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The Japanese Economy:
Past, Present, and Future *

by

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[A] Macroeconomy in Japan

1. Overview

a. Economic Growth

The Japanese economy has been growing steadily. During these past three decades, GDP in real terms has expanded almost fivefold, e.g. from 100 trillion yen

* This paper was prepared for the workshop at the graduate school of the Shanghai Univesity of Finance and Economics held in Septenber 2000.

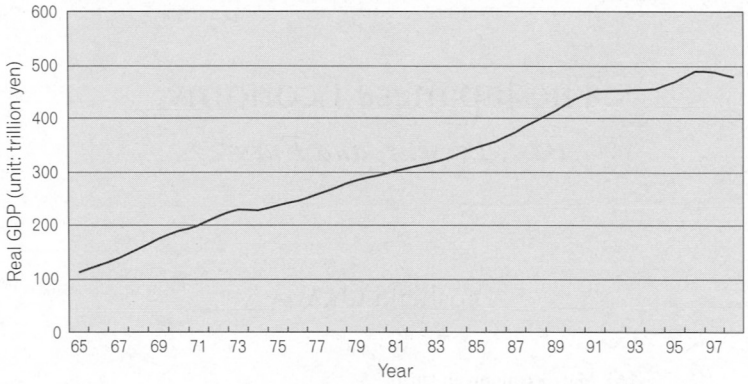


Chart 1. Japanese Real GDP

to 500 trillion yen (see Chart 1). Japanese economic growth has been driven by the following engines:

(1) advanced technological progress,
(2) high quality labor supported by a good education system,
(3) aggressive entrepreneurship,
(4) a high level of saving, and
(5) sound government policy and efficient institutions.

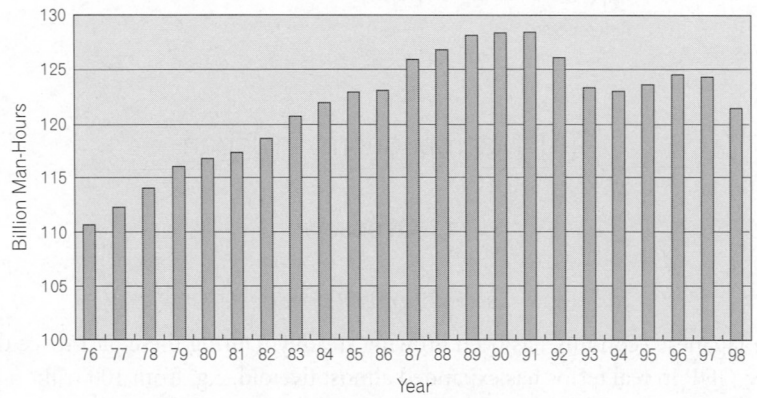


Chart 2. Occupied Man-Hours

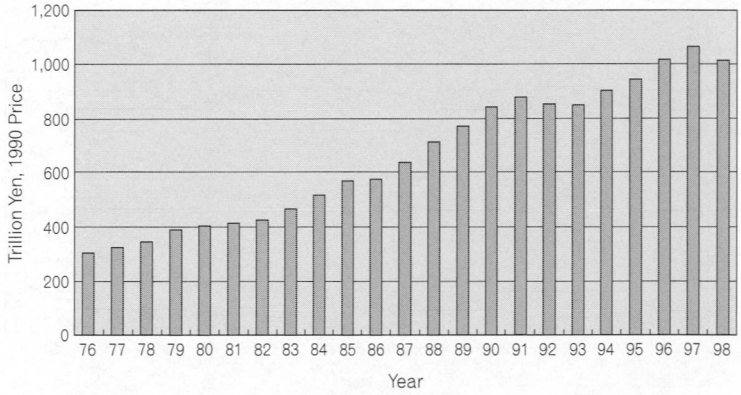


Chart 3. Capital Stocks (adjusted by Capacity Utilization)

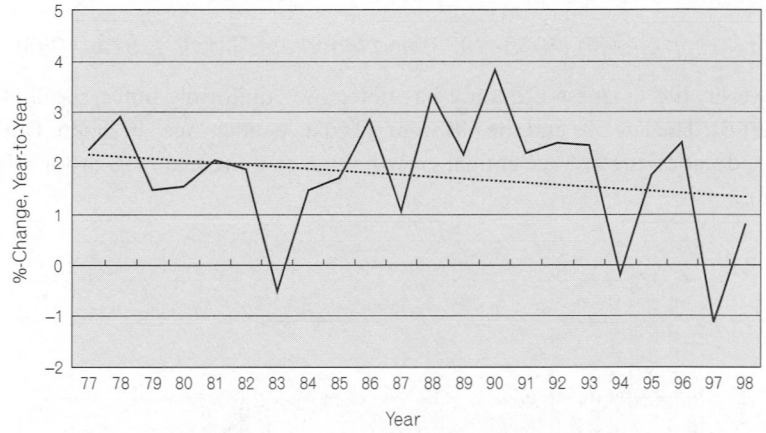


Chart 4. Solow's Technological Progress

If we apply the Abramovitz-Solow growth accounting method (see Appendix 1) to the Japanese economy, we can conclude that Japanese economic growth has been attributed to a 0.4 per cent increase in labor, a 5.7 per cent increase in capital stock, and a 1.8 per cent increase in technological progress in the quarter century since 1975 (see Charts 2 through 5).

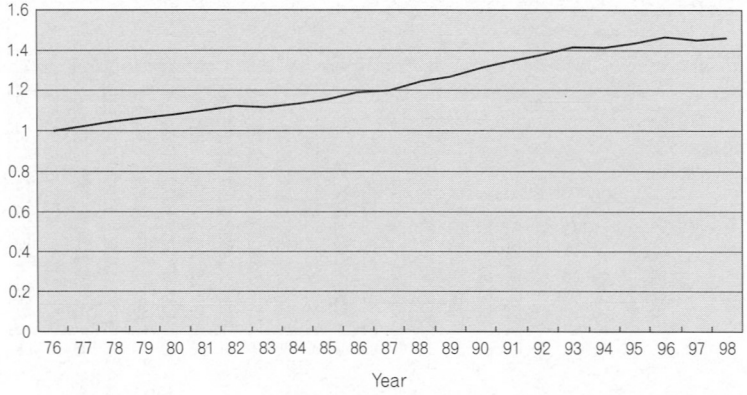


Chart 5. Solow's Technological Progress Index

b. High Growth (1955–1973) and Moderate Growth (1974–1985)

However, the Japanese economy has not grown uniformly but cyclically (see Chart 6). The late 50s and the 60s were called a "Golden Age" in Japan. During these decades, the average annual growth rate was quite high, e.g. around 10% or so.

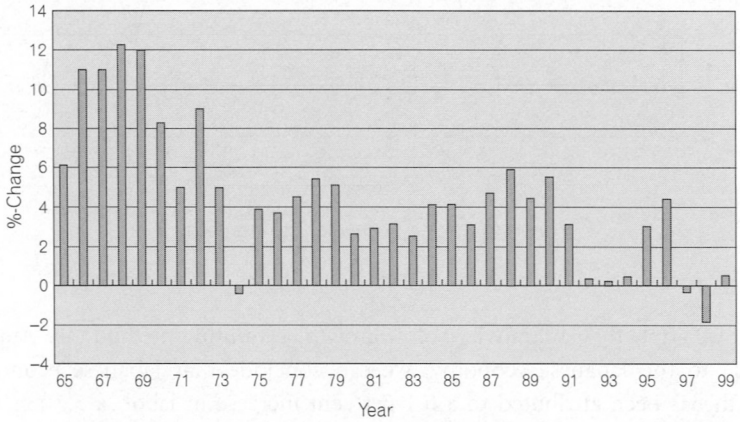


Chart 6. Real GDP Growth Rate in Japan

But in 1973, everything changed dramatically. 1973 is remembered as the year of the oil crisis. Everybody understood that not only petroleum but also other economic resources were limited, so the Japanese economy faced a turning point; that is to say, a transition from a high growth economy to a moderate growth economy occurred. The average annual growth rate from 1975 to 1985 was nearly 4%. This was only about half of the growth rate sustained during the "Golden Age".

c. Bubble (1986–1990)

In the United States, as soon as President Reagan launched his boat in the sea in 1981, he took the policy that US military power should be strengthened in order to overwhelm the Soviet Union and its allies, and that tax cuts and high interest rates should be executed in order to break through the stagflation of the 1970s. As a result, the US economy suffered from the high value of the dollar and the "twin deficits, " i.e. current account deficits and government sector deficits.

Therefore, on 22nd of September 1985, treasury ministers and central bankers of the G5 (US, France, W. Germany, UK, and Japan) met at the Plaza Hotel in New York. That meeting was called the Plaza Meeting and an agreement, the Plaza Agreement, was concluded at that meeting. The agreement stipulated appropriate levels for the currency of each G5 member in order to offset the high value of the US dollar. From that point, the US dollar started to depreciate and the Japanese yen started to appreciate from 238 yen/US$.

Generally speaking, an exchange rate appreciation affects the macroeconomy in two ways. One is an export decrease as well as an import increase, and the other is a price stabilization. The Japanese economy heavily depends on export-oriented industries, so the yen appreciation brought a recession pressure on the Japanese economy. The Japanese government and the Bank of Japan worried about a decline of the economy caused by the yen appreciation, so the Japanese government and the central bank eased economic policies in order to prevent the Japanese economy from dropping into recession or further into slump.

First of all, the Bank of Japan cut the official discount rate from 5.0% p.a. on January 30th in 1986 to 2.5% p.a. on February 23rd in 1987, and continued that low rate till May 31st in 1989 (see Chart 7).

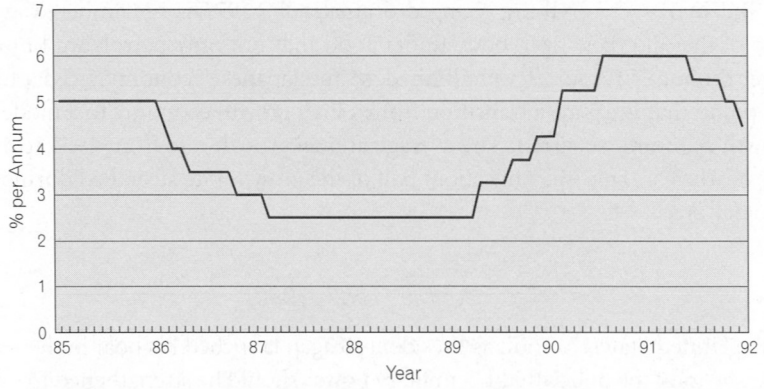
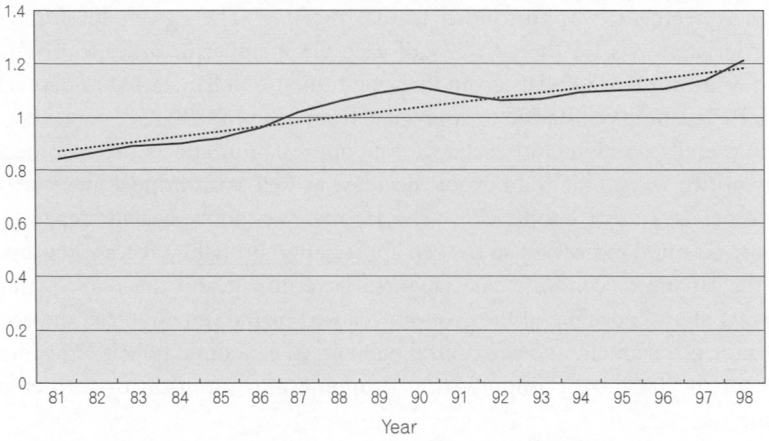


Chart 7. Japanese Official Discount Rate

At the same time, the Bank of Japan expanded the money supply. Marshall's K is defined as $M2 + CD$ for the numerator and GDP for the denominator, and if this figure is above the trend line, then the money supply can be interpreted as expansionary. On the other hand, if this figure is below the trend line, the



$$Y = \underset{(45.095)}{0.862654} + \underset{(10.199)}{0.018025}X \qquad R2 = 0.858361(\text{adjusted})$$

( ): t-value

Chart 8. Japanese Marshall's K ($(M2 + CD)$/GDP)

money supply can be interpreted as contractionary or shrinking. Chart 8 shows that between 1986 and 1991, the money supply was quite expansionary.

This policy combination of the low interest rate and the expanding money supply caused a "bubble" in the Japanese economy. A bubble economy is generally characterized as follows:

(1) a steep increase in asset prices over time,
(2) an overheating in economic activities, and
(3) a credit explosion.

Now let's introduce one simple price expectation formula here.

$$P_t = aE[P_{t+1}/t] + bX$$

P_t: actual prices at time t
$E[P_{t+1}/t]$: expectation of prices at time $t+1$ held at time t
X_t: economic fundamentals at time t which affect prices at time t
a, b: parameter

In this formula, if an iteration or a recursive method is applied and a martingale is assumed, a solution path of the dynamic expectation can be, as $E[X] = X$ because X is not a random variable, shown as follows:

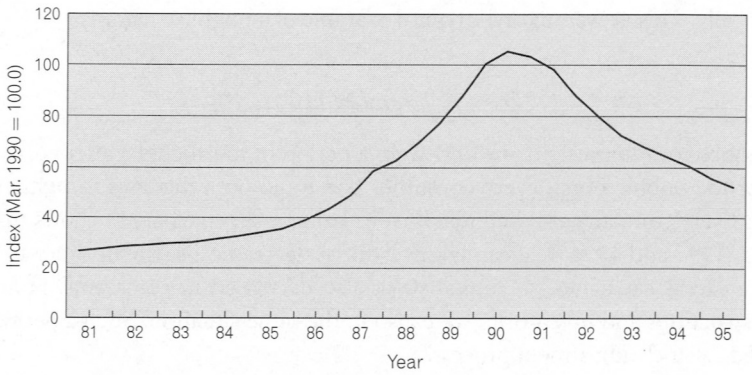


Chart 9. Land Prices in Japan (Six Major Cities)

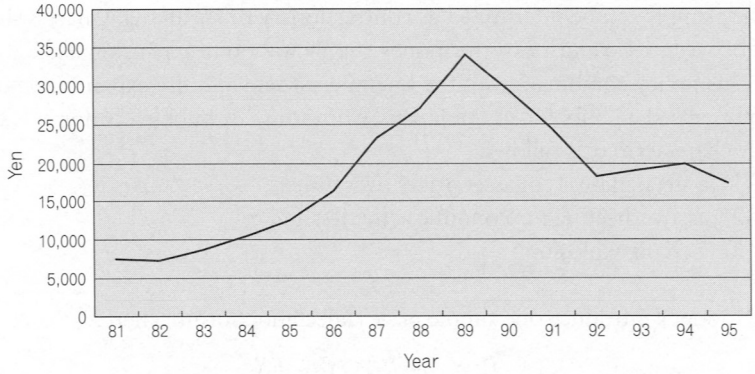


Chart 10. Stock Prices in Japan (The Nikkei Stock Av. 225 Issues)

$$P_t = a^{T+1}E[P_{t+T+1}/t] + b(\sum_{s=0}^{T} a^s X_{t+s})$$

Therefore, if the absolute value of "a" is larger than unity, this creates a bubble economy in the sense that prices would increase explosively. This is a simple explanation of the bubble mechanism.

Chart 9 shows land prices in six major cities and Chart 10 shows stock prices. From 1986 to 1989 or 1990, land prices or stock prices increased dramatically. This is, we can say, a typical example of a bubble economy.

d. Stock Adjustment (1991–1994)

The three or four years from 1991 were a period of melancholia after euphoria. After the bubble burst, every consumer had to go on a diet and to tighten his belt. Every company also had to adjust its balance sheet. Chart 11 shows that in 1992, 1993 and 1994, real capital investment decreased heavily in order to dissolve excess capacities, so capital stock also decreased in real terms. Housing constructions and inventories were also in the same situation. Such a periods is called "a stock adjustment process".

In addition to these efforts by the private sector, the Japanese government implemented very aggressive pump priming policies such as:

(1) government investment expenditure of 15 trillion yen and income tax reductions of 5.5 trillion in February 1994, and

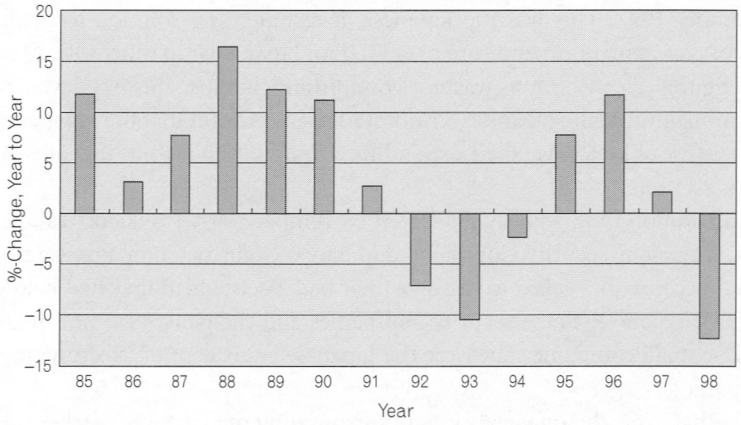


Chart 11. Real Capital Investment

(2) government investment expenditure of 7 trillion yen and 14.2 trillion yen in April and September 1995 respectively.

e. Recovery (1995–1996)

Owing to these aggressive policies, the Japanese economy picked up in 1995 and 1996. Real growth rates recorded 3.0% in 1995 and 4.3% in 1996.

f. Policy Failure and Credit Crunch (1997–1999)

However, the Hashimoto government failed to evaluate this Japanese economic trend in a proper manner. This recovery was fuelled up by big public expenditure in a Keynesian sense, and not by an autonomous momentum. If we draw *IS* and *LM* curves, we can say that this is caused by the right hand shift of the *IS* curve owing to government bond issues absorbed by the private sector, and that policy effects on economies as a whole are therefore quite small compared with *LM* curve shifts or monetary policies. Despite the weakness of the recovery, the Hashimoto government misunderstood that this recovery would be steady and strong, and full-scale. So the government raised taxes by 9 trillion yen in total in FY 1997. Furthermore, they passed the "Fiscal Reform Act" in the Diet in

November 1997. This was the Japanese government's resolution to bring the ratio of government expenditure over GDP in Japan near to other OECD countries' figures. However, this was not good timing, because this Act gave a negative impression of the Japanese economy. This Act meant that the Japanese government would decrease their expenditure dramatically within the subsequent five or six years.

In addition to this policy failure, in November 1997, Hokkaido Takushoku Bank, Yamaichi Security Company, and Sanyo Security Company were bankrupted because they failed to dissolve their bad assets which they had held since the bubble period. These security companies and the bank were not medium-sized or small companies but were the Japanese equivalent of "Fortune top 100 companies".

At that time, the financial climate surrounding the Japanese market was not good for the economy. It was an "against-wind" type of situation. The Thai Baht, Indonesian Rupiah, and Korean Won were all cut down. The Malaysian government suspended conversion of the Ringgit into another foreign currencies. These were the currency and financial crises in East Asia, and they caused a credit crunch in the Japanese financial market. The Japanese banking sector was very cautious to lend new money and they tried to withdraw their money if their borrowers appeared to have any difficulties regarding cash flow.

All of these factors affected the Japanese economy adversely. Real growth rates were negative for two consecutive years, in 1997 and 1998. This was the first time since World War 2 that the Japanese economy had suffered negative growth.

g. Slow Recovery (1999–Present)

In 1999, at last we were able to feel that the Japanese economy was starting to recover slowly if we observed some business cycle indicators such as the diffusion index from the Economic Planning Agency or the Bank of Japan. The recently announced real growth rate for 1999 was 0.5%, i.e. positive, owing to an increase in consumer expenditure, capital investments related to information technology, housing construction, and exports to USA and East Asia.

2. Restructuring of the Management Strategy and Resources

Chart 12 shows that unemployment reached a low point in 1990, and since then it has been increasing. This tendency is explained partly by the economic recession and partly by the restructuring of Japanese companies.

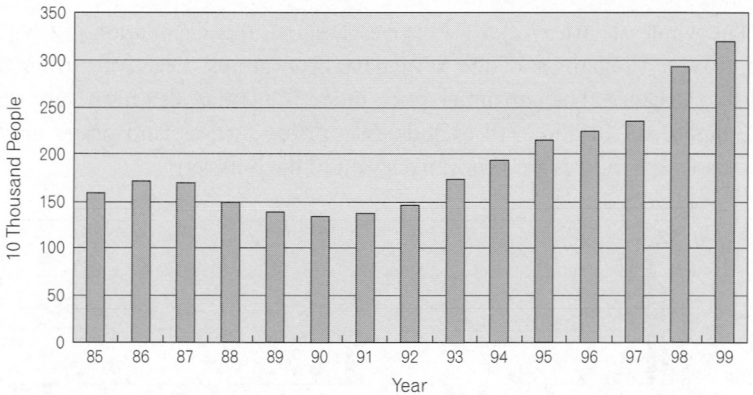


Chart 12. Unemployed Workers in Japan

Restructuring is generally characterized by the following three factors:

(1) ***Downsizing.*** This is to sell unprofitable businesses to others, or to reorganize unprofitable departments or sections, so that they can reduce their total manpower.

(2) ***Core Competence.*** A company puts its management resources into strongly competitive divisions or businesses in order to retain its competence.

(3) ***Outsourcing.*** A company contracts out the work of its own departments of e.g. an administration department or a general affairs department, to outside specialized offices or companies. This can also help them reduce their manpower.

In Japan, especially in the 1990s, many companies enforced this restructuring process and as a result, the number of unemployed workers increased, e.g. it has doubled over this past decade.

3. Disinflation

Disinflation is simply defined as a condition in which prices do not rise despite positive economic growth (price decreases under a recession are known as "deflation").

The wholesale price index (WPI) clearly shows this disinflation in Chart 13. Year-to-year %-changes of the WPI have been almost negative during these past two decades. The consumer price index (CPI) has also been very stable. (The Japanese CPI and WPI exclude asset prices such as land prices or stock prices, so these indices are almost irrelevant to the bubble.)

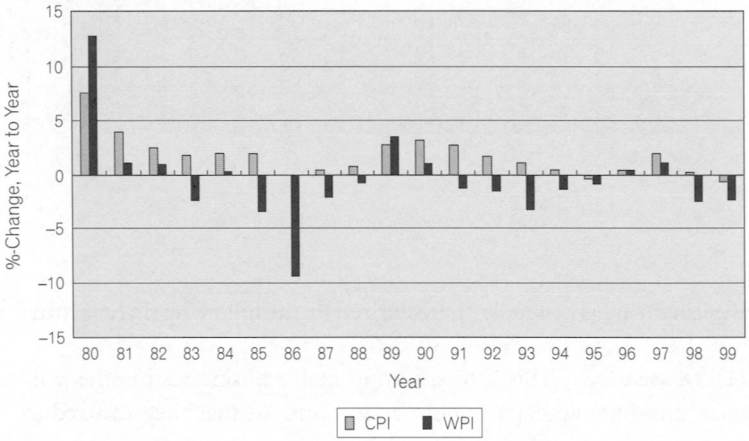


Chart 13. Inflation Rates (CPI and WPI)

Some factors behind the disinflation are summarized as follows:

(1) ***Appreciation of the Value of Yen.*** If yen exchange rates increase, say from 200 yen per US$ to 100 yen, a department store can sell a Gucchi, Plada, or Chanel bag for almost half the current yen denominated price.

(2) ***Globalization.*** The world economy is now a borderless economy. Goods, people, money, and information come and go globally. So recently Japan has been importing many consumer goods from emerging markets where production costs are comparatively low. For example, 70% of colour TVs sold in the Japanese market are imported from emerging markets, and 40% of video tape recorders are also imported from emerging markets.

(3) ***Distribution Channel.*** Recently, large-scale shopping complexes have been opened and they sell goods and services at very low prices, thanks to a scale merit. Discount stores or nation-wide chain stores also sell their commodities at very low prices. These are called "price killers".

(4) ***Deregulation.*** Many regulations have been loosened or removed from markets, so prices are exposed to severe competition. This contributes to price reductions. One example is that in October 1998 regulations on air fares were lifted, so every air flight company was allowed to fix air fares freely. HIS (one Japanese travel agency) started selling Tokyo-New York air tickets for 60 thousand yen, this price was one tenth of regular fares. Now the privatized NTT's telephone charges has become a controversial issue.

4. Public Finance

a. Roles of Public Finance

Public finance is important in a sense that it functions as (1) a resource allocation, (2) an income redistribution, and (3) an economy stabilization.

(1) As to its role as a resource allocation, in a market economy, resources are generally allocated by the price mechanism. However, if public goods are incorporated into such an economy, the price mechanism can not work any more for the allocation of a mixture of private goods and public goods. Public goods are, e.g. military, police, roads, bridges, parks, drainage, irrigation dams, etc. Therefore public goods should be supplied by the public finance.

(2) Income is redistributed from rich people to poor people through an income tax and a social benefit system. This is known as an issue of "fairness" and has been argued for long time in Welfare Economics.

(3) This is a "built-in stabilizer" of business fluctuations. If an economy is in boom, a tax is automatically increased, thanks to a progressive income

taxation, increments of people's disposable income are reduced, and this cools down the economy. On the contrary, if an economy is in slump, a social benefit is increased, people's disposable income is increased and this pulls up the economy.

These functions of the public finance are already less workable than before because the Japanese economy is now entering the "aging society" stage. This situation will become even more serious in years to come.

b. Aging Society

Chart 14 shows a breakdown of the population by age (especially the proportion of the population above 65 years old). The "baby boomer" generation in Japan is now between 50 and 55 years old, so in 15 years' time, in 2015, elderly people are estimated to occupy one quarter of the total Japanese population (estimated by the National Population Research Institute). Furthermore, 2.2 members of the working population (from 15 years old to 64 years old) will have to support one elderly person. This is a heavy burden for the Japanese economy. Therefore, the aging society and the consequent increasing social welfare costs will affect the qality and size of the public finance, and the choice between big government and small government will be a controversial one in the coming "aging society".

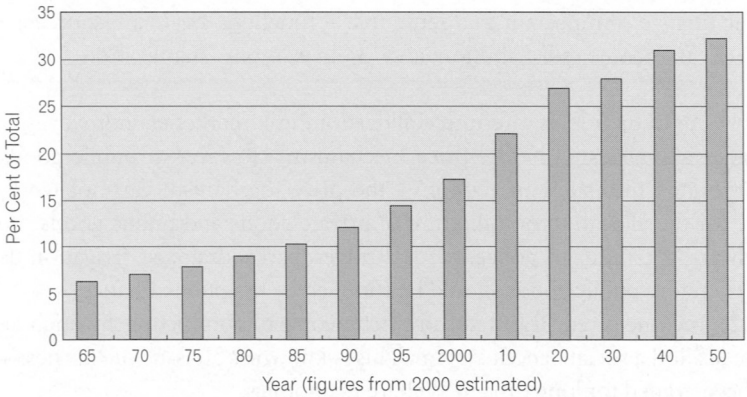


Chart 14. Population Share by Age (above 65 years old)

[B] Financial Systems in Japan

1. Changing Environment

Major functions of financing are generally defined as a settlement, an intermediary, and a credit creation. These financial functions have been influenced by the changing Japanese financial environment which is characterized by three key words, (1) globalization, (2) information technology and (3) deregulation or big bang.

(1) ***Globalization.*** As the real economy operates world-wide, money also runs globally, partly thanks to the deregulation of controls on foreign exchanges and capital flows. According to recently announced statistics, money transactions all over the world amount to US$ 1.5 trillion per day or US$ 375 trillion per year. This is, roughly speaking, 70 times as large as the money generated through world trade, or 70 times as large as the Japanese GDP. These globalized money transactions are affecting international and national financial systems dramatically.

(2) ***Information Technology.*** Developments in information technology also influence financial businesses. On-line banking, network banking, e-banking, or virtual banking are just a few examples. They do not have any brick and mortar branches, can cut operation costs and offer high deposit interest rates. They also give convenience to customers as they are open 7 days a week and 24 hours a day.

(3) ***Big Bang.*** The Japanese big bang started in April 1998. Fire walls among banking, security and insurance businesses were removed. Regulations on businesses, financial commodities, charges, etc. were all loosened or removed. The establishment of financial holding companies was permitted. Financial administration and supervision were reformed, e.g. from a convoy policy to the principle of self-responsibility. Before the big bang, if a bank or a security company or an insurance company was unfortunately bankrupted, peer banks or peer companies helped it under the leadership of the Ministry of Finance. This is the formula for the convoy policy or the club approach. However, now nobody helps

ailing financial institutions any more. They have to take responsibility for solving their own. Very severe situations await them.

2. Changing Financial Sector

a. Financial Sector's Risks

The Japanese financial sector is facing some new risks under these changing circumstances.

(1) ***Credit Risk.*** First, there is a credit risk. This is a very orthodox and fundamental risk for the financial sector. Under deregulation and severe competition, the financial institution tends to take credit risks more seriously than before. In the case of the USA, in the 1980s (this was the period when a financial deregulation had progressed in USA), financial institutions financed to higher risks including commercial real estate loans, junk bond investments, LBO (leveraged buy-out, i.e. financing to M&A secured by buying company's cash flow values, as a result, the self-capital ratio can be lowered or the leverage can be raised by substitution of the self-capital with the debt), etc. Therefore, many institutions suffered heavy losses or were bankrupted in or around 1990 with these high risk-high return finances. Introduction of a good loan grading system, frequent loan reviews and an adequate allowance for loan losses is required for this credit risk management.

(2) ***Country Risk.*** As cross-border financing increases, a country risk evaluation becomes important, especially for emerging markets. IMF's early warning systems which the IMF recently developed should be utilized more effectively in order to minimize this type of risks.

(3) ***Market Risk.*** A financial market changes from time to time after deregulation. Interest rates, bond prices, and exchange rates are exposed to severe fluctuations or volatility, and financial institutions are also exposed to these market risks. For interest rate risks, an asset liability management (ALM), an interest swap to the floater, and securitization (by this, interest risks can be transferred to investors) are, we can say, possible remedies.

(4) ***Settlement (Systemic) Risk.*** As derivative transactions increase recently, settlement risks or systemic risks become higher too. A "value at risk" evaluation method has been developed for this type of risks.

b. Safety Net

So far, if a bank is bankrupted, depositors are all saved by the convoy policy. However, from 2002 or 2003, we will have to take our own risks if financial institutions become bankrupt. This is a principle of the self-responsibility rule. Therefore, a safety net should be incorporated into the financial system in order to maintain a credit order; otherwise, chaos will ensue.

Fundamental rules of the safety net are as follows:

(1) operation costs of the safety net are low,
(2) there are no moral hazards, and
(3) the operation of the safety net is transparent.

Well known examples of the safety net are e.g. (1) pay-off, (2) purchase and assumption, and (3) the club-approach.

(1) ***Pay-off.*** If a bank is bankrupted, depositors are paid with a certain amount of deposit insurance, e.g. 10 million yen or 100 thousand dollars minimum in the Japanese case, thanks to this pay-off system. This deposit insurance, however, does not cover all deposits nor all bankrupted banks. For example, foreign currency deposits, anonymous deposits, and off-shore deposits are not covered. Deposits in governmental banks, foreign bank's branches in Japan, and post offices are also not covered.

Every major country, e.g. USA, UK, France, Germany, have the same pay-off system, in order to save depositors from unpaid deposits if an unforeseen bankruptcy is suddenly caused.

(2) ***Purchase and Assumption.*** Purchase and Assumption (P&A) for the safety net means that some part or all of the asset-liability of the bankrupted bank is bought and succeeded by another bank. That bank is generally selected by an auction. If a bank is bankrupted on Friday, a succeeding bank takes over its assets and liabilities on Monday, so the effect on the depositors is minimal, if this P&A is applied. Costs of the P&A are also much lower than of the pay-off. In USA, the share of the P&A over all safety nets was 66% between 1934 and 1997; on the other hand, the share of the pay-off was just 20% over the same period.

(3) ***Club Approach.*** A Club Approach is one in which peer banks, a central

bank and a government all organize a club and this club takes necessary steps for saving the depositors. In Europe, this approach is common.

3. New Era

Amid globalization, developments in information technology, and deregulation, where are Japanese banks going? Dramatic reorganization of Japanese banks is now under way. Some directions are as follows:

(1) ***Department Store Type Bank.*** This type of bank can supply every type of financial commodity to the customer; that is to say, it is a one-stop shopping bank. The branch sells a car insurance policy to the car loan borrower or a fire insurance policy to the mortgage loan borrower. Or it can offer profitable mutual funds or stocks, or high return bonds to the bank depositor. It also extends businesses of international banking (e.g. syndicated sovereign loans), investment banking (e.g. project finances, M&A, LBO, MBO, green field businesses, securitization), advisory banking (e.g. a financial advisor), currency dealings banking (e.g. foreign exchanges, futures, swap and option derivatives), retail banking, trust and pension banking, etc.

(2) ***Boutique Type Bank.*** This type of bank can offer some specialized banking services to the customer. For example, Ito Yokado Bank (to be established by the convenience store) is aiming for specialization on the settlement function by utilizing nine thousand branches and has the merit of staying open 24 hours a day, 7 days a week. Some non-banks will specialize in M&A or LBO/MBO by collaborating with foreign banks. Sony will also develop "e-banking" businesses by utilizing two million home game terminals (the "Play Station 2").

(3) ***Super Regional/Regional Type Bank.*** Low tier city banks, regional banks, credit association banks and credit union banks will specialize in regional banking services by utilizing their customers' in-depth data stocks; that is to say, one-to-one marketing tools. These data stocks are one of their strengths which can differentiate them from others.

These three directions are ones for which all 950 banks, 200 security companies, and 50 insurance companies in Japan are striving right now.

[C] International Trade and International Finance

1. International Trade

a. Balance of Payment

The Japanese economy increased its exports and imports under GATT/IMF or WTO (from January 1995). Chart 15 shows Japanese exports and imports on the basis of real GDP. Chart 16 also shows the current account balance, and the capital and financial account balance.

It is worth remembering that the fundamental missions of GATT or WTO are (1) multilateral, (2) indiscriminate, and (3) reciprocal. Therefore, if country *A* cuts its tariff for country *B*, country *B* must cut its tariff for country *A* and for other countries as well. As a result, trade barriers including tariffs are removed over the world, which means that world trade develops and economic welfare increases.

Now, as you may be aware, since 1975 or 76, net exports turned from deficit to zero deficit or surplus.

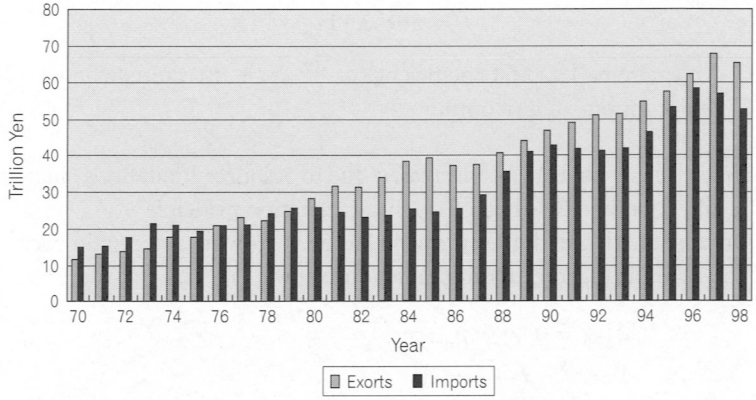


Chart 15. Exorts and Imports (real GDP base)

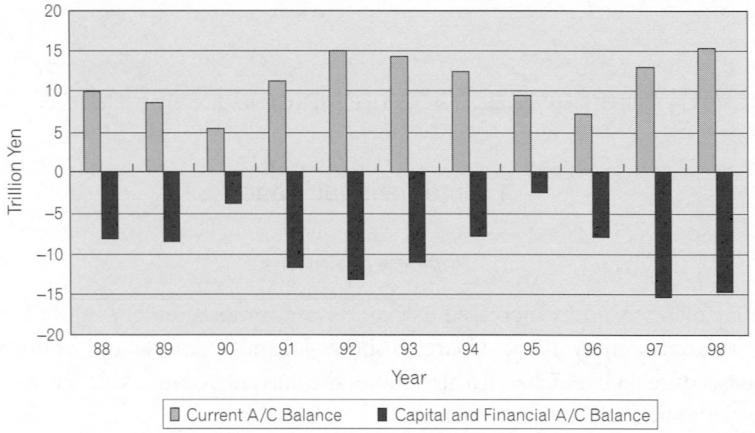


Chart 16. Balance of Payment in Japan

As we have already seen, 1973 was one turning point in the Japanese economy in the post-war period, or in the past half-century. Until that year, domestic investments were quite strong but after then investments turned down.

Now let us incorporate an "acceleration principle" here.

The acceleration principle is that by which an investment is determined by an increment of income.

$$I_t = v(Y_t - Y_{t-1})$$

v: (marginal) capital coefficient (or V: K/Y); required capital stock for one unit of output

So we can say that Y_t has decreased due to resource limitations since 1973; as a result, I_t has decreased based on the acceleration principle.

On the other hand, domestic saving has been growing at a certain pace.

Thus, simple macroeconomic equations show:

$$M + \mathrm{Y} = C + I + E$$
$$Y - C - I = E - M$$
$$S - I = NX$$
$$S < I \Leftrightarrow NX < 0; \quad -1973 \quad (I \text{ exceeded over } S)$$

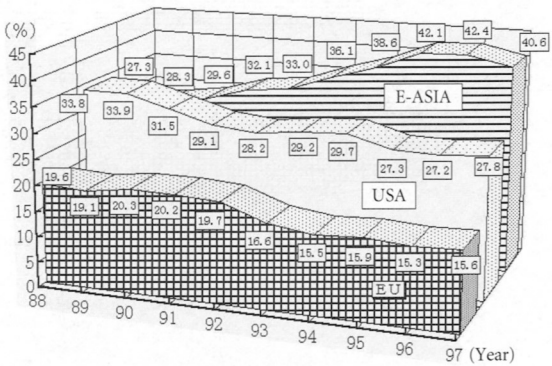
$S > I \Leftrightarrow NX > 0$; 1973– ($S$ exceeded over I)

Y : GDP
C : Consumption
S : Saving
I : Investment
E : Exports
M : Imports
NX: Net exports

According to these simple macroeconomic equations, it is clear why Japanese net exports have been in surplus since around 1975. In other words, we can say that it is not due to a market closeness nor a foreign exchange rate manipulation but due to saving-investment inbalances (see Appendix 2).

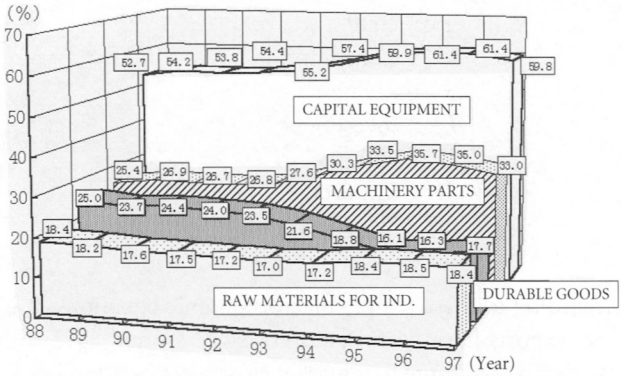
b. Exports and Imports by Region and Category

Charts 17 through 20 show Japanese exports and imports by region and category. You can easily understand that since 1991 the East Asia has been the No. 1 exporting region, with USA the second and EU the third. This is partly because



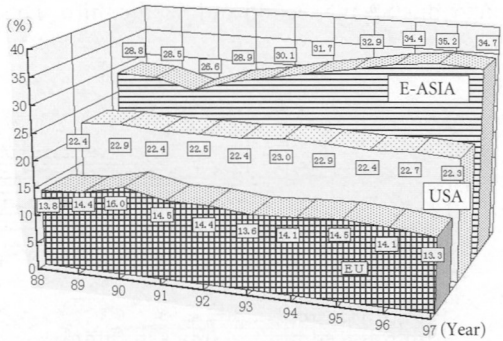
Source: *MITI White Paper 1998*

Chart 17. Exports by Region (% of Total Value)



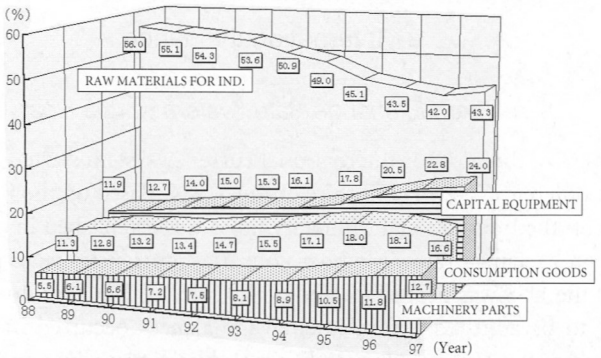
Source: *MITI White Paper 1998*

Chart 18. Exports by Category (% of Total Value)



Source: *MITI White Paper 1998*

Chart 19. Imports by Region (% of Total Value)



Source: *MITI White Paper 1998*

Chart 20. Imports by Category (% of Total Value)

Japanese companies shifted their production lines from Japan to East Asia due to the yen appreciation during the late 80s. In this period, the establishment of M&A and green field businesses in East Asia by Japanese companies increased dramatically. So Japanese parent companies exported raw materials, machinery parts, or capital equipment to their subsidiaries in the East Asia area. On the other hand, Japanese companies imported final goods from these subsidiary production lines in East Asia. Therefore, imports from East Asia are increasing. At the same time, while consumption goods and capital equipment are also increasing, imports of raw materials such as petroleum or iron ore are decreasing.

It can be said that Japanese foreign trade has changed from "vertical type" or "processing type" trade to "horizontal type" or "internationally specialized" trade. It is quite evident that it is not developing but typical developed trade patterns due to technological progress and high value-added industrial sectors in Japan.

2. International Finance

a. Fixed Exchange Rate System vs. the Float

The new era of the postwar international currency system started at the Bretton Woods Conference, New Hampshire, in July 1944. Based on the Bretton Woods Agreement, the International Monetary Fund was established in order to stabilize foreign exchange rates. Member countries' currencies were pegged to the US$ and the US$ was pegged to gold at the price of $35 per ounce. This parity was able to be adjusted if fundamental imbalances occurred in that country. Furthermore, the US government had an obligation to buy and sell gold for each currency.

However, large deficits in the US balance of payments brought about unstable credibility for the US$, and this led to gold rushes in 1968. Finally President Nixon announced a suspension of US$/gold conversion in August 1971. This announcement shook the world and was known as the "Nixon shock." In February-March 1973, major currencies were shifted from the US$-gold standard to a new system of floating exchange rates.

This floating exchange rate system was at first expected to have the following merits:

(1) ***Stabilization Effects on Foreign Exchange Speculations.*** If a speculator expects a yen appreciation, he makes a forward contract to buy yen, and a couple of months later, if the yen actually appreciates actually, he executes his forward contract, and he sells the yen on the spot market. This yen selling mitigates the yen appreciation.

(2) ***Adjustment Effect on Balance of Payments.*** If a current account surplus increases, exporters sell the US$ and buy the yen. This raises the value of the yen and, as a result, the current account surplus decreases.

(3) ***Independence of Monetary Policy.*** Balance of payments are adjusted by floating exchange rates, so the monetary policy can be assigned mainly to domestic policy targets.

(4) ***Isolation Effect (a circuit breaker) on External Disturbances.*** External disturbances are absorbed by exchange rate fluctuations, so internal economies can be isolated from external disturbances. This is called a "circuit breaker".

A quarter century has passed, however, it has become clear that these merits are not necessarily produced by the float.

(1) Deregulation of controls on foreign exchanges and capital transactions progressed under the float, and international capital flows expanded at a very rapid pace, then the market reacted sensitively to future macroeconomic fundamentals or future policy changes. So these instantaneous, global, and huge capital flows brought about "volatility," "overshooting," and "misalignment" of foreign exchange rates.

(2) It is actually observed that the *J*-curve effect worked despite exchange rate appreciations or depreciations. The *J*-curve effect means that if the current account surplus increases and then the yen appreciates, export volumes decrease but $-denominated export prices sometimes increase, so the $-denominated nominal current account surplus is not adjusted for the some period, e.g. within two or three years.

(3) Balance of payments were not adjusted smoothly, so a monetary policy was assigned not only to domestic policy targets but also to external policy targets including a foreign exchange rate stabilization or a balance of payment equilibrium.

(4) Nominal disturbances affected real economies (nominal exchange rate fluctuations affect real exchange rates and other real variables because of price stickiness), and interdependence among countries grew, so the "circuit breaker" did not work so effectively.

Therefore, the Japanese government and other countries' governments are now discussing new schemes of international currency exchanges such as "reference range", "target zone", "crawling band", "currency board", "currency band", "currency union", etc.

b. Exchange Rate Mechanism

Chart 21 shows the yen/dollar exchange rate since 1973. You can easily identify the short term volatility, the medium term fluctuation, and the long term trend on that chart.

Generally short term volatility is explained as follows:

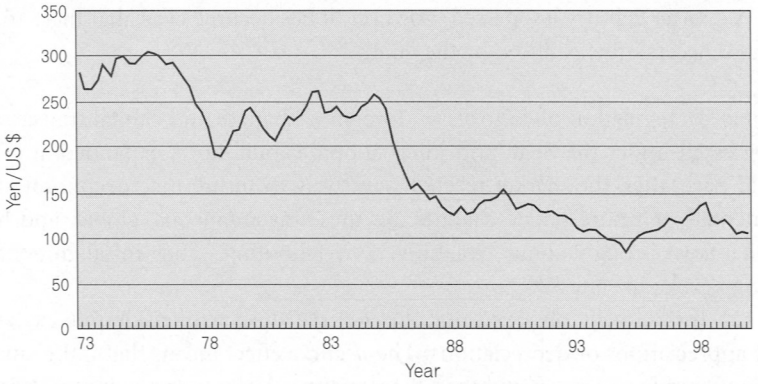


Chart 21. Foreign Exchange Rate

"The Portfolio Balance Approach in the Money Market"

$r = r^* + (\hat{e} - e)/e - R,$
$\Rightarrow \bar{e}$ (the equilibrium short term exchange rate)

r: domestic interest rate
r^*: foreign interest rate
$\hat{e}$: expected exchange rate
e: actual exchange rate
R: risk premium

Next, medium term fluctuation is explained as follows:

"The Mundell-Fleming Model"

$S(Y) - I(r) = NX(Y, e)$: goods & service market equilibrium
$M = L(Y, r)$: financial market equilibrium
$r = r^*$: interest parity
$\Rightarrow (\bar{Y}, \bar{r}, \bar{e})$ (the equilibrium GDP, the equilibrium interest rate, and the equilibrium medium term exchange rate, given r^*)

Y: GDP
S: saving
I: investment

NX: net exports
r: domestic interest rate
r^*: foreign interest rate
e: exchange rate

Finally, the long term trend is explained as follows:

"Purchasing Power Parity (a law of indifference (i.e. the same goods at the same price); goods arbitrage) "

$p = ep^*$
$\Rightarrow \bar{e}$ (the equilibrium long term exchange rate)

p: domestic prices
p^*: foreign prices
e: exchange rate

Some statistical calculations are made in Appendix 3.

c. *International Currency Crises*

—Stylized Facts

The East Asian economy has been developing at a high growth rate since the late 80s' and the World Bank called it the "East Asian Miracle". In 1997 and 98, however, East Asian emerging markets experienced very severe international currency crises. The Thai Baht, Indonesian Rupiah, and Korean Won were devalued by almost 30 to 50% within half a year. The countries concerned received IMF financial support for their international liquidity shortage. The Malaysian government suspended free Ringgit conversion into foreign currencies and also controlled capital flows. The Philippine Peso, Singapore Dollar, New Taiwan Dollar, and Hong Kong Dollar were all damaged.

If we observe these international currency crises, we can point out the following stylized facts:

(1) Foreign capital inflows increased due to (a) a strong investment demand with a high growth economy, (b) deregulation of foreign capital inflow controls, (c) mitigation of foreign exchange risks (through the US$ peg, the

basket peg, the managed float, etc.), and (d) widening spreads (or margins) between domestic and foreign interest rates.

(2) These foreign currencies expanded the domestic credit and financed excessively the real estate sector in Thailand, big business syndicates in Korea, and Suharto's family businesses in Indonesia. These excessive finances turned into bad loans very easily because of loose credit examinations, and these made the financial sector's balance sheets worse.

(3) International markets stopped their roll over or new loans for fear of re-scheduling or defaults.

(4) This international credit contraction brought about loss of confidence in a currency in the international currency and financial market, together with the fear of their international liquidity shortage and foreign debt sustainability collapse.

(5) Thus, loss of confidence in a currency in emerging countries caused a large volume of speculative attacks including US hedge funds, and the countries concerned had to devaluate their currencies.

(6) A vicious cycle of (a) devaluation, (b) insolvency of the financial sector, and (c) international liquidity shortage is one characteristic of these international currency crises in East Asia (i.e. devaluation $\Rightarrow$ aggravation of the financial sector's balance sheet due to foreign debt increases $\Rightarrow$ insolvency issues (assets $<$ debts; no repaid) $\Rightarrow$ international investors' withdrawal $\Rightarrow$ international liquidity shortage $\Rightarrow$ devaluation).

—Traditional Type (Balance of Payment Model)

In an international currency crisis, traditional international finance theory explains that:

(1) If a government follows an expansionary monetary policy, devaluation pressures on the parity will become strong. So a monetary authority has to intervene by buying its own currency with its foreign reserves in order to maintain the parity.

(2) If their foreign reserves decrease below a certain level, international markets will fear an international liquidity shortage, and express fears about the foreign debt sustainability of that country.

(3) Thus, international investors will suspend their roll over of existing loans or stop any new money lending. Furthermore, even speculation may take place.

As a result, that country will not be able to put up with these devaluation pressures any more, and finally give up maintaining their parity.

—New Type (Self-fulfilling Expectation Model)

These international currency crises in East Asia took place despite the economic fundamentals in each country being relatively stable and the current account deficits being not so large. Therefore, a new explanation was sought. One good explanation is as follows:

If one international investor's risk evaluation changes due to some reasons, information about these small changes spreads in the international market, and it causes a large volume of speculative attacks irrelevant to the economic fundamentals or the balance of payment situation. This phenomenon is called a self-fulfilling crisis.

In this model, information transmission and reaction in the market plays a major role in the form of (a) herd behavior, (b) contagion, and (c) spillover.

[Appendix 1]

Abramovitz-Solow's growth accounting method is shown as follows:

$Y(t) = A(t)L(t)^m K(t)^n$: Cobb-Douglas production function with disembodied technological progress

$Y(t)$: GDP at time t
$A(t)$: technological progress at time t
$L(t)$: labor at time t
$K(t)$: capital stock at time t
m, n: parameter ($m + n = 1$, i.e. constant returns to scale)

If we express this function with a logarithm and differentiate it with time t, then we can derive the following formula:

$$\dot{Y}/Y = \dot{A}/A + m\dot{L}/L + n\dot{K}/K$$

Thus applying the Japanese data between 1976 and 1998 to the above linear equation and calculating the regression, we can get the following statistical figures.

$$y = \underset{(2.170685)}{0.801199}\,l + \underset{(1.785598)}{0.172255}\,k + \underset{(3.46874)}{1.765938}$$

( ): t-value

$R2$: 0.670934, $R2$(adjusted): 0.636296

Y: real GDP (billion yen and 1990 price)

L: occupied labor force multiplied by yearly working hours (billion people; hour)

K: real capital stock of all enterprises mutiplied by capacity utilization index (trillion yen and 1990 price; 1990 = 1.00)

$(y \equiv \dot{Y}/Y, \quad l \equiv \dot{L}/L, \quad k \equiv \dot{K}/K)$

Based on these calculations, we can also estimate the "Solow residual" for the technological progress (see Charts 4 and 5). While the level of Japanese technological progress has been increasing, the rate of progress has been decreasing for a couple of decades.

[Appendix 2]

In a closed economy, national saving equals domestic investment due to the assumption that the current account is always zero. This contrasts, however, with the behavior we expect when capital is internationally mobile. Under capital mobility, saving and investment can diverge, as countries run unbalanced current acounts. For this conjecture, Feldstein and Horioka claimed that, even among industrial countries, capital mobility is sufficiently limited that changes in national saving rates ultimately change domestic investment rates by the same amount. This is known as the Feldstein-Horioka Puzzle. They reported, as evidence, cross-sectional regressions of gross domestic investment rate average (I/Y) on gross national saving rate average (S/Y). For a sample of 16 OECD countries over 1960–74, Feldstein and Horioka found the following result:

$$I/Y = \underset{(0.02)}{0.04} + \underset{(0.07)}{0.89}\,S/Y, \quad R2 = 0.91$$

With respect to the fact that, over the 1960–74 period, capital was not as mobile internationally as it is today, Obstfeld and Rogoff recalculated it in the 22 OECD samples over the decade 1982–91. The result is as follows:

$$I/Y = \underset{(0.02)}{0.09} + \underset{(0.09)}{0.62}S/Y, \quad R2 = 0.69$$

This estimation shows a weakening, but still very significant, positive association.

In a case of Japan, if we calculate the time-series saving-investment association, the result for the 1985–97 sample is

$$I/Y = \underset{(0.0382)}{0.2152} + \underset{(0.2169)}{0.4709}S/Y, \quad R2 = 0.2363.$$

This equation shows that the coefficient of 0.47 is a good deal smaller than the 0.89 found in Feldstein and Horioka's original work, and the 0.62 in Obstfeld and Rogoff's work, while the standard error of 0.22 is larger and the determination coefficient of 0.24 is smaller than the ones in both works. These statistical figures demonstrate that international capital mobility has been developed in the Japanese economy.

[Appendix 3]

For the portfolio balance model, the following reduced forms are conducted:

(1) $$e_t = a_0 + a_1 r_t^* + a_2 r_t + a_3 E[e_{t+1}/t] + a_4 R_t$$
$$a_1 > 0, \quad a_2 < 0, \quad a_4 < 0$$

(2) $$e_t = a_0 + a_1 r_t^*/p_t^* + a_2 r_t/p_t + a_3 E[e_{t+1}/t] + a_4 R_t$$
$$a_1 > 0, \quad a_2 < 0, \quad a_4 < 0$$

(3) $$e_t = a_0 + a_1 (r_t^* - r_t) + a_2 E[e_{t+1}/t] + a_3 R_t$$
$$a_1 > 0, \quad a_3 < 0$$

(4) $$e_t = a_0 + a_1 (r_t^*/p_t^* - r_t/p_t) + a_2 E[e_{t+1}/t] + a_4 R_t$$
$$a_1 > 0, \quad a_3 < 0$$

e_t: yen-dollar exchange rate (central rates at the Tokyo market)
r_t^*: US interest rate (3mo. treasury bills; %-p.a.)
r_t: Japanese interest rate (3mo. repurchasing agreement bonds; %-p.a.)
p_t^*: US prices (CPI index; 1982–84 = 1.000)
p_t: Japanese prices (CPI index; 1995 = 1.000)
$E[e_{t+1}/t]$: expected yen-dollar exchange rate at time $t+1$ held at time t (the rational expectation hypothesis is assumed here)

R_t: risk premium (cumulative Japanese current account surpluses; 100 billion yen)

a_i: parameter

Applying the ordinary regression analysis to the monthly data (January 1990 to June 2000, 126 observations), we can obtain the following results (( ): t-statistics and $R2$: adjusted determination coefficient):

$$\underset{}{e_t} = \underset{(1.7505)}{8.25895} - \underset{(1.3357)}{0.65171}\, r_t^* + \underset{(3.6545)}{2.16190}\, r_t + \underset{(21.1446)}{0.86752} E[e_{t+1}/t] + \underset{(2.7018)}{0.01059} R_t$$

$$R2 = 0.87802$$

$$\underset{}{e_t} = \underset{(2.8267)}{12.7892} - \underset{(0.3791)}{0.17700}\, r_t^* + \underset{(2.8777)}{0.69595}\, r_t + \underset{(21.5925)}{0.88999} E[e_{t+1}/t]$$

$$R2 = 0.87162$$

$$\underset{}{e_t} = \underset{(1.9258)}{9.01681} - \underset{(1.3556)}{0.92061}\, r_t^*/p_t^* + \underset{(3.6531)}{2.10478}\, r_t/p_t + \underset{(20.7413)}{0.86213} E[e_{t+1}/t] + \underset{(2.6591)}{0.01003} R_t$$

$$R2 = 0.87809$$

$$\underset{}{e_t} = \underset{(2.9063)}{13.1546} - \underset{(0.5773)}{0.38369}\, r_t^*/p_t^* + \underset{(2.8396)}{0.72194}\, r_t/p_t + \underset{(21.5294)}{0.88923} E[e_{t+1}/t]$$

$$R2 = 0.87193$$

$$\underset{}{e_t} = \underset{(2.2079)}{10.4572} - \underset{(2.6082)}{1.17479}(r_t^* - r_t) + \underset{(25.3945)}{0.91929} E[e_{t+1}/t] + \underset{(1.4553)}{0.00463} R_t$$

$$R2 = 0.87267$$

$$\underset{}{e_t} = \underset{(1.8622)}{5.28869} - \underset{(2.0914)}{0.29945}(r_t^* - r_t) + \underset{(42.9723)}{0.96415} E[e_{t+1}/t]$$

$$R2 = 0.95013$$

$$\underset{}{e_t} = \underset{(2.1745)}{10.1731} - \underset{(3.1775)}{1.68522}(r_t^*/p_t^* - r_t/p_t) + \underset{(24.4592)}{0.89787} E[e_{t+1}/t] + \underset{(2.0414)}{0.00682} R_t$$

$$R2 = 0.87590$$

$$\underset{}{e_t} = \underset{(2.9018)}{13.0933} - \underset{(2.8849)}{0.73019}(r_t^*/p_t^* - r_t/p_t) + \underset{(24.1866)}{0.89926} E[e_{t+1}/t]$$

$$R2 = 0.87265$$

For all of these estimations, coefficient conditions (positive or negative) of the interest rate term and the risk premium term are not satisfied, and t-values of both terms are relatively low in some cases.

On the other hand, if we apply it to the data for five years from January 1990 to December 1994 (60 observations), we can get the following estimations.

$$\underset{}{e_t} = \underset{(4.7508)}{106.554} + \underset{(2.1326)}{1.27027 r_t^*} - \underset{(2.0975)}{2.21331 r_t} + \underset{(2.4688)}{0.33240 E[e_{t+1}/t]} - \underset{(4.0064)}{0.07574 R_t}$$

$$R2 = 0.93119$$

$$\underset{}{e_t} = \underset{(4.8761)}{93.0810} + \underset{(2.0518)}{1.22223 (r_t^* - r_t)} + \underset{(2.9121)}{0.37647 E[e_{t+1}/t]} - \underset{(4.4735)}{0.06075 R_t}$$

$$R2 = 0.93083$$

$$\underset{}{e_t} = \underset{(4.7595)}{106.568} + \underset{(2.2469)}{1.83262 r_t^*/p_t^*} - \underset{(2.0623)}{2.13211 r_t/p_t} + \underset{(2.4331)}{0.32843 E[e_{t+1}/t]} - \underset{(3.9646)}{0.07502 R_t}$$

$$R2 = 0.93134$$

$$\underset{}{e_t} = \underset{(4.9985)}{100.504} + \underset{(2.3672)}{1.88640 (r_t^*/p_t^* - r_t/p_t)} + \underset{(2.5145)}{0.33445 E[e_{t+1}/t]} - \underset{(4.5116)}{0.07115 R_t}$$

$$R2 = 0.93239$$

In these 4 estimated equations, the determination coefficients are very high (i.e. above 0.9), coefficient conditions are satisfied, and t-values of each coefficient are almost statistically meaningful.

Thus, based on these calculations, we can conclude that:

(1) In early 1990s, the interest rate parity worked very effectively for the short term exchange rate determination (see Chart 22). However, in late 90s, because of "zero" or excessively low and rigid interest rates in Japan (see Chart 23), the interest rate parity did not work any more for the short term determination.

(2) For the interest rate parity, nominal interest rates and real interest rates are both effective for the Japanese and US economies. This is because prices in both economies are relatively sticky compared with interest rate fluctuations.

Next, for the medium term exchange rate fluctuation, we have to take into account of the open macroeconomy, i.e. interaction among a goods and service market (domestic and foreign), a financial market (including a foreign exchange market), and a labor market. A bond market can be neglected by the Walras

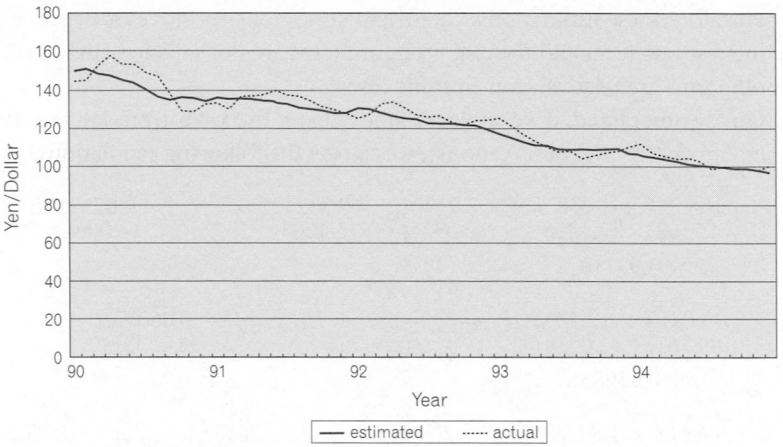


Chart 22. Short Term Estimated Exchange Rate

low. The following is a simple open economy macroeconometric model based on the Mundell-Fleming theory (( ): t-statistics and $R2$: adjusted determination coefficient). All data are yearly data from 1973 to 1998.

[Behavioral Equations]

$$C_t = \underset{(4.9229)}{17387.0} + \underset{(57.609)}{0.55616} Y_{t-1}$$

$$R2 = 0.99282$$

$$\text{Log}\, I_t = \underset{(1.1792)}{0.87137} - \underset{(1.0784)}{0.00904} r_t + \underset{(15.325)}{0.93112}\, \text{Log}\, I_{t-1}$$

$$R2 = 0.96040$$

$$EX_t = - \underset{(4.9950)}{62654.0} + \underset{(2.2243)}{52.2797}\, e_{t-1} + \underset{(11.232)}{17.2626}\, Y^*_{t-1}$$

$$R2 = 0.96903$$

$$IM_t = \underset{(0.5300)}{9043.74} - \underset{(1.3773)}{51.3715}\, e_{t-1} + \underset{(3.3759)}{0.09693} Y_{t-1}$$

$$R2 = 0.88858$$

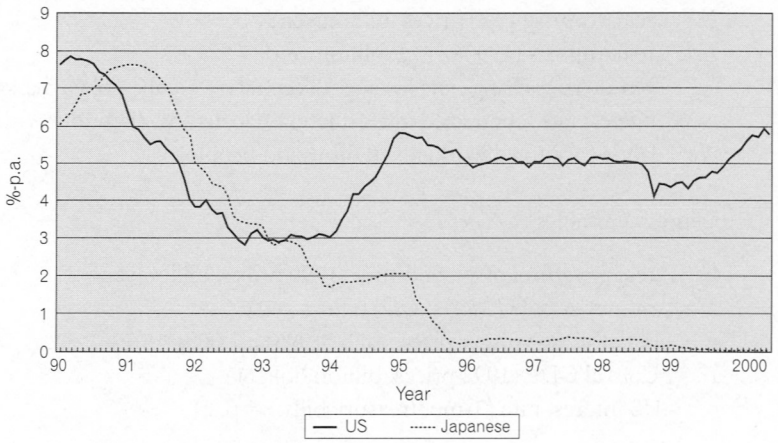


Chart 23. Japanese and US Interest Rates

$$e_t = \underset{(1.1865)}{19.7950} - \underset{(1.1887)}{0.00110}(EX_t - IM_t) + \underset{(12.908)}{0.90016}\, e_{t-1}$$

$$R2 = 0.89408$$

$$r_t = \underset{(6.7058)}{9.39675} + \underset{(1.0077)}{0.11104}\, r_t^* - \underset{(5.0682)}{0.01081} M_t/p_t$$

$$R2 = 0.62381$$

$$N_t = \underset{(138.76)}{4023.37} + \underset{(66.726)}{0.00522} Y_t$$

$$R2 = 0.99442$$

[Definition Equation]

$$Y_t = C_t + I_t + G_t + EX_t - IM_t$$

[Endogenous Variables]

Y: real GDP (1990 prices; billion yen)
C: real consumption expenditure (1990 prices; billion yen)
I: real capital investment (1990 prices; billion yen)

EX: real exports (1990 prices; billion yen)
IM: real imports (1990 prices; billion yen)
e: yen-dollar exchange rate (average of central rates at the Tokyo market)
r: interest rate (contracted interest rates on loans and discount; %-p.a.)
N: labor (occupied workers; 10 thousand people)

[Exogenous Variables]

G: real government expenditure (1990 prices; billion yen)
M: money supply ($M2 + CD$; billion yen)
p: deflator (consumer price index; 1995 = 1.000)
Y^*: US real GDP (1992 prices; billion dollar)
r^*: US interest rate (3-mo. treasury bills; %-p.a.)

Thus, given exogenous variables, all endogenous variables including the exchange rate can be determined. The estimated exchange rate is shown in Chart 24.

Finally, let us deal with the long term equilibrium exchange rate. To this, we apply the following (relative) purchasing power parity:

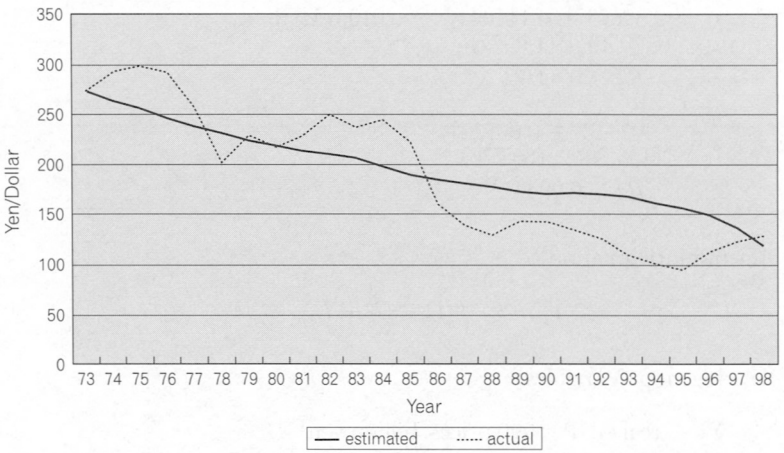


Chart 24. Medium Term Estimated Exchange Rate

$$e_t = e_0 (p_t/p_0)/(p_t^*/p_0^*) \quad (0: \text{ the base period})$$

Therefore, if we select Producer Price Index (PPI) and Consumer Price Index (CPI) for the US price (p_t^*) and Wholesale Price Index (WPI) and Consumer Price Index (CPI) for the Japanese price (p_t), we can calculate the long term equilibrium exchange rate from 1973 as the base year, applying the purchasing power parity (see Charts 25 and 26). The correlation coefficient between the actual figures and the estimated figures based on the PPI/WPI data is 0.952669, while the CPI based coefficient is 0.884102, therefore PPI/WPI are a better indicator than CPI for the purchasing power parity of the US dollar and the Japanese yen.

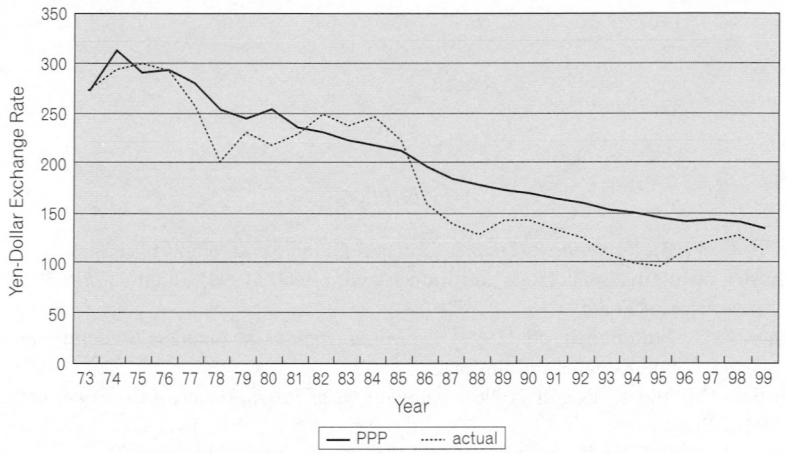


Chart 25. Purchasing Power Parity (WPI-base)

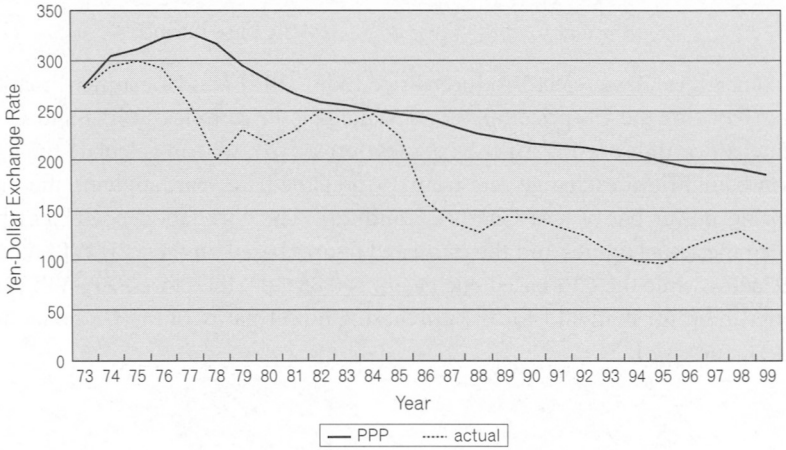


Chart 26. Purchasing Power Parity (CPI-base)

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