6,956	6,349
Net Exports Ex Oil	10,985	13,304	15,691	15,779	17,884
Gross Exports of Manufactured Goods	42,894	44,868	50,123	52,974	60,262
Gross Imports of Basic Inputs	10,696	12,008	13,750	18,065	23,390

Source: Cabinet Office, Government of Japan.

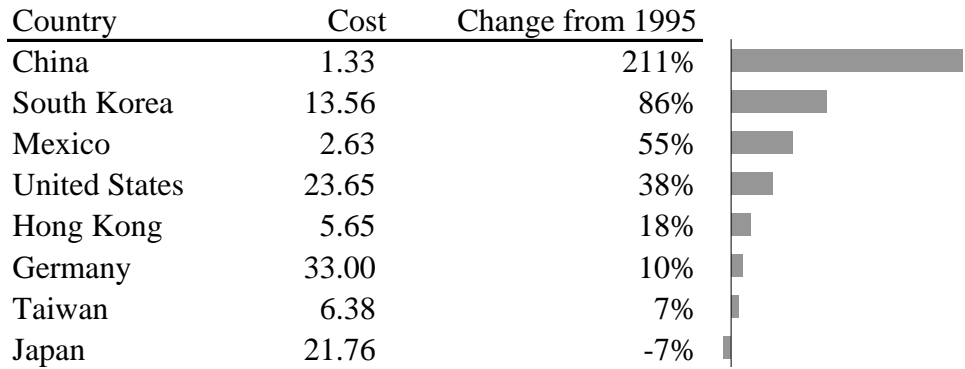
Chart 1: Domestic factory construction in Japan and new overseas operations started by Japanese companies



Source: Japanese Ministry of Economy, Trade and Industry

Notes: This Chart is reproduced from the Wall Street Journal article by Yuka Hayashi on June 12, 2007. According to the original notes, the year in overseas operations data covers from April of the previous calendar year to March of the year indicated.

Chart 2: Hourly compensation cost for manufacturing workers, 2005
(U.S. dollars)



Source: U.S. Department of Labor, Chinese Ministry of Labor and Social Security, EIU

Note: The cost for China is based on urban manufacturing employees, calculated by Lett and Banister's (2006) method. The change from 1995 for China is based on the average wage of urban manufacturing employees.