Development Bank of Japan
Research Report
No. 3

The Slump in Plant and Equipment Investment in the 1990s: Focusing on Lowered Expectations, the Debt Burden and Other Structural Factors

January 2000

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Development Bank of Japan

Contents

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Focusing on Lowered Expectations, the Debt Burden and Other Structural Factors

Summary

1. Plant and equipment investment in the 1990s experienced a sharp decline for the three consecutive years 1992-94 following the collapse of the bubble economy. It then expanded between the second half of 1995 and the first half of 1997 thanks primarily to independent investment (investment independent of business-cycle factors) in the information and communications field. In the first quarter of 1998, however, growth turned negative with a 6.1% drop from the previous year, and major declines have now continued for seven consecutive quarters.

2. Growth in capital stock followed the business cycle in the early 1980s but then overshot it during the bubble era. The 1990s has been a period of adjustment, with average rate of growth of capital stock declining in step with expected growth rates. Adjustment has become particularly far-ranging lately as the gap between supply and demand expands due to the sluggishness of the latter. The drop in plant and equipment investment has been especially pronounced in the non-manufacturing sector, where adjustment of capital stock has been severe. Adjustment in the manufacturing sector started somewhat later.

3. Japan's capital coefficient (capital stock/GDP) has risen steadily since the 1970s. By sector, the capital coefficient for non-manufacturing has climbed at the slightly faster pace. The capital coefficient for the manufacturing sector as adjusted for capacity utilization rate follows a gentle upward path. Japan's rising capital coefficient is in contrast with those of the U.S. and Germany, both of which are virtually flat.

4. The capacity utilization rate for the manufacturing industry in the 1990s has on the whole fallen below the average for the 1970s and 1980s. Lately it has declined to a level even lower than that recorded immediately after the bubble economy. Growth in production capacity peaked after the bubble, and the current dramatic decline in production volume is the primary reason for the fall in capacity utilization rate.

Excess capacity index has been rising rapidly lately but remains lower than in the aftermath of the oil shock. Significantly overemployment index, which has hitherto been almost consistently lower than excess capacity, now exceeds it.

5. Plant and equipment investment increased dramatically in the late 1980s and at the beginning of the 1990s for all sizes of enterprise. Capital spending by small businesses peaked around 1990 ahead of that for large and medium-sized firms, then with the collapse of the bubble went into decline until 1994. That decline proved more severe than in the case of large and medium-sized firms, and subsequent recovery has been weaker.

6. In the manufacturing sector plant and equipment investment by small firms picked up one to two quarters earlier than that by large and medium-sized firms during phases of economic recovery through the 1980s. In the economic recovery of the late 1990s, however, no such lead can be observed.

7. In the 1970s number of years to redeem debt (outstanding debt / cash flow) was longer in the case of large and medium-sized firms than for small companies. Beginning in the late 1980s, however, small companies rapidly increased their dependence on outside funding as plant and equipment investment ballooned. The number of years it took small firms to redeem debt then soared as profits soured in the early 1990s, resulting in a heavier debt burden than that felt by large and medium-sized firms.

8. Plant and equipment investment by large corporations in the non-manufacturing sector has followed largely the same pattern of decline as rates of return since the collapse of the bubble economy. Plant and equipment investment by small businesses in the same sector, meanwhile, has experienced three separate periods of decline, in the early and mid 1990s and again from 1998. In the early 1990s and in 1998 the Lending Attitude D.I. also plummeted, suggesting that lending patterns have placed constraints on plant and equipment investment. In 1998, in particular, the Lending Attitude D.I. declined to an unprecedented low; thus lending constraints are believed to have further accelerated the rapid decline in plant and equipment investment by small corporations.

9. Two sets of factors lie behind the present steep drop in private-sector plant and equipment investment. The first consists of short-term cyclical factors, such as the drop in capacity utilization rates and profit caused by a slowdown in demand. The second consists of structural factors that have been lurking deep down since the collapse of the bubble economy: the decline in long-term expected growth rates and the rate of return on capital, a hostile lending environment, a heavy debt burden and so forth. The current adjustment in plant and equipment investment is for that reason of considerable depth. The task at hand is for companies to restructure the way they do business and government to stabilize the financial system in order to solve these structural problems. In this way an environment can be created in which firms pursuing new technologies and commercial opportunities are able to invest in the future.

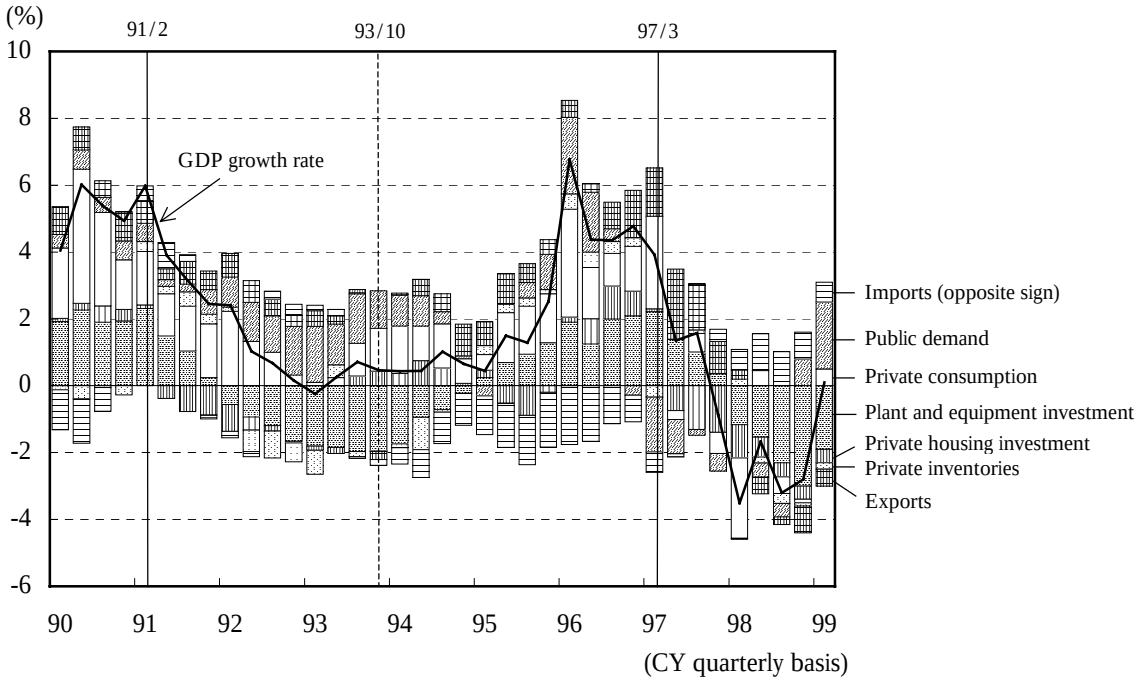
Introduction

Private-sector plant and equipment investment experienced a sharp decline for the three consecutive years 1992-94 following the collapse of the bubble economy. It then resumed positive growth on a real GDP basis for the first time in thirteen quarters in the first quarter of 1995, after which it continued to increase fairly steadily until the first half of 1997, fueled by independent investment (investment independent of business-cycle factors) in the information and communications field. However, the rate of increase fell considerably during the second half of that year, and in the first quarter of 1998 growth turned negative with a 6.1% decline from the previous year. Plant and equipment investment has shown no signs of recovery since, recording major declines for the seven consecutive quarters through the third quarter of 1999. In terms of contribution to GDP, the sharp drop in private-sector plant and equipment investment has been the greatest single factor prolonging the current recession (Figure).

The purpose of the present paper is to identify the characteristics of private-sector plant and equipment investment in recent years. Instead of concentrating solely on short-term cyclical factors, it attempts to explain the present slump in plant and equipment investment by focusing mainly on medium- to long-term factors that have become evident over the course of the 1990s since the collapse of the bubble economy.

The analysis combines a macroeconomic perspective with a more or less microeconomic perspective by scale of enterprise. Chapter I considers the relationship between declining expected growth rates, fluctuations in rate of increase of capital coefficient, and plant and equipment investment. Chapter II examines the structural factors behind the slump in plant and equipment investment, focusing especially on such factors as debt burden and financing.

Figure. Contribution to GDP by Component of Demand
(Year-on-year change)



Source: Economic Planning Agency, "Annual Report on National Accounts," 1990 as base year.

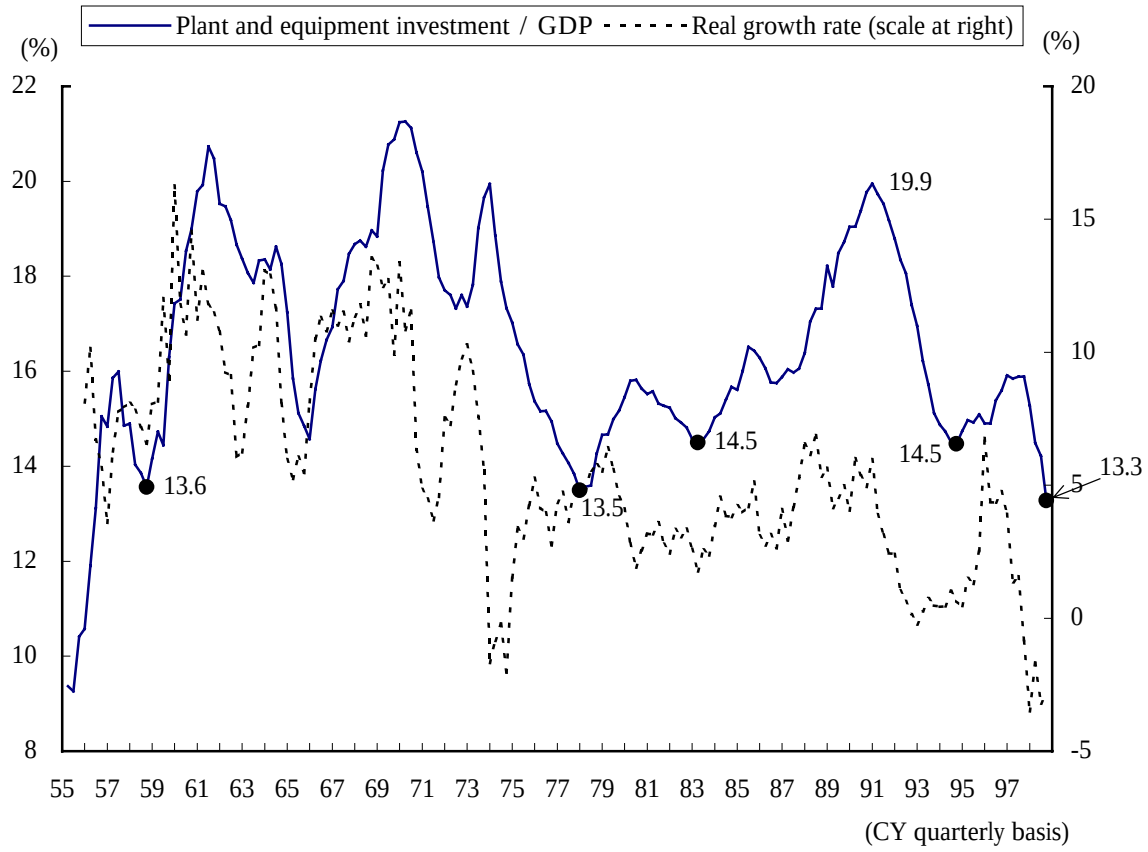
I. Macroeconomic Trends in Plant and Equipment Investment

1. Expected Growth Rates Dwindle and Capital Stock Adjustment Deepens

1.1 Ratio of Plant and Equipment Investment to GDP Declines Rapidly

Ratio of plant and equipment investment to GDP (nominal) rose dramatically during the bubble era, peaking at 19.9% in the first quarter of 1991, then dropped after the bubble burst to 14.5% in the third and fourth quarters of 1994 (Figure I-1). As viewed in the longer term, the ratio fluctuated between 16-20% during Japan's rapid growth phase; since the middle of the 1970s, however, it has remained on the whole in the 14-16% range except in the bubble period. In light of the fact that expected growth rates during the bubble economy somewhat overshot the mark, it is fair to state that the medium- to long-term trend until recently was a level of around 15%. That figure has now dipped dramatically. In the fourth quarter of 1998 it dwindled to a mere 13.3%, a level unprecedented since before the 1960s.

Figure I-1. Ratio of Plant and Equipment Investment to GDP and Economic Growth Rate



Note: Ratio of plant and equipment investment to GDP is based on seasonally-adjusted nominal figures. Economic growth rate represents year-on-year real growth.
Source: Economic Planning Agency, "Annual Report on National Accounts."

Table I-1. Estimated Long-term Expected Growth Rate

Increase in capital coefficient (%)	Ratio of plant and equipment investment to GDP (%)						
	18	17	16	15	14	13	12
2.5	3.2	2.7	2.1	1.6	1.1	0.5	-0.0
2.0	3.7	3.2	2.6	2.1	1.6	1.0	0.5
1.5	4.2	3.7	3.1	2.6	2.1	1.5	1.0

Notes: 1. Growth rate = ratio of plant and equipment investment to GDP / (capital coefficient × relative price of investment goods) - capital retirement rate - increase of capital coefficient.
2. Capital coefficient represents actual figures for 1998; retirement rate = 4.0% (in light of actual past trends).

A decline in the medium- to long-term ratio of plant and equipment investment to GDP (hereafter referred to as investment ratio) appears to correlate with a drop in expected growth rates.[1] Investment ratios will fluctuate to some extent in accordance with the state of the economy. The question then becomes whether a decline such as that noted above represents a temporary or long-term trend. Considering how low the percentage is currently, it seems likely that the medium- to long-term investment ratio may have declined somewhat. In that sense, adjustment of capital investment is now proceeding at a pace exceeding that experienced after the bubble's collapse or the oil shock.

Table I-1 presents estimates for expected growth rates corresponding to given investment ratios and increases in capital coefficient. For example, if the medium- to long-term rise in the capital coefficient stood around 2.5% as has been the trend heretofore, while the medium- to long-term nominal investment ratio declined to the 14% level, the corresponding expected growth rate[2] at present would work out to a mere 1%.[3]

While it can be argued that a decline in expected growth rate triggers a drop in the ratio of plant and equipment investment to GDP, it can also be argued that a drop in plant and equipment investment impacts GDP on the supply side by driving down the actual average long-term equilibrium rate of growth.[4] In that sense one can interpret the growth rate in Figure I-1 as the long-term potential growth rate calculated from the investment ratio. Therefore if the investment ratio remain low, it will drive down long-term potential growth rates.[5]

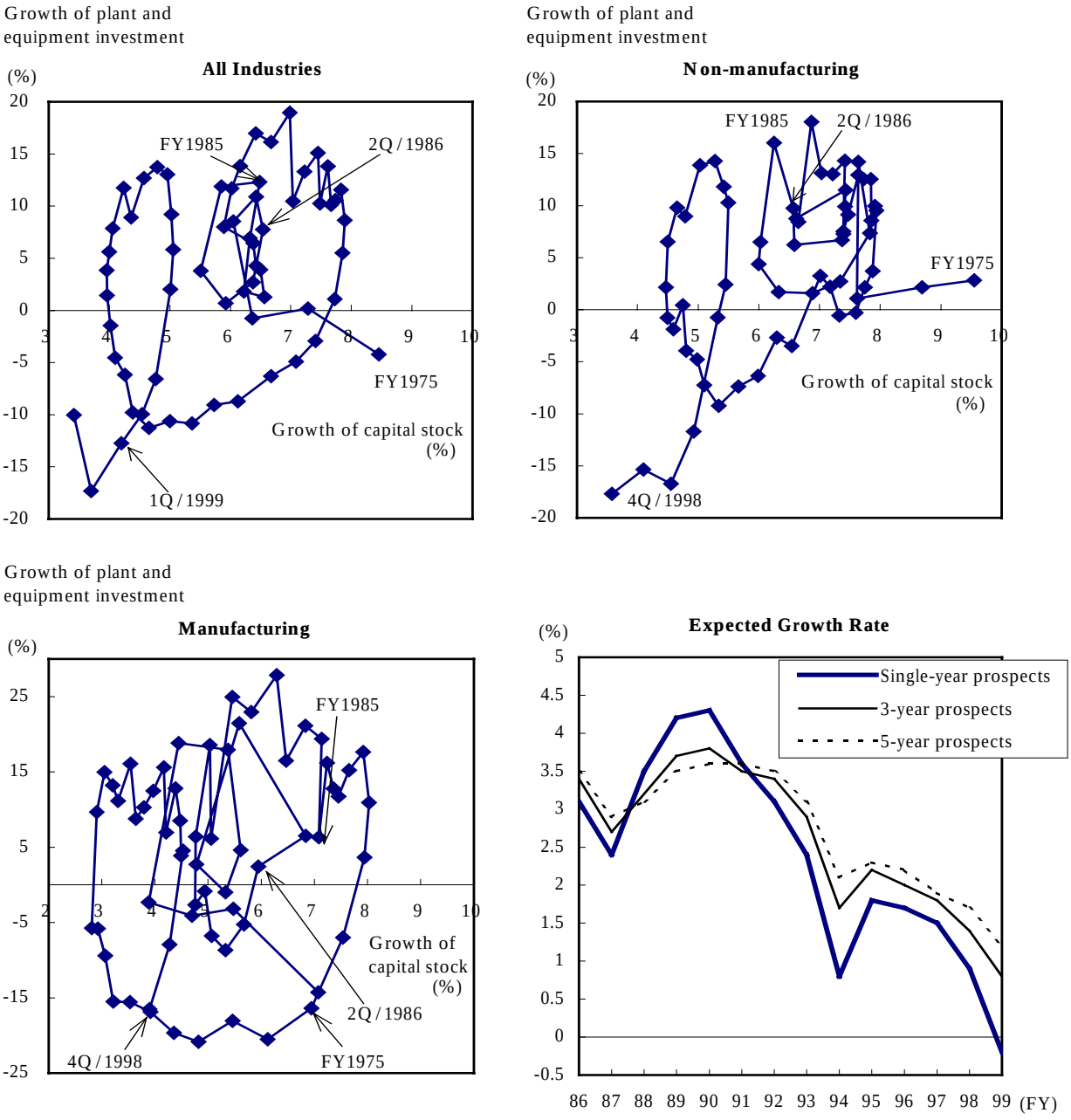
1.2 Capital Stock Adjustment Deepens: The Cyclical Center Shifts and Growth in Investment Plummets

As a look at a cyclical diagram of capital stock adjustment will show, the early 1980s witnessed cyclical adjustment with a stock growth rate hovering around the 6% mark. In the late 1980s that figure rose to 7-8%. Then, at the outset of the 1990s, growth of capital stock dipped sharply, with the center shifting to the left (Figure I-2). This leftward shift was also seen in the 1970s during

[1] The basic equation is, Investment ratio = expected growth rate × capital coefficient. Note that when using this formula to postulate a causal relationship between fluctuations in growth rate and changes in investment ratio, one must treat capital coefficient as an exogenous variable.
[2] Expected growth rate is calculated backwards from investment ratio/capital coefficient etc. The equation used is the same as in 1.
[3] It should be kept in mind that trends in the relative price of plant and equipment investment also affect the outcome, as the equation shows.
[4] Because a decline in investment rates holds down potential growth in supply capacity. The basic equation is, Potential growth rate = investment ratio/capital coefficient.
[5] If there is a GDP gap, the growth rate will in reality decline proportionately from this low equilibrium rate of growth.

the transition from rapid to stable growth. Expected growth rates have declined considerably in the 1990s compared to the levels typically achieved before and during the bubble economy. It appears that growth of capital stock has adjusted as medium- to long-term expected growth rates have declined (Table I-2).

Figure I-2. Capital Stock Cycle and Expected Growth Rate



Note: Adjustments have been made for the discontinuity created by the privatization of government institutions.
Sources: Economic Planning Agency, "Gross Capital Stock of Private Enterprises" and "Questionnaire Survey on Corporate Behavior."

Table I-2. Estimated Growth of Capital Stock

Increase in capital coefficient (%)	Expected growth rate (%)					
	5.0	4.0	3.0	2.0	1.0	0.0
2.5	7.5	6.5	5.5	4.5	3.5	2.5
2.0	7.0	6.0	5.0	4.0	3.0	2.0
1.5	6.5	5.5	4.5	3.5	2.5	1.5

Note: Growth of capital stock
= plant and equipment investment / capital stock - fixed capital retirement rate = expected growth rate + increase of capital coefficient.

After the bubble, capital stock grew ahead of the business cycle. Misplaced expectations led to over-optimism about growth rates and thus fueled an excessive rise in capital stock; a three-year period of adjustment followed during which plant and equipment investment languished. Notably, this adjustment was not confined to a correction of previous overinvestment; it was a truly major change, with a shift in the center to the left.[6]

In fiscal 1995-96 growth in capital stock again rose, only to be followed by a decline in fiscal 1997. During fiscal 1998 growth in plant and equipment investment plunged dramatically, and it is possible that the center of the cycle has shifted even further to the left. Not only does this pattern differ from cyclical movements in the 1980s; it differs also from the aftermath of the bubble economy in so far as investment growth has experienced a further drop in spite of the fact that investment is not especially ahead of the cycle.

Of equal importance with declining expected growth rates *per se* is the fact that expansion in plant and equipment investment decelerates under the influence of forecasts of lower medium- to long-term growth, even in the absence of a short-term gap between supply and demand. Not only do lower expected growth rates precipitate a corresponding drop in expansion of plant and equipment investment; the fact expected growth rates are on the decline also exerts considerable downward pressure. Plant and equipment investment has dropped sharply in the past when a medium- to long-term decline in growth rates was projected, such as in the aftermath of the oil shock or the bubble economy (Figure I-1).

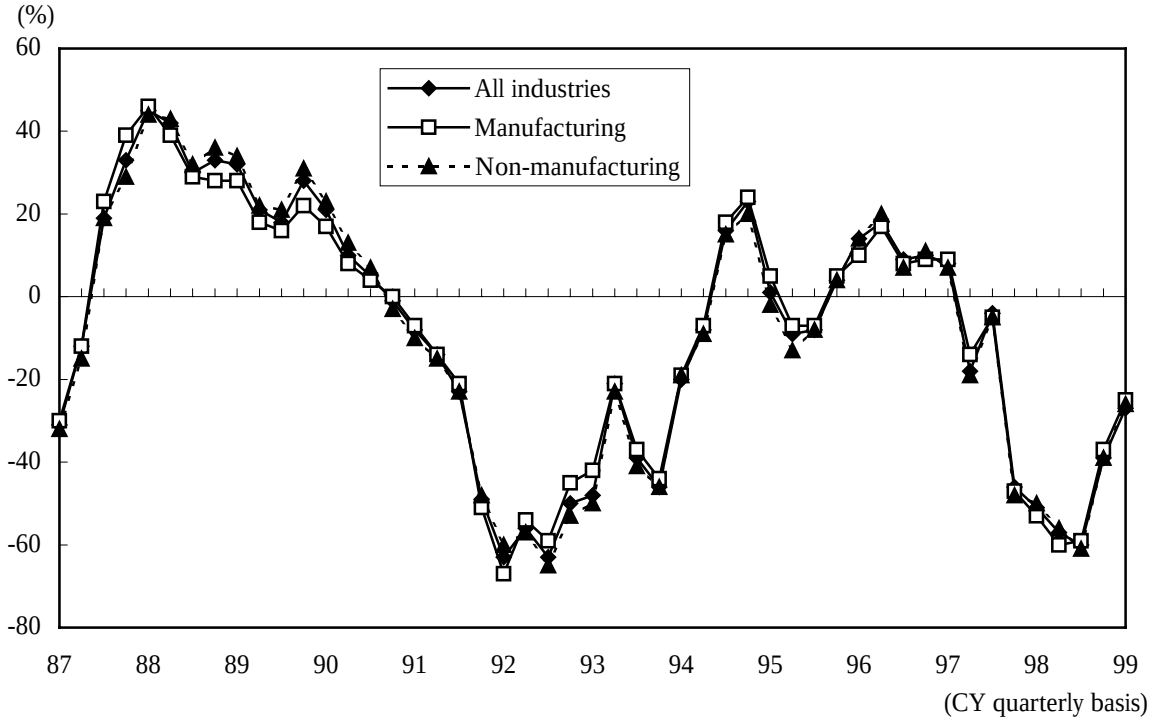
1.3 The Risk of Protracted Capital Stock Adjustment

According to the Economic Planning Agency's survey on corporate behavior, medium- to long-term expected growth rates continue to decline (Figure I-2). The average expected growth rate for the next three years has dwindled to 0.8%, and how long the long-term adjustment in plant and equipment investment levels lasts depends on when this drop in expected growth rates comes to a halt. Business sentiment is currently beginning to come out of its decline (Figure I-3), but, as already suggested in 1 and 2, expansion in plant and equipment investment and capital stock is unlikely to pick up until medium- to long-term expected growth rates rise.

[6] It should be kept in mind that levels of capital stock cannot be deduced from a capital stock cyclical diagram. Explaining the slump in fixed investment growth in the aftermath of the bubble also requires comparing capital stock or production capacity with production volumes from a cyclical perspective. This question is discussed in Section 3.

When the expected growth rate is on the decline, pushing down growth in capital stock, expansion in plant and equipment investment will be lower than that in capital stock; the difference between the two is an indicator of the direction of change in the growth rate. As actual trends show (Figure I-4), since fiscal 1997 the difference between the two has fallen sharply, suggesting that the expected growth rate is declining rapidly. There are signs however that the decline is bottoming out somewhat in the non-manufacturing sector. Nonetheless, even assuming zero growth, if the capital coefficient expands as heretofore at a rate of 2-3%,[7] the same level of expansion will be seen in capital stock and plant and equipment investment.

Figure I-3. Domestic Business Sentiment BSI ("Rise" - "Fall")

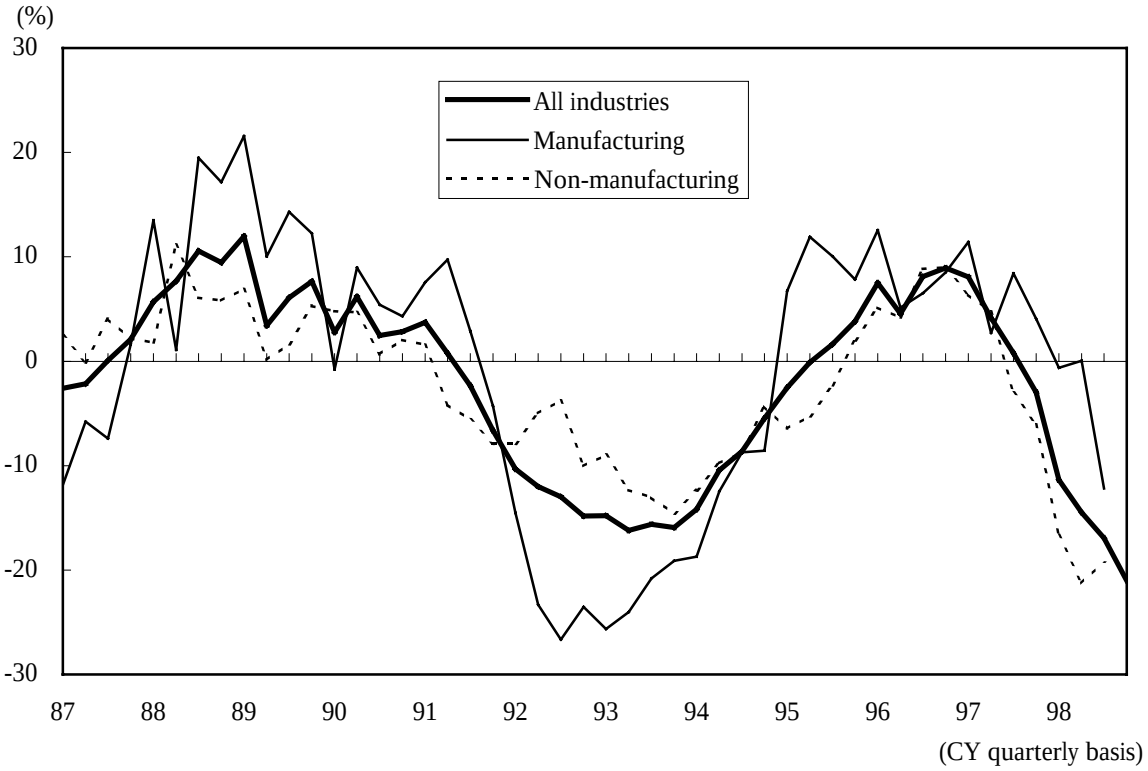


Source: Economic Planning Agency, "Business and Investment Survey of Incorporated Enterprises."

A decline in expected growth rates prolongs capital stock adjustment, reinforcing fears that capital stock adjustment could become a long-term trend. In addition to the factors identified in 1 and 2, therefore, there may be a structural factor involved in the dramatic slowdown in expansion in plant and equipment investment: the decline in medium- to long-term growth rates.

[7] The question of whether capital coefficient will continue to rise hereafter will be discussed in Section 2.

Figure I-4. Direction of Change in Expected Growth Rate



Note: Direction of change in expected growth rate is calculated as growth of plant and equipment investment minus growth of capital stock.
Source: Economic Planning Agency, "Gross Capital Stock of Private Enterprises."

2. Capital Coefficient Rises as Return on Capital Declines

2.1 The Excessive Rise in Capital Coefficient and the Glut in Capital Stock

Capital coefficient is defined as capital stock[8] divided by GDP. As this formula indicates, a rise in capital coefficient means that capital stock is growing faster than GDP. Let us consider the factors behind variations in capital coefficient by examining the recent movement of the denominator and numerator in this formula (Figure I-5). The dividend, capital stock, has remained fairly flat, while the divisor, GDP, shows a certain degree of fluctuation. A look at the rate of change brings this tendency into sharper focus[9] (Figure I-6). For example, the rise in capital coefficient after the bubble was caused by the fact that expansion in capital stock did not drop by as much as the economic growth rate. Similarly, the primary reason for the trend witnessed in 1998 was not so much that growth in capital stock declined as that GDP experienced negative growth; hence the GDP factor made a marked positive contribution.[10] Thus short-term fluctuations in the capital coefficient reflect the movement of the business cycle; they are affected considerably by fluctuations in GDP.

It is worth emphasizing that the primary reason that the capital coefficient has overshot the trend since 1997 lies in the decline in GDP growth; in other words, this trend is a reflection of recessionary conditions. A glut in capital stock has arisen or emerged into focus because of a slump in the economy; it would be difficult to contend that the economy has slumped because of an excessive build-up in capital stock.[11]

If the excessive rise in capital coefficient continues for a prolonged period, the upshot will be a full-scale adjustment in capital stock, leading to a further slowdown in GDP. There are thus few grounds for optimism.[12] Nonetheless, as is clear from the above analysis, when the economy moves toward recovery it tends to return to medium- to long-term trends as overall demand expands, and a reduction in capital stock equivalent to the excess in the rise in capital coefficient is not necessarily required.

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8 Except where otherwise indicated, capital stock is calculated using gross figures from the Economic Planning Agency. For an estimate of net figures, see Chapter II of The Japan Development Bank (1999a).

9 This can be partially attributed to the fact that the divisor represents stock and the dividend represents flow.

10 This type of explanation based on a formulaic definition is almost tautologous. It is not wholly adequate to explain *why* capital coefficient has risen, but it may be considered valid for the purposes of analyzing short-term fluctuations.

11 Even if one accepts the view that there was a structural glut in capital stock right through the period of recovery in 1995-96, it would be difficult to regard that as the main reason for the economic recession, since production capacity if anything peaked during that period (see Section 3).

12 If the slump in demand comes to be regarded as a long-term rather than short-term trend, supply capacity will begin to be cut accordingly, possibly leading to an even deeper slump.

Figure I-5. Quarterly Change in Capital Coefficient

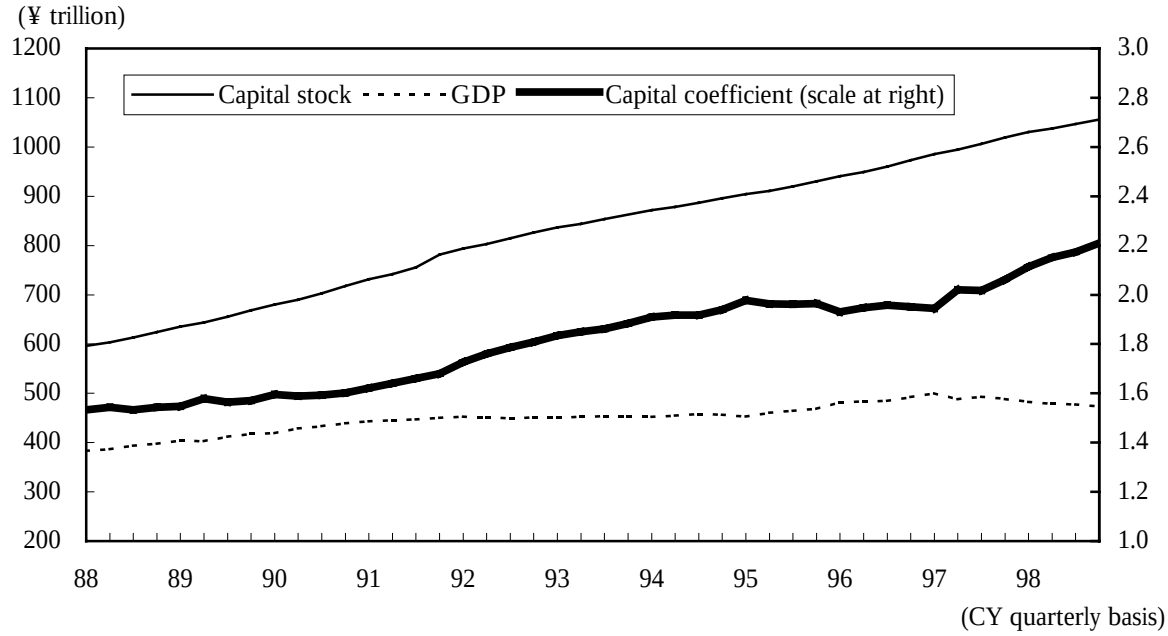
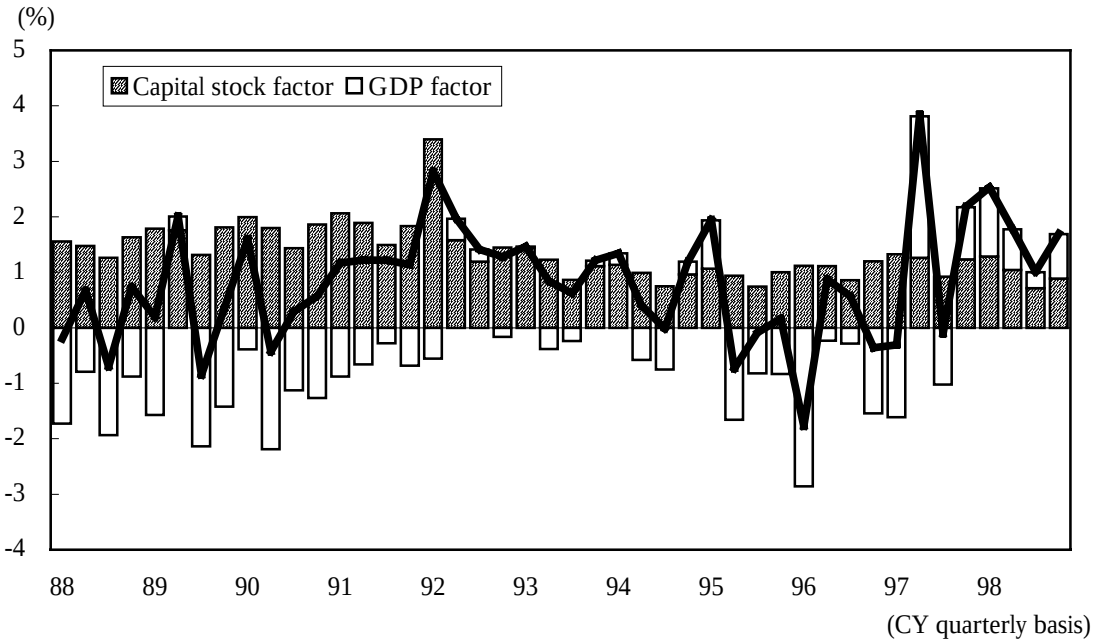


Figure I-6. Quarterly Increase in Capital Coefficient



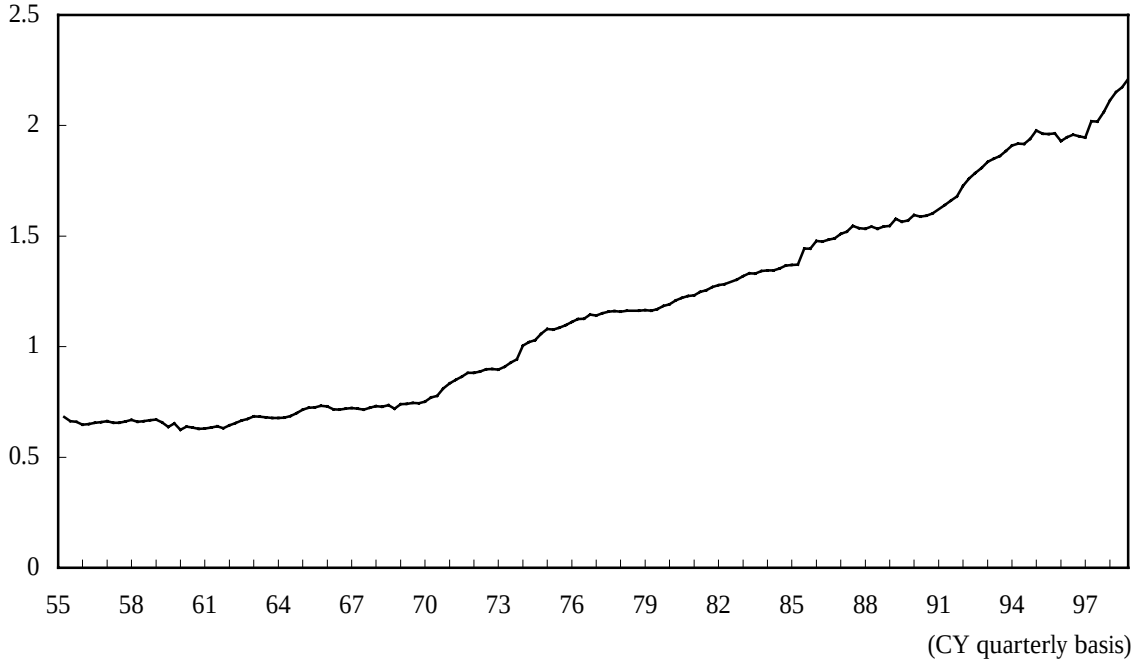
Notes: 1. Capital coefficient = capital stock at start of quarter / GDP.
2. Capital stock is based on private-sector real investment for all industries including construction in progress (1990 as base year).
3. GDP represents the seasonally-adjusted series (1990 as base year, in real terms) as converted to annual rate.
4. The first quarter of 1992 marks a break due to an increase in the range covered by the statistics.

Sources: Economic Planning Agency, "Annual Report on National Accounts" and "Gross Capital Stock of Private Enterprises."

2.2 The Medium- to Long-term Uptrend in the Capital Coefficient

In addition to the short-term fluctuations noted above, an examination of the capital coefficient's long-term movement reveals a medium- to long-term upward trend (Figure I-7). While there are differences by period, since the 1970s the capital coefficient has on the whole tended to creep up at a rate of 2-3% in the medium to long term.

Figure I-7. Long-term Movement of the Capital Coefficient



Notes: 1. Capital coefficient = capital stock at start of quarter / GDP.
2. Capital stock is based on private-sector real investment for all industries including construction in progress (1990 as base year).
3. GDP represents the seasonally-adjusted series (1990 as base year, in real terms) as converted to annual rate.

Sources: Economic Planning Agency, "Annual Report on National Accounts" and "Gross Capital Stock of Private Enterprises."

When viewed in secular terms once cyclical fluctuations are averaged out,[13] the capital coefficient for the manufacturing sector, which is characterized by greater swings than that for the non-manufacturing sector, has until recently risen with remarkable consistency (Figure I-8).[14] This trend, which contrasts starkly with that in the U.S. and Germany, where the capital coefficient has remained almost flat (Figure I-9), is one of the peculiarities of the Japanese economy.[15] What impact does a rise in the capital coefficient have on the overall economy? How should this phenomenon be understood to have arisen?

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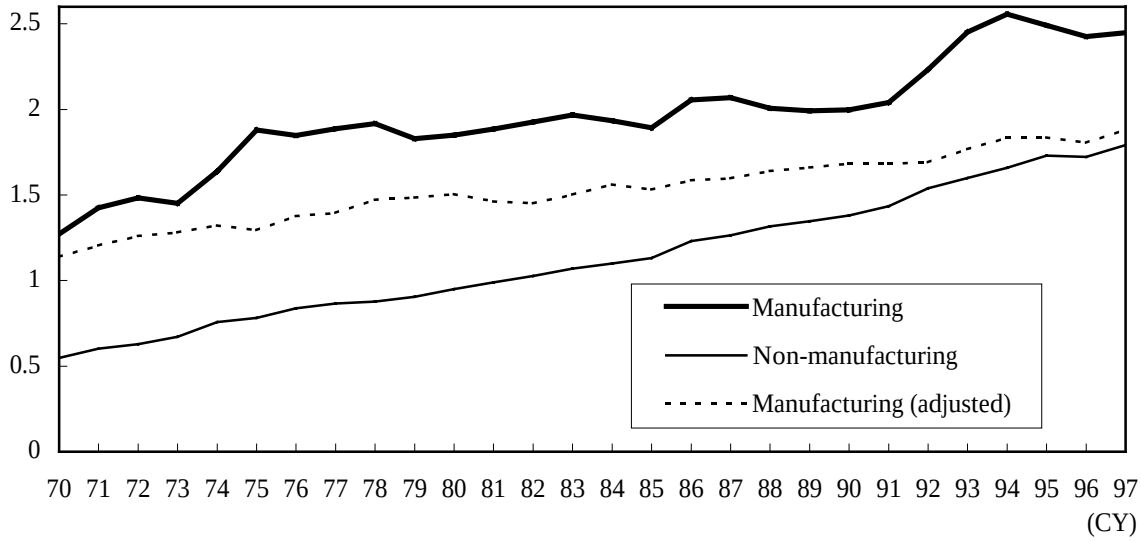
[13] Basically the capital coefficient as adjusted for capacity utilization rate represents the trend component. Since the multiplier used is the actual capacity utilization rate, however, this works out to a figure somewhat lower than the real trend (because the normal level of capacity utilization is not necessarily 100%). For that reason it should be kept in mind that there is a somewhat greater deviation from the capital coefficient before adjustment.

[14] The non-trend component reflects excess capital stock that has arisen at a particular point in time due to a widening of the gap between supply and demand, while the trend component reflects non-cyclical factors, in other words productivity of capital. It can be deduced that capital productivity is gradually decreasing from the fact that the trend proportion is increasing.

[15] Note that the method of calculating capital stock etc. differs somewhat from country to country. Comparing exact figures is thus difficult. Comparing trends is less problematic.

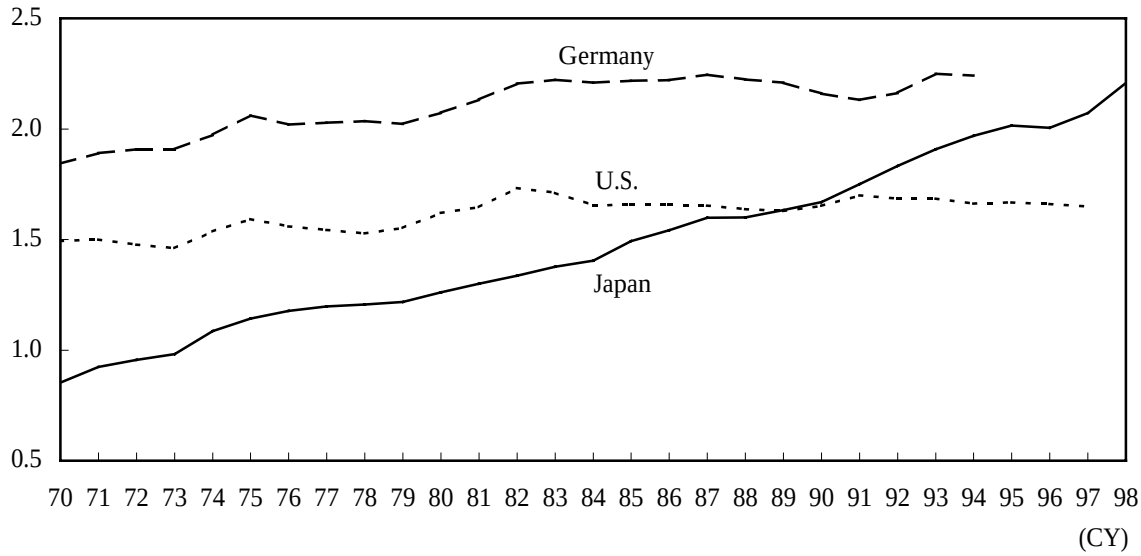
Figure I-8. Capital Coefficient by Industry



Notes: 1. Capital coefficient = capital stock at start of quarter / GDP.
Adjusted capital coefficient = capital coefficient × (capacity utilization index / 100) × actual capacity utilization rate (73.7%).
2. Capital stock is based on private-sector real investment for all industries including construction in progress.
3. GDP represents real GDP.

Sources: Economic Planning Agency, "Annual Report on National Accounts" and "Gross Capital Stock of Private Enterprises;" Ministry of International Trade and Industry, "Production, Shipments and Inventory Index Bulletin."

Figure I-9. International Comparison of Capital Coefficient



Note: Capital coefficient is standardized based on 1990 prices for all three countries. As regards gross capital stock in the U.S., data from old statistics are extended using the net / gross ratio as of 1993.

Sources: Economic Planning Agency, "Annual Report on National Accounts" and "Gross Capital Stock of Private Enterprises;" U.S. Department of Commerce, "Survey of Current Business;" OECD, "National Accounts" and "Flows and Stocks of Fixed Capital."

(1) Impact of fluctuations in the capital coefficient on economic growth

A rise in the capital coefficient means an increase in the amount of capital required for production. It restricts the supply side of the economy and can hamper growth potential over the medium to long term.

In the short term, on the other hand, a decline in the capital coefficient's rise restricts growth in capital stock needed for production and prolongs capital stock adjustment. It is thus one factor that can dampen demand in the economy.[16]

(2) Substitution of capital for labor -- the impact of changes in factor prices

According to economic theory, there are two possible cases in which the capital coefficient may rise due to substitution of capital for labor. One is when an increase in the cost of labor relative to capital motivates a shift from the former to the latter. The other is when capital is substituted for labor even without a change in factor prices because of technological innovation.[17]

Actually, these two factors are thought to overlap in prompting the substitution of capital for labor. Consider how factor input per unit of production has evolved between fiscal 1955 and 1997 (Figure I-10). As plotted on a graph, the input structure has shifted year by year from the lower right to the upper left since the 1970s in particular, and in reality there has been a rise in the capital coefficient and a fall in labor input per unit of GDP. This trend becomes especially pronounced from the 1970s. It is reasonable to conclude that in essence capital has substituted for labor, rather than that capital efficiency has simply declined.

Next, let us examine relative price of labor (Figure I-12). Wages have risen consistently, driving up the relative price of labor. Under such circumstances it makes sense to invest in ways to substitute capital for labor by rationalizing and saving manpower -- in other words, boost the capital-labor ratio (capital equipment rate).[18] It is not clear how technological progress has affected the capital coefficient, but at least since the mid 1970s it has not significantly hampered its rise.

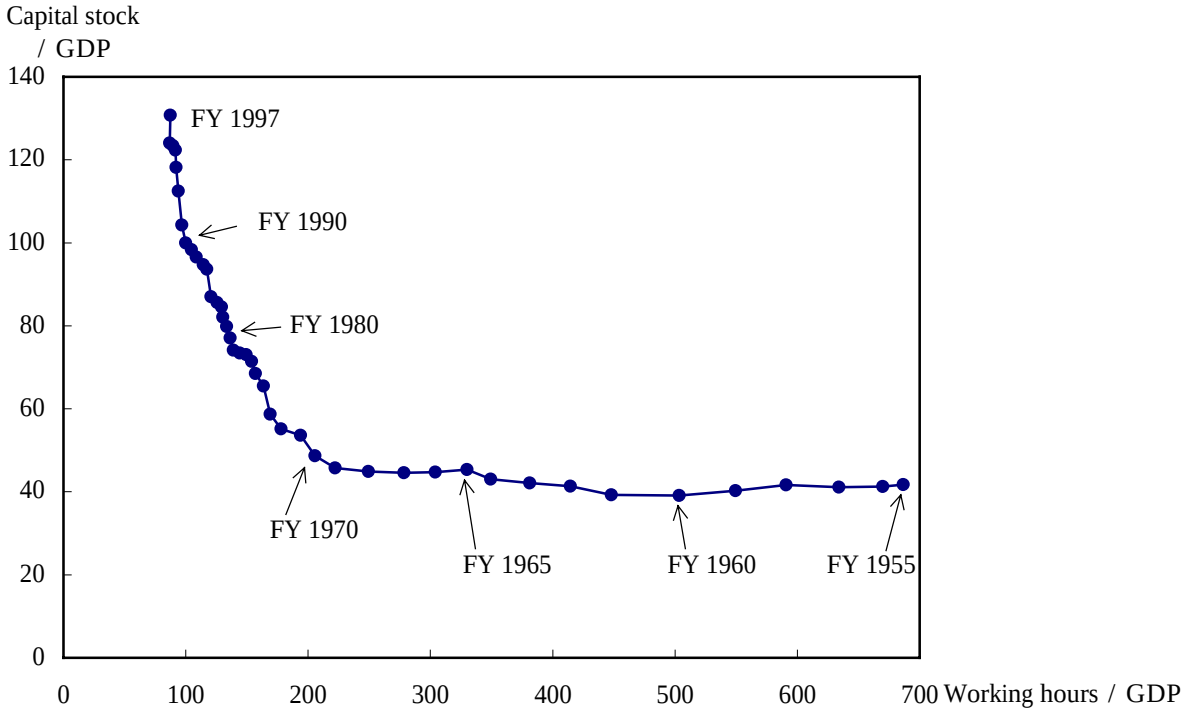
Let us now take a look at factors determining the cost of capital (Figure I-13). In the 1990s, as in the 1980s, the price of capital goods has remained stable, but with interest rate levels down the cost of capital has fallen. At least in this regard it is fair to say that substitution of capital continues to be advantageous.

16 It has an impact on both demand in terms of capital stock adjustment and supply in terms of potential growth rate.

17 Due to corporate minimization of expenses (maximization of profits).

18 Similarly, investment in energy conservation technology is believed to have been driven in part by the fact that rising energy prices encouraged the substitution of capital for intermediate inputs (substitution effect). (The effect is not straightforward, however, in that there have been negative impacts on production [income effect]. See Kuninori and Takahashi [1984], Chapter 1.)

Figure I-10. Factor Input per Unit of Production



Notes: 1. All values are plotted based on FY 1990 = 100.
2. Capital stock is as of the beginning of each fiscal year.
3. Working hours = gross actual working hours × number of workers. Figures for 1955-69 are estimates.

Sources: Economic Planning Agency, "Annual Report on National Accounts" and "Gross Capital Stock of Private Enterprises;" Ministry of Labor, "Monthly Labor Survey;" Management and Coordination Agency, "Manpower Survey."

(3) Differences in patterns of technological progress -- an international comparison

Since capital coefficient is equivalent to capital equipment rate divided by labor productivity,[19] an uptrend in the capital equipment rate is one of the possible determinants of a rise in capital coefficient. However, even if there is a rise in the capital equipment rate, the capital coefficient will not go up if labor productivity also rises sufficiently.[20] When Japan's capital coefficient is broken down according to this formula (Figure I-11), we find that, while labor productivity has indeed risen with the capital equipment rate, the rise in the latter has made the greater contribution, resulting in an ascending capital coefficient.

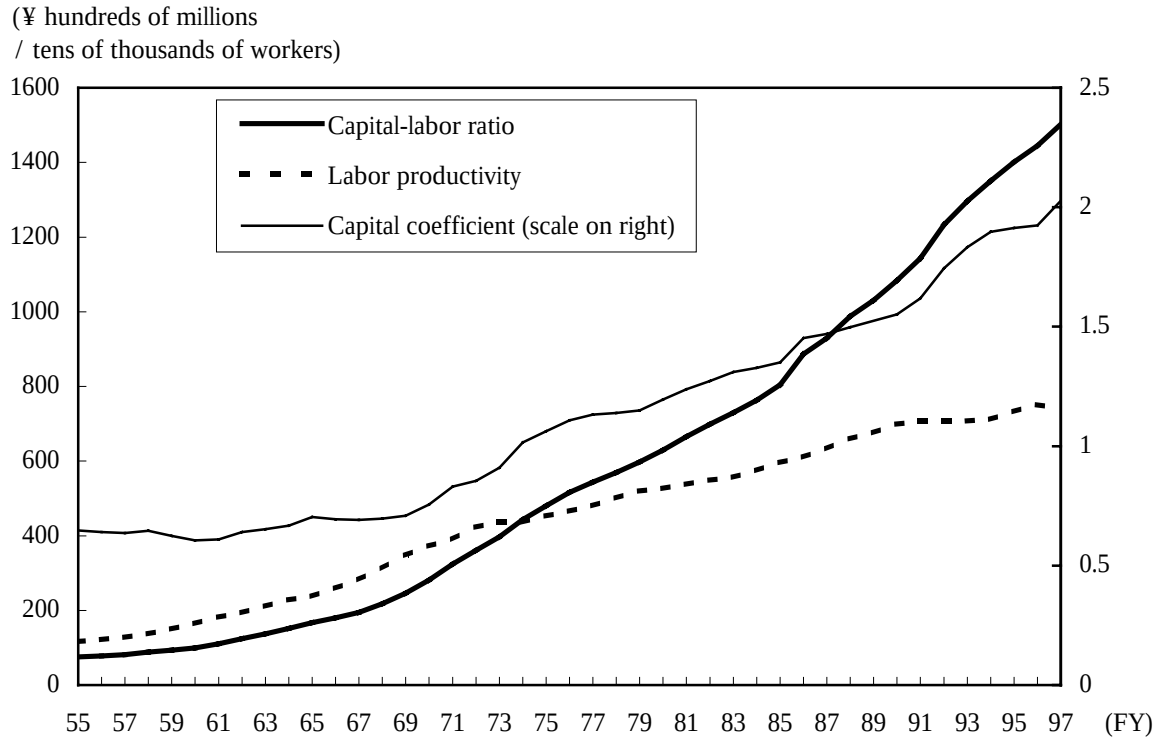
In the U.S. and Germany, the capital coefficient has remained stable while labor productivity has gone up. It would appear that those two countries have experienced ongoing technological progress capable of generating a sufficient rise in labor productivity even without marked gains in the capital equipment rate.[21]

[19] K/Y=(K/L)/(Y/L) (K = capital, L = labor, Y = GDP).

[20] Note however that, assuming the standard Cobb-Douglas production function (all other things being equal, marginal productivity of capital will diminish), it is natural that the capital coefficient should rise with the capital equipment rate if there is no change in technology. The effect of the rise in the capital equipment rate will exceed that of the rise in labor productivity.

[21] So-called "Harrod's neutral technological progress" or "labor-saving technological progress."

Figure I-11. Capital-Labor Ratio and Labor Productivity



Sources: Economic Planning Agency, "Annual Report on National Accounts" and "Gross Capital Stock of Private Enterprises;" Management and Coordination Agency, "Manpower Survey."

(4) A stable capital coefficient -- the situation until the mid 1970s

It is noteworthy that, while the relative price of labor did rise before the 1970s, the rise in the capital coefficient was restrained until the middle of that decade. This can be attributed to the fact that during Japan's rapid growth phase a good deal of investment was directed to boosting capacity. There are no reliable data on investment motives for the rapid growth period, but survey data on motives for plant and equipment investment as classified into consistently defined categories are available for fiscal 1973 through 1985 (Table I-3). These indicate that boosting capacity predominated at first as an investment motive, but declined as a percentage over time. In the high growth phase, once a company expanded facilities and boosted capacity, it was easy to increase production correspondingly.[22] When this type of investment is common, the capital coefficient does not rise very much.[23] This situation was further enhanced by the fact that much new technology was brought in and profitability remained buoyant because of ample investment opportunities.

[22] Successive expansions in production probably also led to economies of scale, bolstering production efficiency.

[23] In that sense the rise in the capital coefficient in the 1970s can be attributed primarily to the plummet in growth in the aftermath of the oil shock (see Yoshikawa [1992], Chapter 2).

Table I-3. Plant and Equipment Investment by Motive (All Industries)

(Unit: Percent)

FY	Capacity expansion	Rationalizing and saving manpower	Research and development	Maintenance and repairs	Other
1973	57.9	15.2	4.6	—	22.2
1974	51.7	15.8	5	—	27.5
1975	46.7	15.4	3.2	10.9	23.8
1976	51	14.9	3.5	13.7	16.9
1977	53.6	12	2.9	12.7	18.8
1978	54.4	13.2	2.8	13.3	16.2
1979	53.1	14.3	3.8	12.7	16.1
1980	53.9	13.9	4.1	11.8	16.2
1981	52.5	15.3	4.5	12.3	15.3
1982	50.8	16	4.8	11.7	16.6
1983	51.1	16	5.3	11.5	16.1
1984	48.9	14.4	6.2	16.3	14.2
1985	46.4	14.6	6.3	15.1	17.7

Note: Investment for capacity expansion was reclassified in 1986.
Source: The Japan Development Bank, "Plant and Equipment Investment Questionnaire Survey."

(5) The rise in the capital coefficient and the cost of capital

In recent years the capital coefficient has been on the rise, partially due to the fact that the cost of capital has declined as interest rates have plummeted over the course of the 1990s (Figures I-12 and I-13). It is also conceivable over the longer range that labor shortages caused by the aging population and other factors may further encourage substitution of capital.[24]

(6) Capital coefficient by sector

As viewed by sector (Figure I-8), the capital coefficient is higher in manufacturing. This is presumably a reflection of the fact that manufacturing is capital-intensive. In the non-manufacturing sector, where industries that require large numbers of employees such as the distribution and service industries are the rule, while industries like electric power are the exception, there is a limit to how far capital-intensive methods of production can be brought in.

In both the manufacturing and non-manufacturing sectors the capital coefficient displays a medium- to long-term upward trend. The rise is somewhat sharper in the non-manufacturing sector.

2.3 The Decline in Return on Capital and its Floor

The rate of return on capital fell during the 1970s and 1980s, leveled off for a while, then plummeted during the 1990s (Figure I-14).[25] This is because assets increased somewhat while returns experienced a moderate decline (Figure I-15).

One reason for this is a drop in capital share (Figure I-16). However, the decline in rate of return has been even steeper, a reflection of the fact that there has been a decrease in the volume

[24] Even as the population ages the Japanese propensity to save has not notably declined; thus there are at present no constraints from that aspect.

[25] In examining return on capital, it is wiser to use the net rather than the gross figure for the divisor, capital; the same holds true for the dividend, returns (or products distributed to capital). Note that Figure I-14 gives the return on assets (ROA) for tangible assets including capital (the divisor and dividend both include figures for land since returns on land cannot be statistically isolated).

of production generated by capital. The sluggishness of Japan's rate of return is pronounced compared to that of the U.S.,[26] which has recently been on the rise. A gap has thus opened up between the two countries.

While risks associated with exchange rate movements do need to be taken into consideration, if in an open economy major discrepancies arise in the rate of return internationally, projects of low profitability will be terminated and real investment will largely cease; therefore the rate cannot decline indefinitely in any particular country. Relative levels of capital coefficient present a difficult issue.[27] Nonetheless, in light of the fact that a declining rate of return lies behind the rise in the capital coefficient, that rise cannot be expected to continue indefinitely.

[26] See The Japan Development Bank (1999b), Figure II-5.
[27] It should be remembered that even in theory there is no "right" level of capital coefficient.

Figure I-12. Relative Wages

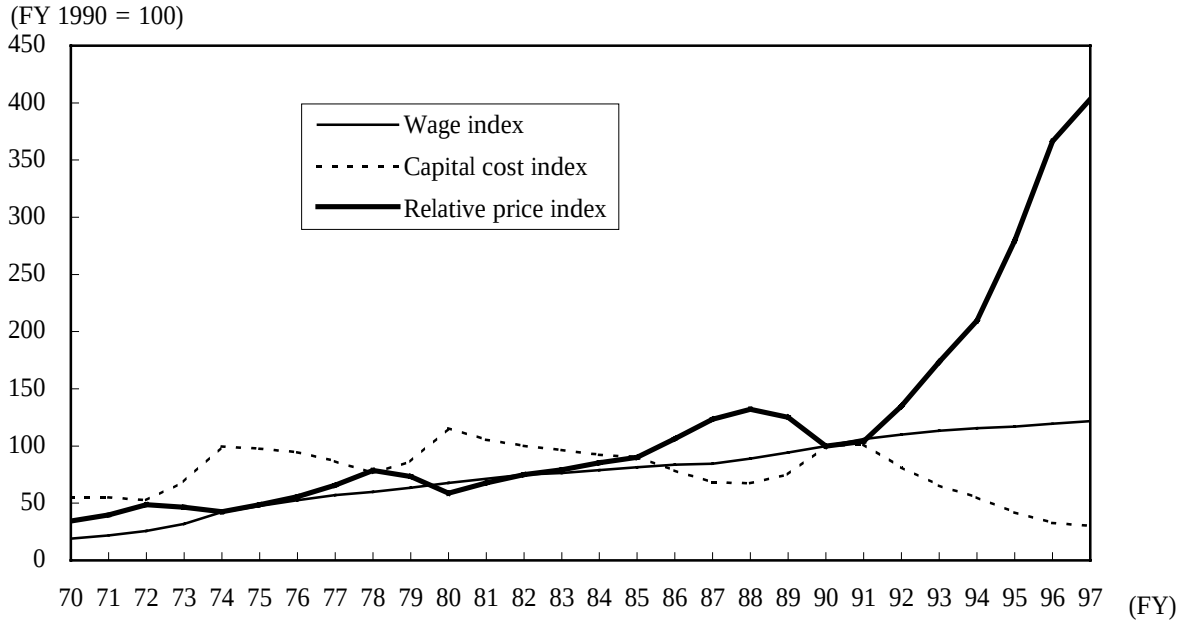
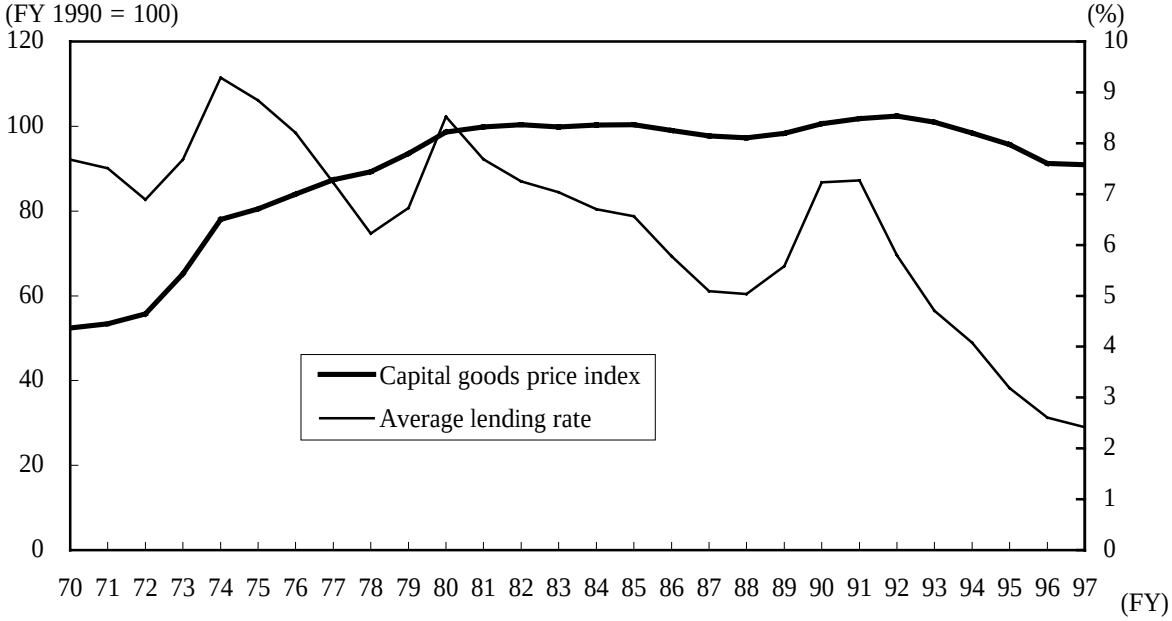


Figure I-13. Price of Capital Goods and Interest Rate



Notes: 1. Relative price index = wages / capital cost (1990 = 100).
2. Wages = total value of cash wages / index of gross actual working hours (1990 = 100).
3. Capital cost = capital goods price index × interest rate (1990 = 100).
The private enterprise facilities deflator is used for price of capital goods.
The overall average interest rate for loan commitments by domestic banks is used for average lending rate.

Sources: Ministry of Labor, "Monthly Labor Survey;" Economic Planning Agency, "Annual Report on National Accounts;" Bank of Japan, "Economic Statistics Monthly."

Figure I-14. Rate of Return on Tangible Assets

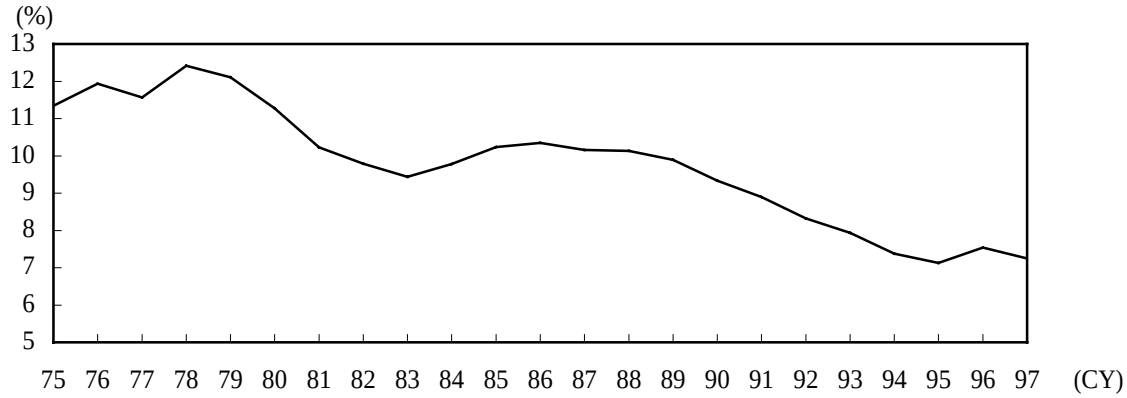


Figure I-15. Returns and Tangible Assets

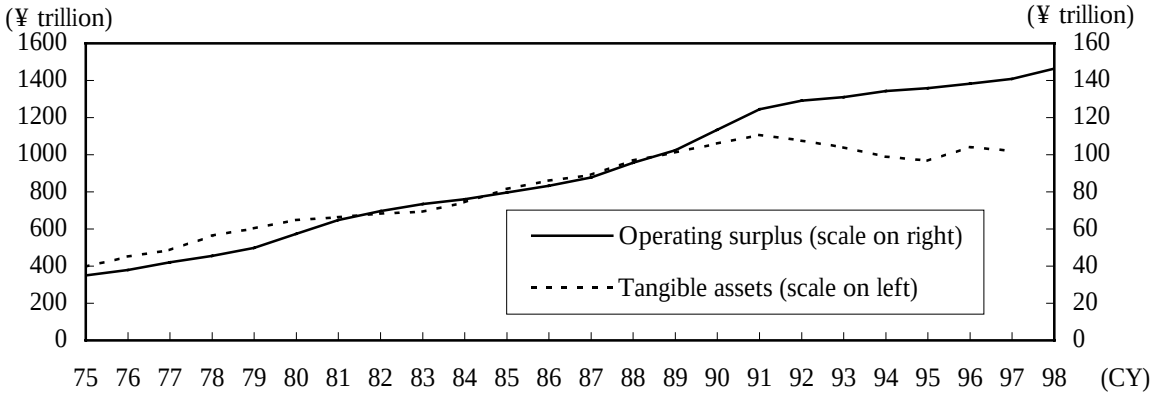
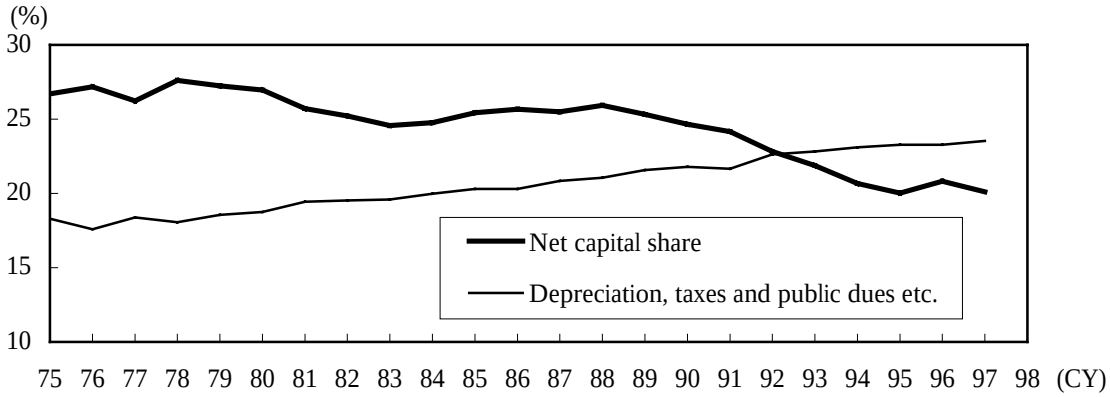


Figure I-16. Distribution for Capital



Notes: 1. Return on tangible assets = operating surplus / tangible assets. Tangible assets, which exclude housing and residential land, are as of the beginning of each year.
2. Net capital share = (GDP - employer income - depreciation etc.) = operating surplus / GDP.
3. Depreciation, taxes and public dues etc. = (fixed capital consumption + indirect taxes - subsidies) / GDP.

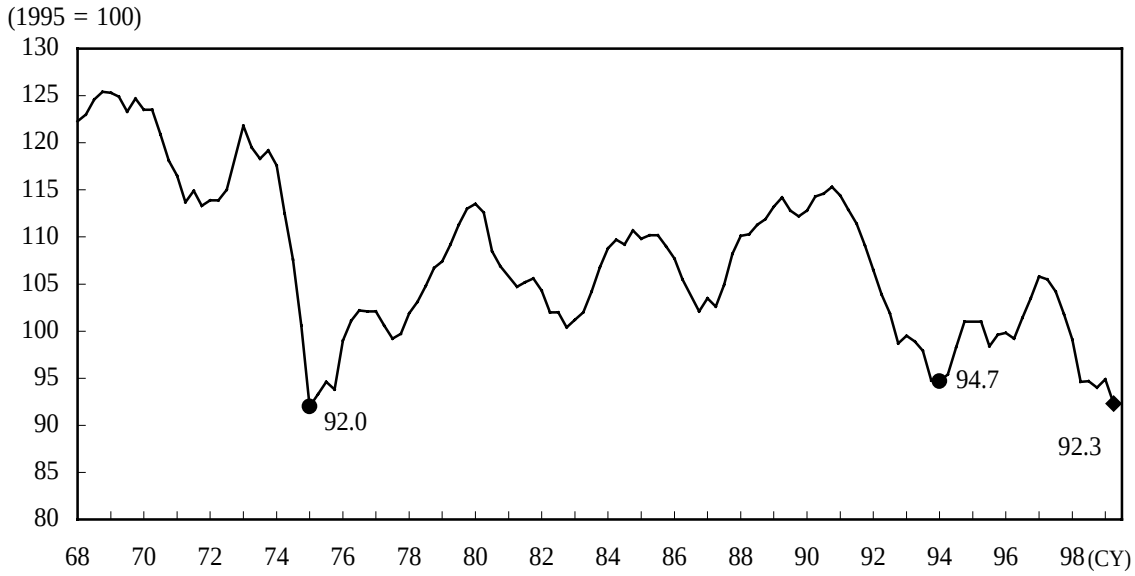
Source: Economic Planning Agency, "Annual Report on National Accounts."

3. The Declining Capacity Utilization Rate and the Glut in Facilities: Supply Capacity Idles as Demand Slumps

3.1 Capacity Utilization Rate Falls as Demand Stagnates

The capacity utilization rate for the manufacturing industry in the 1990s has on the whole fallen below the average for the 1970s and 1980s; lately it has declined to a level even lower than that recorded immediately after the bubble economy (Figure I-17). It has not however dropped as far as it did in the aftermath of the oil shock.

Figure I-17. Capacity Utilization Rate Index (Manufacturing Industry)

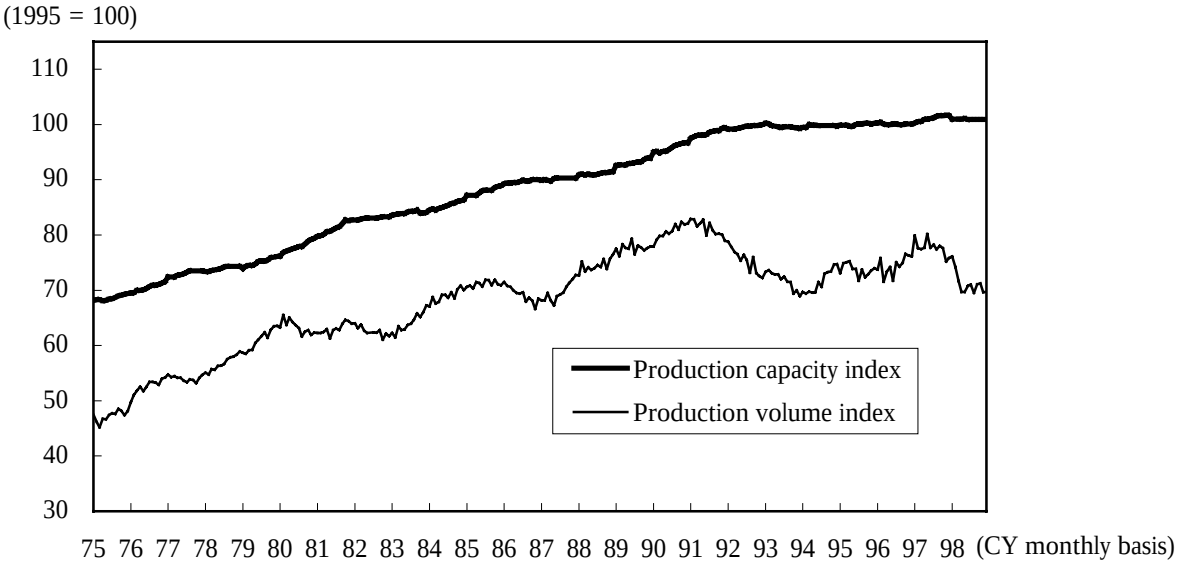


Note: Seasonally adjusted.
Source: Ministry of International Trade and Industry, "Trade and Industry Statistics."

The rise in overall production capacity peaked after the bubble, while production volume plummeted at that time and has done so again recently (Figure I-18). The drop in capacity utilization rate is partially due to the fact that production capacity increased during the bubble period, but in light of the decline in production volume it is chiefly attributable to the sluggishness of demand.

Let us next compare capital stock and production capacity in the manufacturing sector. Until the 1980s production capacity increased in step with capital stock; in the 1990s, however, the former has remained largely flat in spite of a rise in the latter (Figure I-19). This indicates that during this decade firms have favored investment not intended to boost capacity.

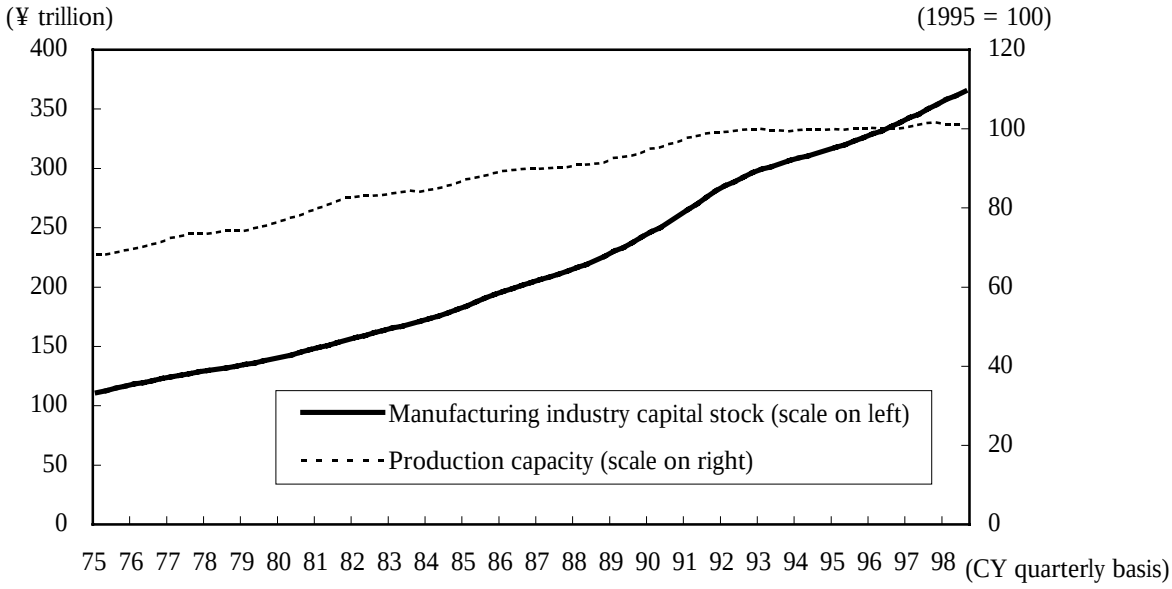
Figure I-18. Production Capacity and Production Volume



Note: 1. Seasonally adjusted.
2. Production volume index = production capacity index × capacity utilization rate index / 100 × actual capacity utilization rate (73.7%).

Source: Ministry of International Trade and Industry, "Trade and Industry Statistics."

Figure I-19. Capital Stock and Production Capacity in the Manufacturing Industry

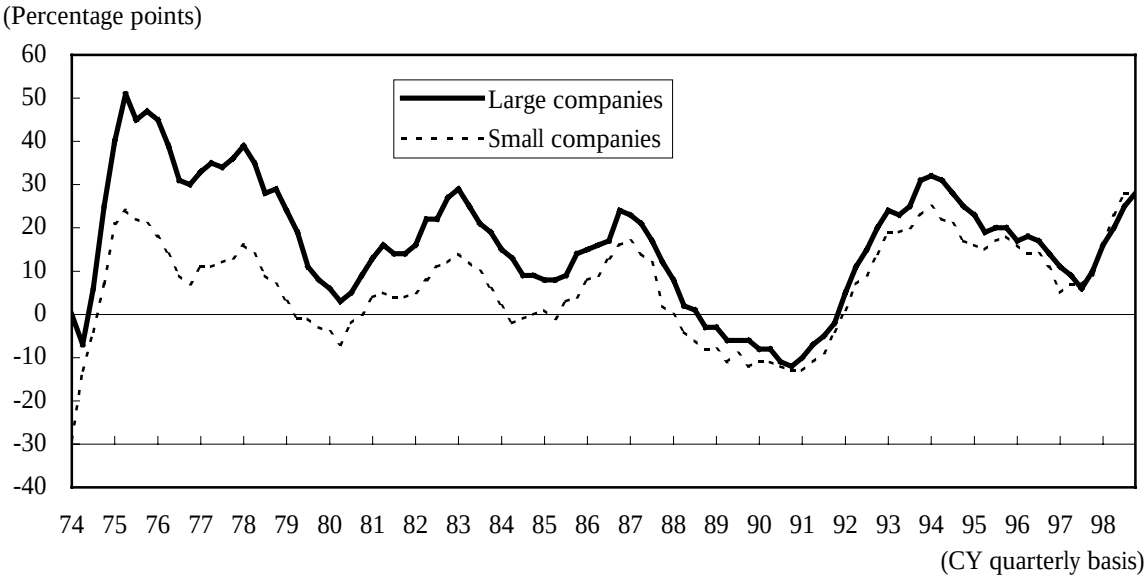


Sources: Economic Planning Agency, "Gross Capital Stock of Private Enterprises;" Ministry of International Trade and Industry, " Trade and Industry Statistics."

3.2 Excess Capacity Index Climbs: An Aspect of the Overall Glut in Supply

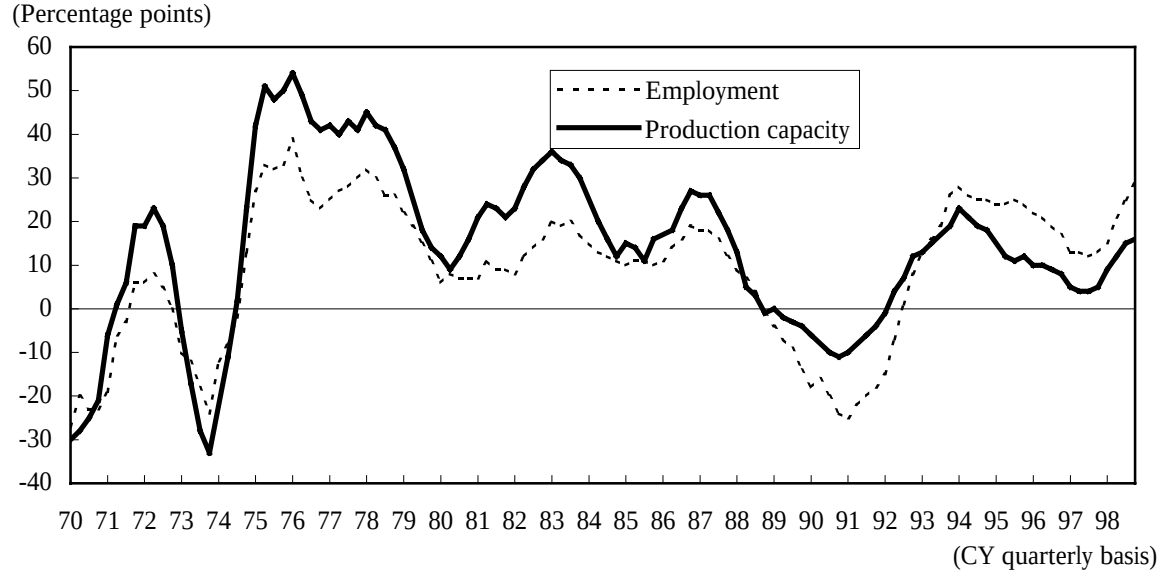
Excess capacity index has been rising rapidly lately but on the whole still remains lower than in the aftermath of the oil shock (Figure I-20). By size of enterprise, the rise in excess capacity index has been especially pronounced in small businesses (Figure I-21). Significantly overemployment index, which has hitherto been almost consistently lower than excess capacity index, now exceeds it (Figure I-21).

Figure I-20. Production Capacity Excess D.I. by Size of Enterprise



Note: Excess D.I. = "excessive" - "insufficient."
Source: Bank of Japan, "Tankan."

Figure I-21. Production Capacity Excess D.I. and Employment Excess D.I. (All Industries)

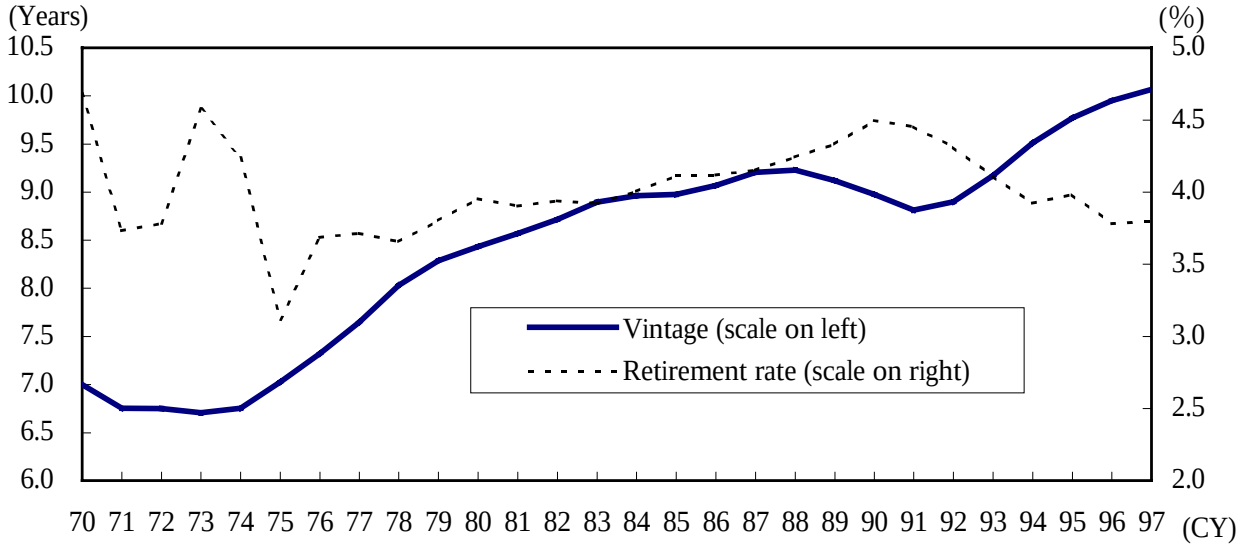


Note: Excess D.I. = "excessive" - "insufficient."
Source: Bank of Japan, "Tankan."

3.3 Vintage and Replacement Investment Ratio Both on the Rise

Vintage of capital stock in the manufacturing sector continues to rise (Figure I-22). In 1997 it crossed the ten-year mark. While vintage alone is not sufficient to determine quality of capital stock, risk of obsolescence has increased. The macroeconomic retirement rate (Figure I-22), which peaked during the bubble economy, has gone into decline, suggesting that little progress has been made in scrapping of facilities. Nonetheless, the replacement investment ratio is climbing in accordance with the overall slowdown (Figure I-23).

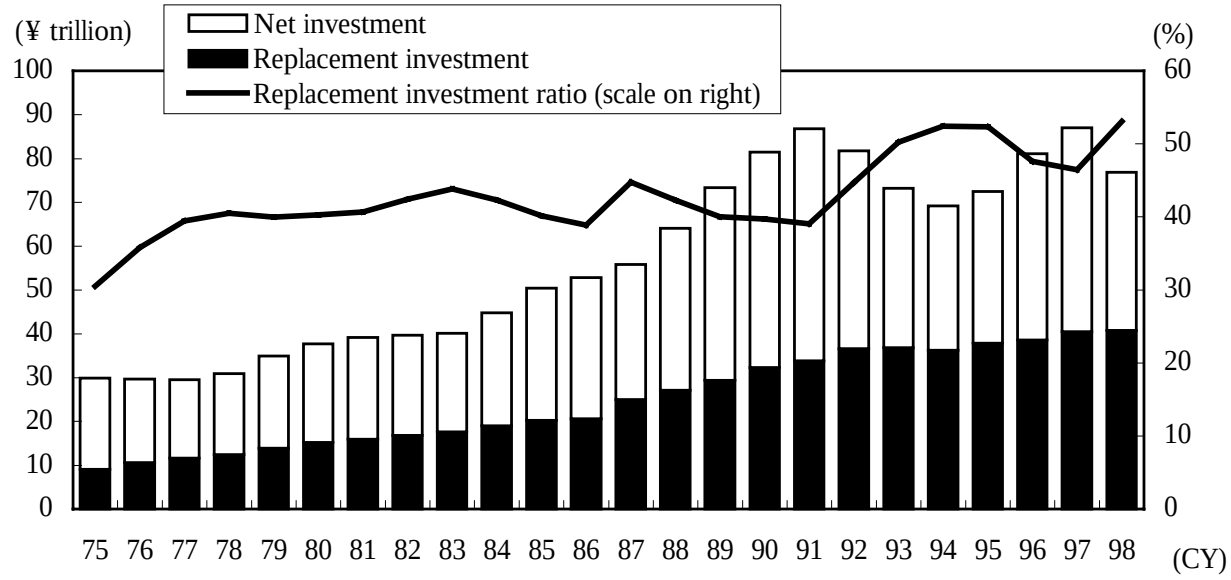
Figure I-22. Vintage and Depreciation Rate of Capital Stock in the Manufacturing Industry



Notes: 1. Vintage of stock for *t* th year (average age) is calculated as follows:
Vt = (Vt - 1 +1) × (Kt - 1 - retirement) / Kt + 0 × It / Kt.
Kt = Kt - 1 - retirement + I t.
(Kt: capital stock at beginning of Year t. It: plant and equipment investment in Year t.)
2. The benchmark V_0 is the "average years elapsed" as of 1970 (= 7 years as per national wealth statistics).
3. Retirement rate = value of retired stock / value of capital stock.

Sources: Economic Planning Agency, "1970 Census of National Wealth" and "Gross Capital Stock of Private Enterprises."

Figure I-23. Replacement Investment and Net Investment (All Industries)



Notes: 1. Adjustments have been made for the discontinuity created by the privatization of government institutions.
2. That portion of plant and equipment investment equivalent to the value of retired stock is treated as replacement investment (see Appendix 1.4).

Source: Economic Planning Agency, "Gross Capital Stock of Private Enterprises."

II. Microeconomic Characteristics of Recent Plant and Equipment Investment

1. Plant and Equipment Investment Trends Since the Bubble by Size of Enterprise

This chapter begins with an overview of trends in plant and equipment investment since the bubble in all industries, manufacturing and non-manufacturing based on the "Quarterly Report of Statistical Survey of Incorporated Enterprises". We shall examine the record for all profit-making enterprises, excepting financial institutions, as classified by size: large companies (with capital of ¥1 billion or over), medium-sized companies (with capital of between not less than ¥100 million and less than ¥1 billion), and small companies (with capital of between not less than ¥10 million and less than ¥100 million).

Figures II-1, II-2 and II-3 give the seasonally-adjusted nominal value of plant and equipment investment by large, medium-sized and small companies in all industries, manufacturing, and non-manufacturing respectively. Values are expressed as an index number with the 1990 average equaling 100.

Plant and equipment investment for all industries climbed sharply regardless of size of enterprise during the bubble economy between the end of the 1980s and the beginning of the 1990s (Figure II-1). However, differences began to emerge by size of enterprise once this trend reached its peak. Capital spending by small businesses topped out in 1990 ahead of that for large and medium-sized firms, then with the collapse of the bubble went into decline until 1994. That decline proved severer than in the case of large and medium-sized firms, and subsequent recovery has been weaker. This is one of the notable features of the slump in plant and equipment investment since the collapse of the bubble.

As for manufacturing, no difference by size of enterprise is to be observed in the surge in plant and equipment investment that started in the second half of the 1980s; spending by large, medium-sized and small companies peaked together in 1991 (Figure II-2). Since the collapse of the bubble, however, plant and equipment investment by small firms has remained sluggish compared with that of their large and medium-sized counterparts.

In the non-manufacturing sector, on the other hand, plant and equipment investment by large companies has remained buoyant thanks to strong demand in services and electric power (Figure II-3). Small companies, by contrast, have fallen behind their larger brethren due to the slump in consumer-related industries such as wholesale and retail and services, where smaller firms are well represented. Their spending has suffered an especially precipitous decline since the latter half of 1997. Thus an increasingly wide gap has opened up in plant and equipment investment between large and small firms since 1991 in the manufacturing and 1990 in the non-manufacturing sector. In order to analyze the nature of this gap, let us examine share of plant and equipment investment by industry in fiscal 1997 for both large and small companies (Table II-1).

The manufacturing sector accounts for 37% of plant and equipment investment by large companies, while the non-manufacturing sector accounts for 63%. The respective figures for small companies are 26.3% and 73.7%. The non-manufacturing sector's share of investment is thus some ten percent points higher in the case of small firms. Within the manufacturing sector, the three industries of electric machinery (with a 9.4% share of investment in all industries), transport equipment (6.0%) and chemicals (4.9%) account for over half of the total investment by large companies. In the case of small firms, by contrast, no single industry accounts for a predominant slice of investment, with foods standing at 4.0%, metal products at 3.6%, and publishing and printing at 2.5%.

Indices of Nominal Plant and Equipment Investment by Size of Enterprise (Seasonally Adjusted)

Figure II-1. All industries

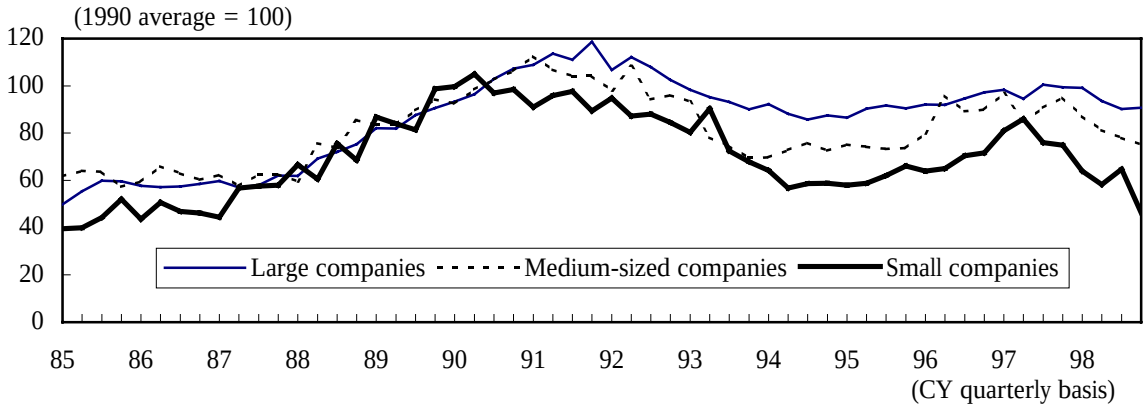


Figure II-2. Manufacturing

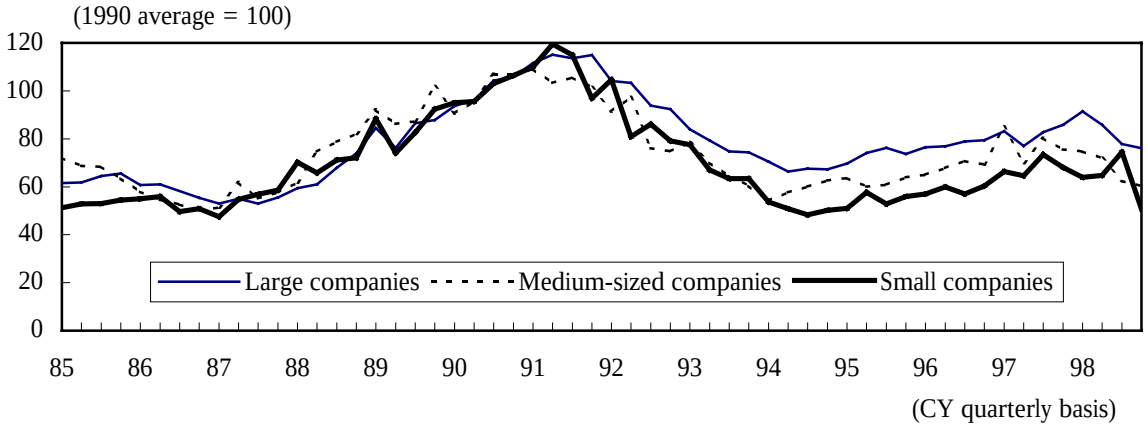
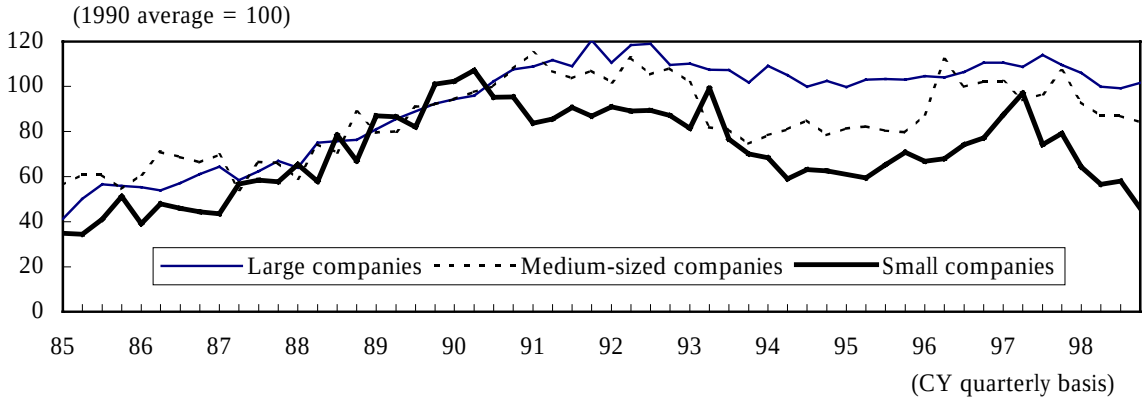


Figure II-3. Non-manufacturing



Note: Large companies are defined as companies with capital of ¥1 billion or over. Medium-sized companies are defined as companies with capital of between not less than ¥100 million and less than ¥1 billion. Small companies are defined as companies with capital of between not less than ¥10 million and less than ¥100 million.

Source: Ministry of Finance, "Quarterly Report of Statistical Survey of Incorporated Enterprises."

Table II-1. Share of Plant and Equipment Investment by Industry, FY 1997 (Large vs. Small Companies)

Nominal value (¥ billions, %)	Value of plant and equipment investment, FY 1997		Share of plant and equipment investment, FY 1997	
	Large companies	Small companies	Large companies	Small companies
All industries	31,184	12,890	100.0	100.0
Total manufacturing	11,547	3,391	37.0	26.3
Foods	801	515	2.6	4.0
Textiles	155	66	0.5	0.5
Apparel / other textile products	20	75	0.1	0.6
Wood / wood products	20	73	0.1	0.6
Pulp / paper / paper products	434	102	1.4	0.8
Publishing / printing	220	321	0.7	2.5
Chemicals	1,539	284	4.9	2.2
Oil / coal products	283	6	0.9	0.0
Ceramics / sand & stone	324	235	1.0	1.8
Iron & steel	650	56	2.1	0.4
Non-ferrous metals	506	48	1.6	0.4
Metal products	276	461	0.9	3.6
General machinery	527	285	1.7	2.2
Electric machinery	2,947	288	9.4	2.2
Transport equipment	1,884	251	6.0	1.9
Precision machinery	276	79	0.9	0.6
Shipbuilding & repair	173	17	0.6	0.1
Other manufacturing	513	228	1.6	1.8
Total non-manufacturing	19,636	9,499	63.0	73.7
Agriculture, forestry & fisheries	9	75	0.0	0.6
Agriculture	1	28	0.0	0.2
Forestry / hunting	0	2	0.0	0.0
Fishing / aquaculture	8	44	0.0	0.3
Mining	54	72	0.2	0.6
Construction	503	951	1.6	7.4
Wholesale / retail	1,710	2,559	5.5	19.9
Wholesale	606	1,258	1.9	9.8
Retail	1,104	1,301	3.5	10.1
Real estate	683	948	2.2	7.4
Transport / communications	6,149	1,466	19.7	11.4
Land transport	1,606	542	5.2	4.2
Water transport	165	785	0.5	6.1
Other transport / communications	4,378	139	14.0	1.1
Electric power	4,387	0	14.1	0.0
Gas / water	397	14	1.3	0.1
Services	5,745	3,413	18.4	26.5
On-premise services	5,266	1,441	16.9	11.2
Hotels and other lodgings	83	166	0.3	1.3
Personal services	30	593	0.1	4.6
Movies and entertainment	140	721	0.5	5.6
Broadcasting	130	5	0.4	0.0
Miscellaneous services	96	487	0.3	3.8

Note: Large companies are defined as companies with capital of ¥1 billion or over. Small companies are defined as companies with capital of between not less than ¥10 million and less than ¥100 million.

Source: Ministry of Finance, "Quarterly Report of Statistical Survey of Incorporated Enterprises."

In the non-manufacturing sector, on the other hand, transport and communications accounts for the largest share of plant and equipment investment by large companies (19.7%), followed by services (18.4%) and electric power (14.1%). Wholesale and retail account for only a minor share (5.5%). In the case of small companies, by contrast, services accounts for an overwhelming share at just over one quarter the total for all industries (26.5%), followed by wholesale and retail (19.9%) and transport and communications (11.4%). Thus three quarters of plant and equipment investment by small firms is concentrated in the non-manufacturing sector; moreover, consumer-related industries (services, wholesale and retail etc.) typified by small shops and stores account for an extremely large percentage of such spending.

Let us now go on to compare large and small companies with regard to the contribution of major industries to annual fluctuations in plant and equipment investment. First, the manufacturing sector. In the case of large companies, a few industries such as electric machinery and transport equipment account for the lion's share of the fluctuation (Figure II-4). By contrast, in the case of small firms in the late 1980s and throughout the 1990s, a few specific industries have not consistently determined fluctuations in plant and equipment investment; rather, the industries making the biggest difference switch virtually every year (Figure II-5). Plant and equipment investment experienced a severe slump of some 20% for three consecutive years beginning in fiscal 1992, yet the industries making the biggest negative contribution varied considerably over that time, alternating between electric machinery, foods, metal products etc.

Next, the non-manufacturing sector. In the latter half of the 1980s large companies chalked up impressive year-on-year increases in plant and equipment investment thanks to a flurry of spending in the services and electric power industries. This trend gradually lost steam in the early 1990s, but buoyed up by investment in the electric power field, growth remained positive in annual terms until 1992 (Figure II-6). Meanwhile, plant and equipment investment by small firms in the non-manufacturing sector enjoyed a sharp increase in the late 1980s fueled mainly by services, wholesale and retail, and real estate; then it fell for four consecutive years between fiscal 1991 and 1994 (Figure II-7). A primary reason for this slump was the slowdown in the consumer-related industries of services and wholesale and retail, which account for a considerable proportion of small firms. It is significant that plant and equipment investment by small firms has suffered a greater decline since the bubble economy's collapse than that of their larger counterparts; as shall be discussed below, small business investment appears to have been affected not only by short-term sluggishness in demand, but also to a considerable degree by intensified competition fueled by structural change in the form of the relaxation of the Large-Scale Retail Stores Act in 1991.

It is generally maintained that plant and equipment investment by small businesses recovers before that of larger firms.[28] Figures II-8, II-9 and II-10 give the annual increase in plant and equipment investment for large, medium-sized and small companies (three-quarter backward moving average for the original series).[29]

As shown in Figure II-9, in the manufacturing sector plant and equipment investment by small firms did indeed as generally claimed pick up one to two quarters earlier than that by large and medium-sized firms during phases of economic recovery through the 1980s. In the economic recovery of the late 1990s, however, no such lead can be observed.

[28] Kanauchi and Nosaka (1995) presents a detailed discussion on the priority of small business plant and equipment investment.

[29] Placing large and medium-sized companies together in a single category of firms with capital of over ¥100 million brings the contrast with small companies into sharper relief.

Figure II-4. Contribution by Industry to Annual Fluctuations in Plant and Equipment Investment (Large Companies in the Manufacturing Sector)

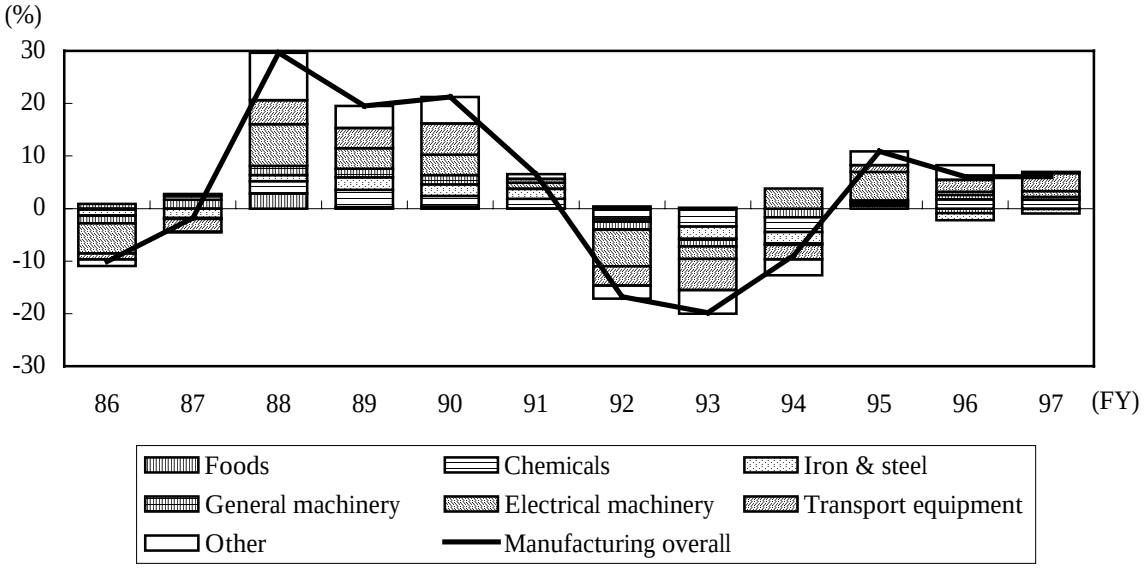
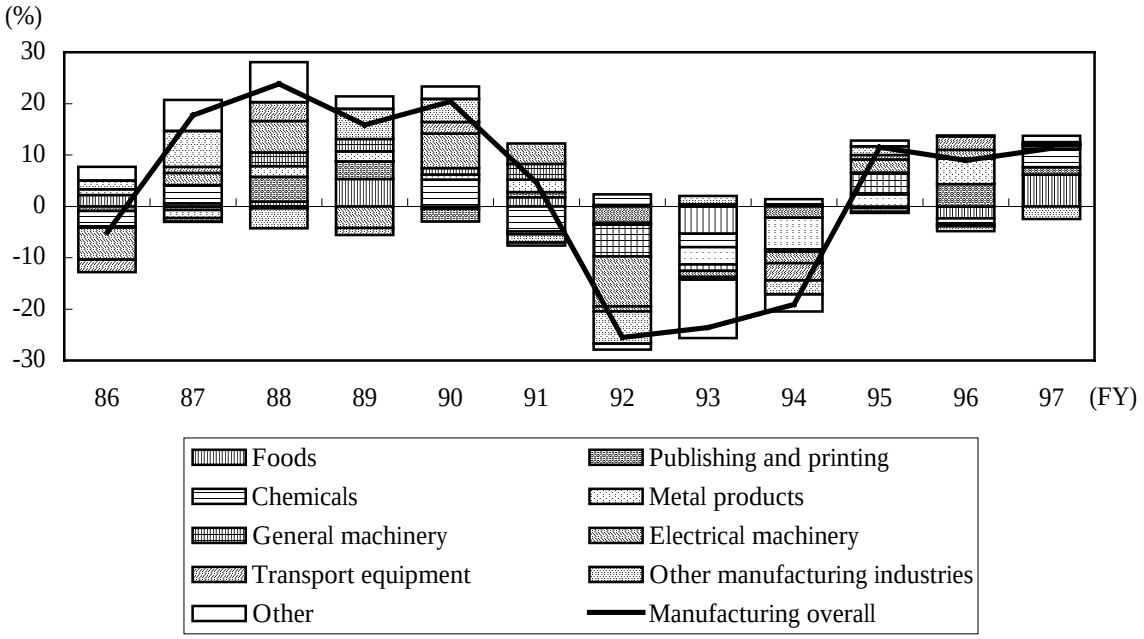


Figure II-5. Contribution by Industry to Annual Fluctuations in Plant and Equipment Investment (Small Companies in the Manufacturing Sector)



Note: Large companies are defined as companies with capital of ¥1 billion or over. Small companies are defined as companies with capital of between not less than ¥10 million and less than ¥100 million.
Source: Ministry of Finance, "Quarterly Report of Statistical Survey of Incorporated Enterprises."

Figure II-6. Contribution by Industry to Annual Fluctuations in Plant and Equipment Investment (Large Companies in the Non-manufacturing Sector)

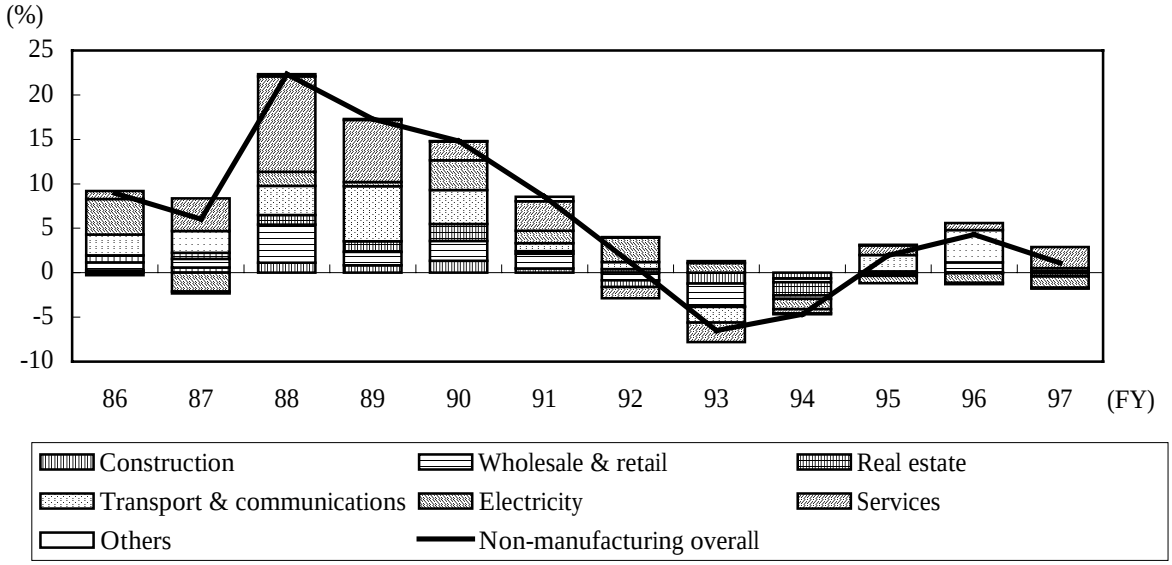
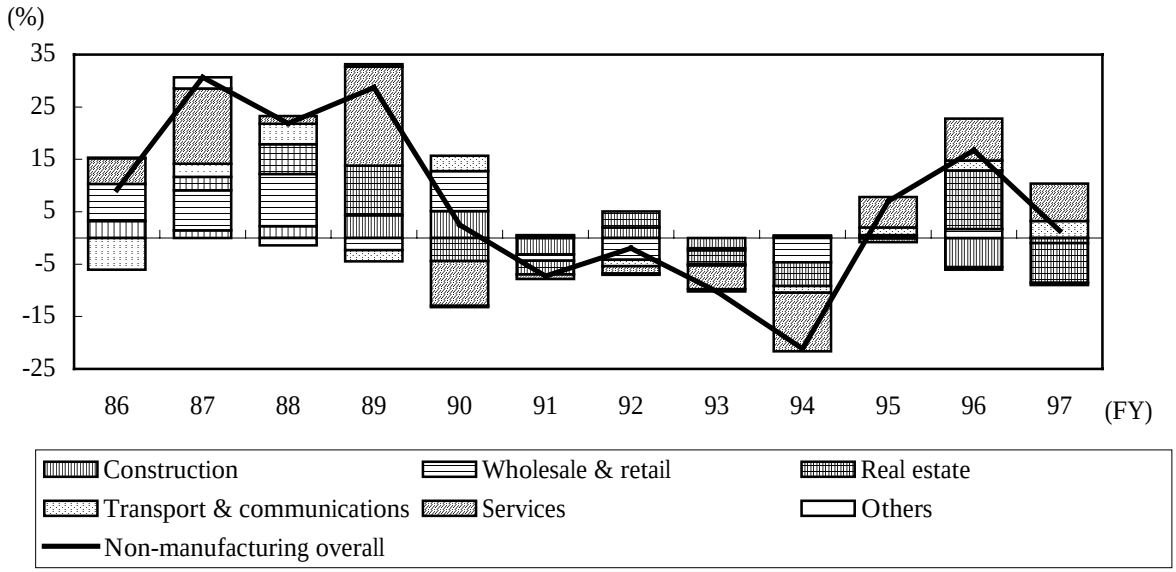


Figure II-7. Contribution by Industry to Annual Fluctuations in Plant and Equipment Investment (Small Companies in the Non-manufacturing Sector)



Note: Large companies are defined as companies with capital of ¥1 billion or over. Small companies are defined as companies with capital of between not less than ¥10 million and less than ¥100 million.
Source: Ministry of Finance, "Quarterly Report of Statistical Survey of Incorporated Enterprises."

Annual Increase in Plant and Equipment Investment

Figure II-8. All industries

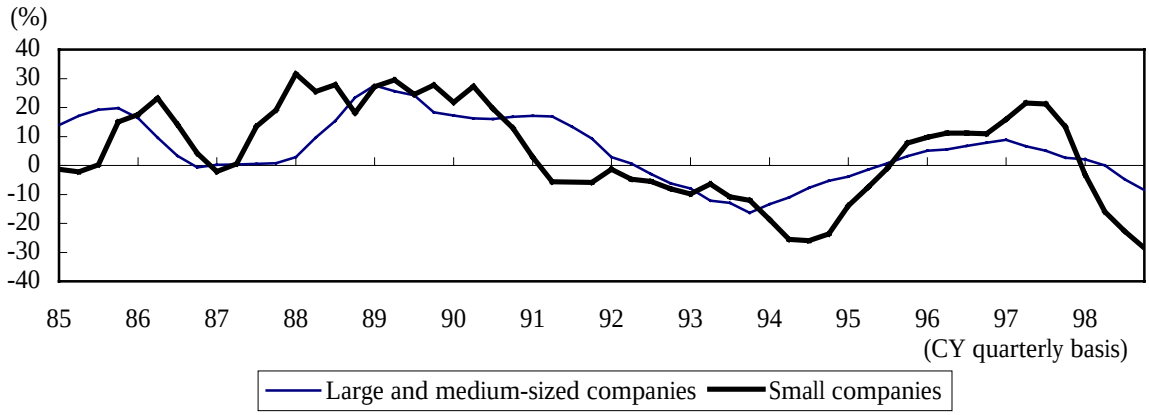


Figure II-9. Manufacturing

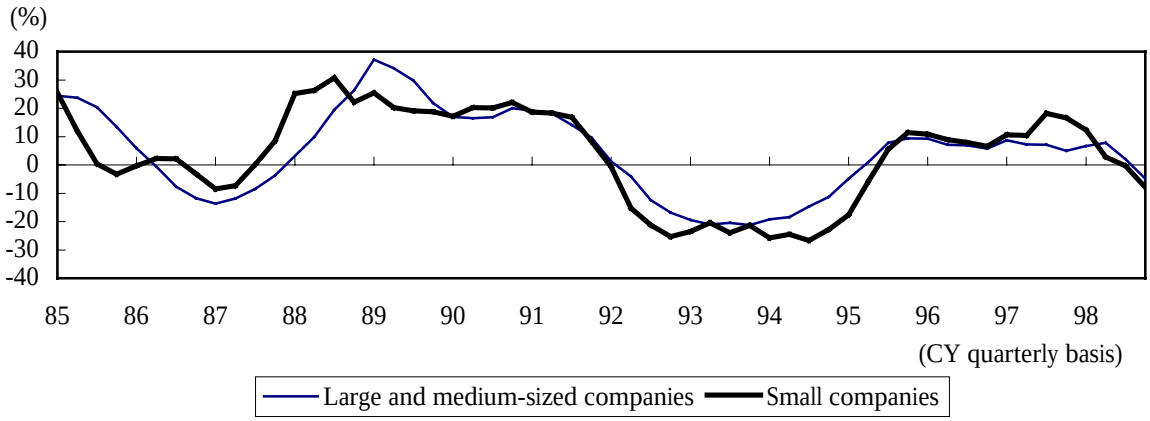
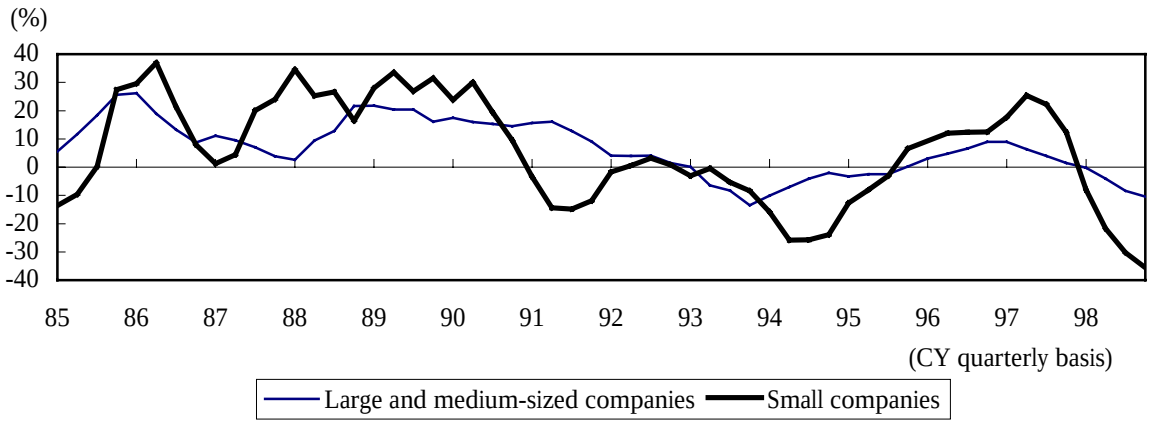


Figure II-10. Non-manufacturing



Notes: 1. Large and medium-sized companies are defined as companies with capital of ¥100,000,000 or over. Small companies are defined as companies with capital of between not less than ¥10 million and less than ¥100 million.
2. Annual rate of increase in plant and equipment investment is calculated after finding the three-quarter backward moving average for the original series.

Source: Ministry of Finance, "Quarterly Report of Statistical Survey of Incorporated Enterprises."

In the non-manufacturing sector, plant and equipment investment by large and medium-sized firms has been fairly stable and tended to underpin the economy. That of small firms, by contrast, displays considerable fluctuation. Since the collapse of the bubble, plant and equipment investment by small firms has lagged far behind that of large and medium-size firms except during the period of recovery in 1996 and 1997 (Figure II-10).

2. Plant and Equipment Investment and Machinery Orders Received

We tentatively calculated a simple function of plant and equipment investment as a means of analyzing the current fall in capital spending, which has been especially marked in the non-manufacturing sector. The explanatory variable is actual machinery orders received (civilian demand excluding ships and electric power), which is considered a leading indicator of private-sector plant and equipment investment. The data used represent the three-quarter backward moving average of seasonally-adjusted nominal value. A forward lag of two quarters is postulated.[30] The explained variable is the seasonally-adjusted nominal value of private-sector plant and equipment investment on a GDP basis. The period of computation is the second quarter of 1988 through the third quarter of 1999. The method of ordinary least squares (OLS) is employed.

The results are presented in Table II-2. They show on the whole a satisfactory performance. Figure II-11 plots in graph form the explanatory variable, i.e., value of orders received for machinery, the explained variable, i.e., actual and estimated private-sector plant and equipment investment, and the error in approximation (actual investment - estimated investment). Trends for the period from the fourth quarter of 1997 through the third quarter of 1998 are extrapolated.

Table II-2. Plant and Equipment Investment Function: Results of Tentative Computation

Period of computation: 1988/ 2Q - 1997/ 3Q. Method of computation: OLS
Figures in brackets = t value.

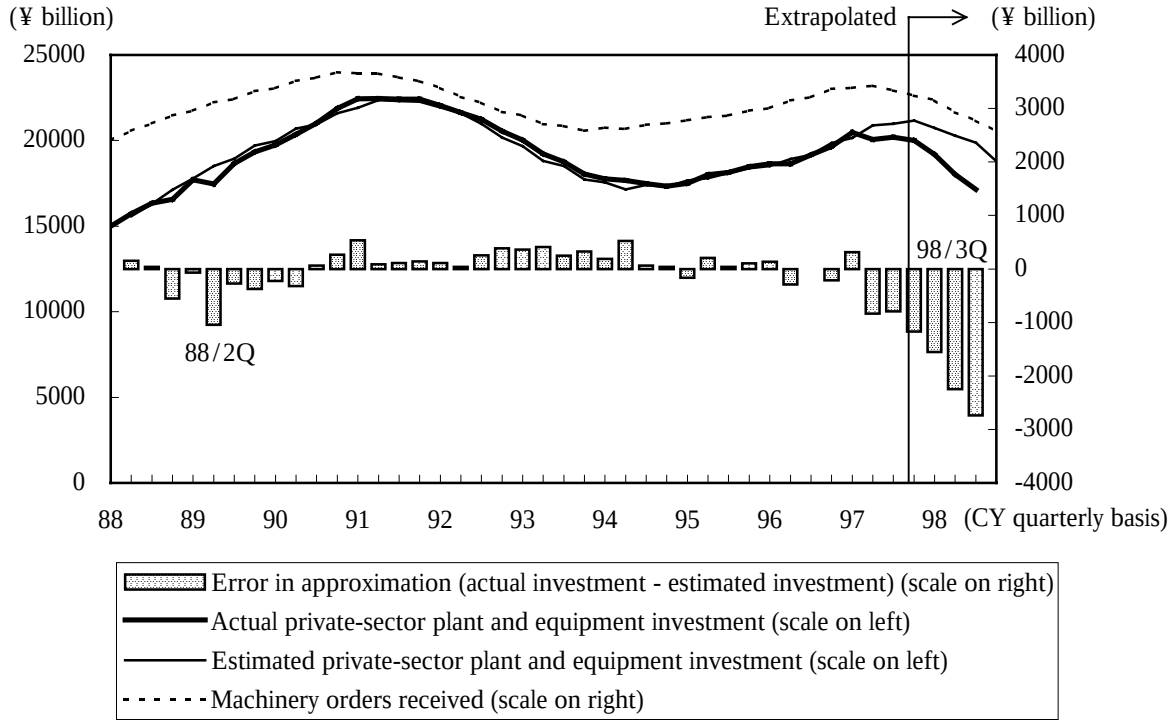
Explained variable	Constant	Value of machinery orders received	Coefficient of determination adjusted for degrees of freedom	
			Adj_R2	D-W ratio
Value of private-sector plant and equipment investment	0.474697*10^{7} (9.78793)	4.79739 (30.3377)	0.961312	1.07399

Notes: 1. Private-sector plant and equipment investment represents seasonally-adjusted nominal value on a GDP basis.
2. The data for machinery orders received, which cover private demand excluding ships and electric power, represent the three-quarter backward moving average of seasonally-adjusted nominal value. A lag of two quarters has been postulated in compiling the estimate.

[30] Since machinery orders received tend to swing considerably, the data have been seasonally adjusted, then smoothed out by the moving average method over the preceding three quarters. Note also that calculations were made for four separate scenarios with forward lags of between one and four quarters; a postulated forward lag of two quarters was found to produce the best results.

Figure II-11 indicates that actual investment has fallen considerably below estimated levels since the latter half of 1997. This discrepancy between machinery orders received and plant and equipment investment has occurred mainly in the communications sector.

Figure II-11. Error in Approximation of Private-Sector Plant and Equipment Investment as Estimated from Actual Machinery Orders Received



Sources: Economic Planning Agency, "Annual Report on National Accounts " and "Machinery Order Statistics."

3. Structural Changes in Plant and Equipment Investment

3.1 Debt Burden by Size of Enterprise Since the Bubble's Collapse: A Different Pattern from the 1970s

Plant and equipment investment by small businesses since the collapse of the economic bubble has in general been lackluster. One reason for this is the rise in debt burden due to the fact that small firms chose to raise funds from external sources as plant and equipment investment expanded from the late 1980s. Let us examine how number of years to redeem debt (outstanding debt / cash flow) by size of enterprise differs between the 1970s, including the first oil shock, and the period since the late 1980s (Figure II-12).

In the 1970s large and medium-sized companies took longer to pay off debt than their smaller counterparts. In the early part of the decade they spent considerable sums on plant and equipment investment; then, as earnings declined in the aftermath of the first oil shock, number of years to redeem debt shot up rapidly, peaking at nine years, twice the level for fiscal 1970. The amount of debt per company[31] held by small firms in the same period did not increase as much as that for large and medium-sized enterprises (Figures II-13 and II-14); thus number of years to redeem debt remained consistently lower. Number of years to redeem debt subsequently tapered off gradually for all sizes of enterprise thanks to improved profits.

In the first half of the 1980s number of years to redeem debt declined for large and medium-sized companies, but gradually crept up for small companies.

Beginning in the late 1980s, small companies in particular rapidly increased their dependence on outside funding as plant and equipment investment ballooned. By the early 1990s the number of years it took small firms to redeem debt had soared as profits soured. Large firms, by contrast, did not in the main suffer as severe a slump in profits; hence the number of years they required to redeem debt inched up only slightly.

Thus the number of years required for small businesses to redeem debt jumped dramatically following the collapse of the bubble economy, in stark contrast to the situation in the 1970s. The sluggishness of plant and equipment investment by small firms throughout the course of the 1990s can thus be ascribed ultimately to their heavy debt burden.[32]

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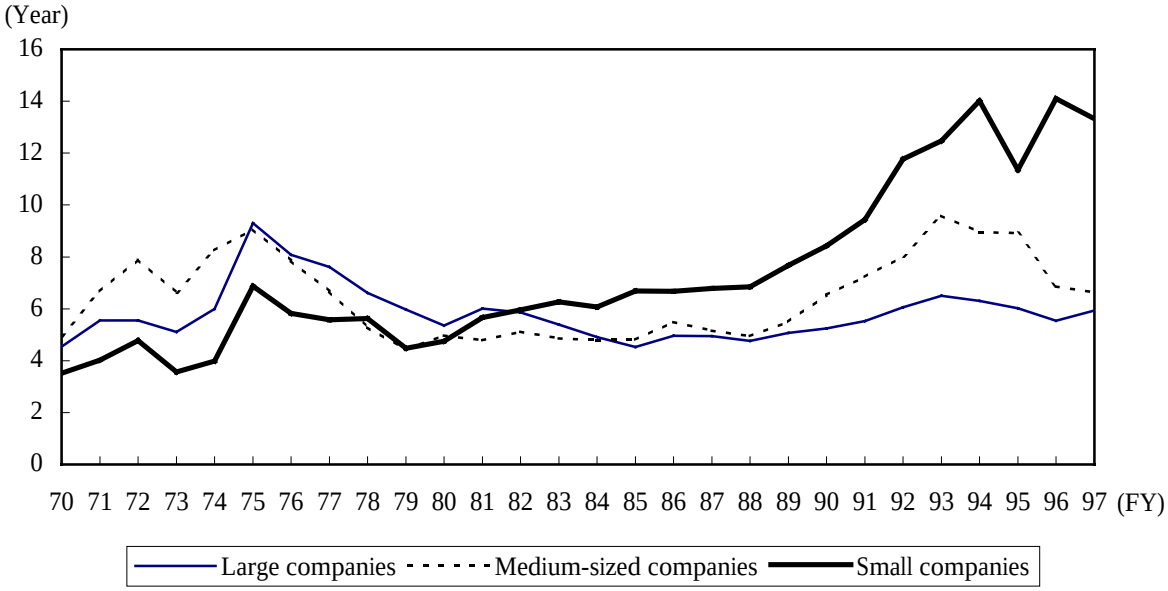
[31] The number of small companies has increased dramatically in the 1990s. This is because many extremely small enterprises (with capital of less than ¥10,000,000) increased their capital such as to be eligible for classification as small businesses (with capital of between not less than ¥10 million and less than ¥100 million) after the minimum amount of capital required to incorporate a joint-stock company (*kabushiki kaisha*) was raised to ¥10,000,000. In order to exclude the effect of this trend, we have calculated outstanding debt and cash flow on a per-company basis.

[32] Debt burden exerts an adverse impact on a company's plant and equipment investment in two regards. The company itself loses its enthusiasm for plant and equipment investment because that would entail increasing funding from outside sources, while financial institutions are reluctant to lend to a company already laboring under an extremely heavy debt burden due to the risks involved. Needless to say, another reason for the current severe slump in plant and equipment investment is the lack of a clear forecast of future demand.

Figure II-12. Number of Years to Redeem Debt by Size of Enterprise (All Industries)



Outstanding Debt and Cash Flow per Company

Figure II-13. Large companies

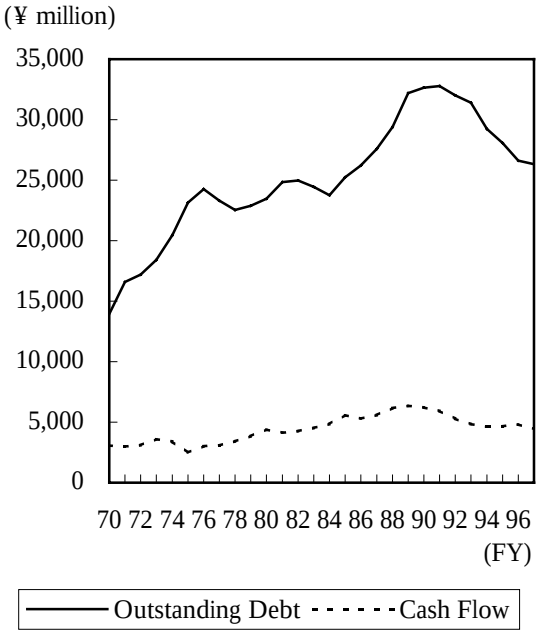
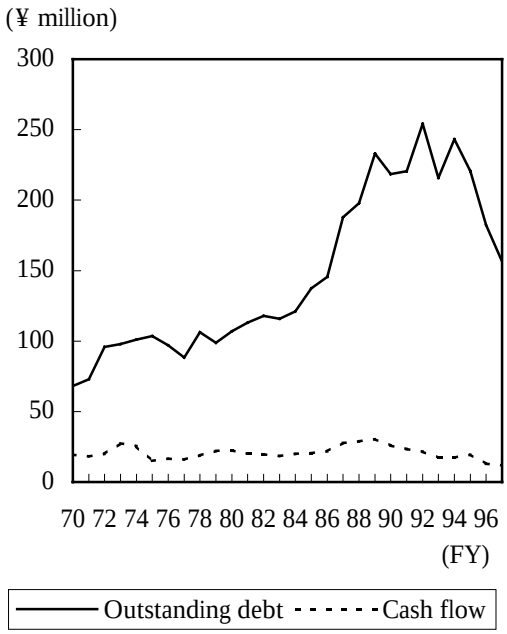


Figure II-14. Small companies



Notes:
1. Large companies are defined as companies with capital of ¥1 billion or over. Medium-sized companies are defined as companies with capital of between not less than ¥100 million and less than ¥1 billion. Small companies are defined as companies with capital of between not less than ¥10 million and less than ¥100 million.
2. Number of years to redeem debt = outstanding debt / annual cash flow.
3. Outstanding debt per company = (outstanding long-term loans + outstanding bonds) / estimated number of companies.
4. Cash flow per company = (depreciation + retained profits) / estimated number of companies; retained profits = current income after tax - dividends and bonuses.

Source: Ministry of Finance, "Quarterly Report of Statistical Survey of Incorporated Enterprises."

3.2 Impact of Lending Constraints on Non-manufacturing Plant and Equipment Investment

As we have already observed, since the collapse of the bubble economy plant and equipment investment by small companies in the non-manufacturing sector has been especially sluggish compared to that by large corporations. In this section we shall examine the reason for this slump through a comparison with the activity of large companies in the same sector, but from a different viewpoint to that adopted in Part 1.

In the late 1980s and at the beginning of the 1990s plant and equipment investment by large corporations in the non-manufacturing sector grew fairly steadily, buoyed up by a solid rate of return on real assets (Figure II-15). With the collapse of the bubble, however, investment has slumped as rates of return have declined. No definite correlation can be identified between plant and equipment investment and the Lending Attitude D.I.

The rate of return on tangible assets for small businesses in the non-manufacturing field suffered a similar dramatic fall in the first half of the 1990s, then entered a further dive in 1997 before ever having had a real chance to recover (Figure II-16). Meanwhile plant and equipment investment by small businesses experienced three separate periods of decline, in the early and mid 1990s and again from 1998. In the early 1990s and in 1998 the Lending Attitude D.I. also plummeted; this, it is fair to assume, placed constraints on plant and equipment investment. During the latest plunge in particular the Lending Attitude D.I. declined to an unprecedented low, a fact that presumably further accelerated the rapid decline in plant and equipment investment by small corporations, which depend mainly on lending from financial institutions for external funding.

To summarize, trends in plant and equipment investment by large corporations in the non-manufacturing sector can basically be explained with reference to rates of return on real assets. Plant and equipment investment by small businesses in the non-manufacturing sector, by contrast, is influenced not only by rates of return on real assets, but also by borrowing constraints as illustrated by the Lending Attitude D.I. for financial institutions.

Annual Increase in Plant and Equipment Investment, Rate of Return on Tangible Assets and Lending Attitude D.I.

Figure II-15. Large Companies in the Non-manufacturing Sector

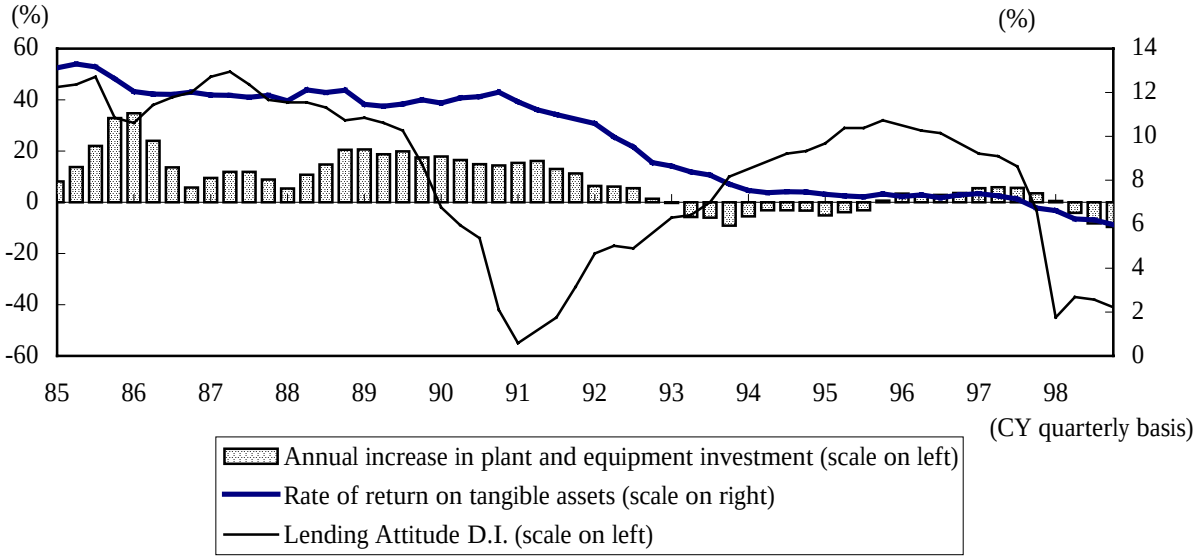
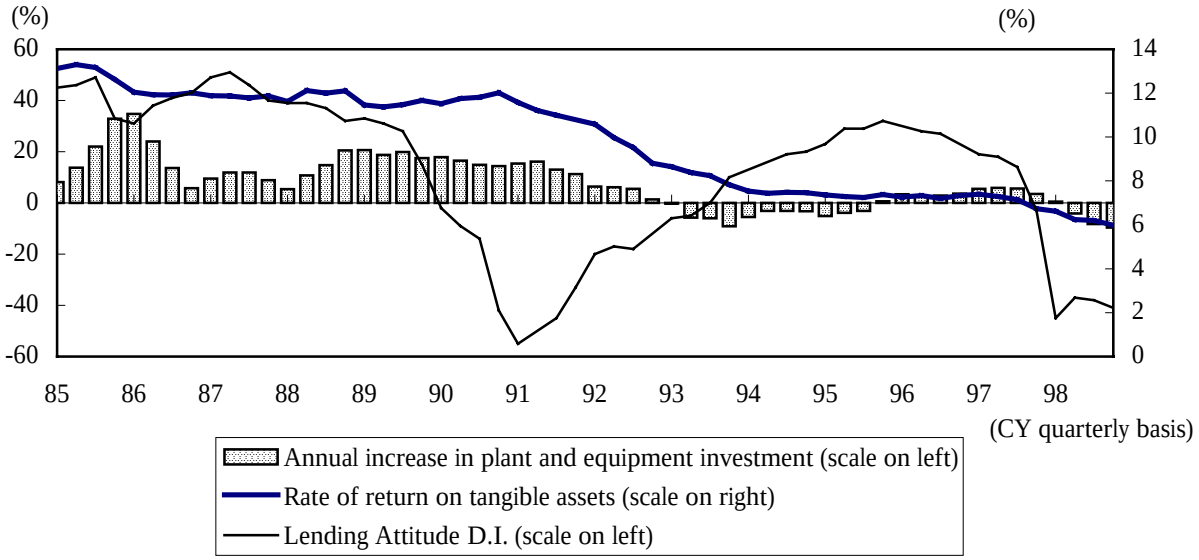


Figure II-16. Small Companies in the Non-manufacturing Sector



Notes:
1. Large companies are defined as companies with capital of ¥1 billion or over. Small companies are defined as companies with capital of between not less than ¥10 million and less than ¥100 million.
2. Annual increase in plant and equipment investment is calculated after finding the three-quarter backward moving average for the original series.
3. Rate of return on tangible assets = operating profit / average for beginning and end of quarter (tangible fixed assets [excluding land] + inventories).
4. Operating profit, tangible fixed assets (excluding land) and inventories are seasonally-adjusted and calculated based on the three-quarter backward moving average.
5. Lending Attitude D.I. for financial institutions = "accommodative" - "severe."
6. Lending Attitude D.I. for large companies represents the judgement index for major corporations.

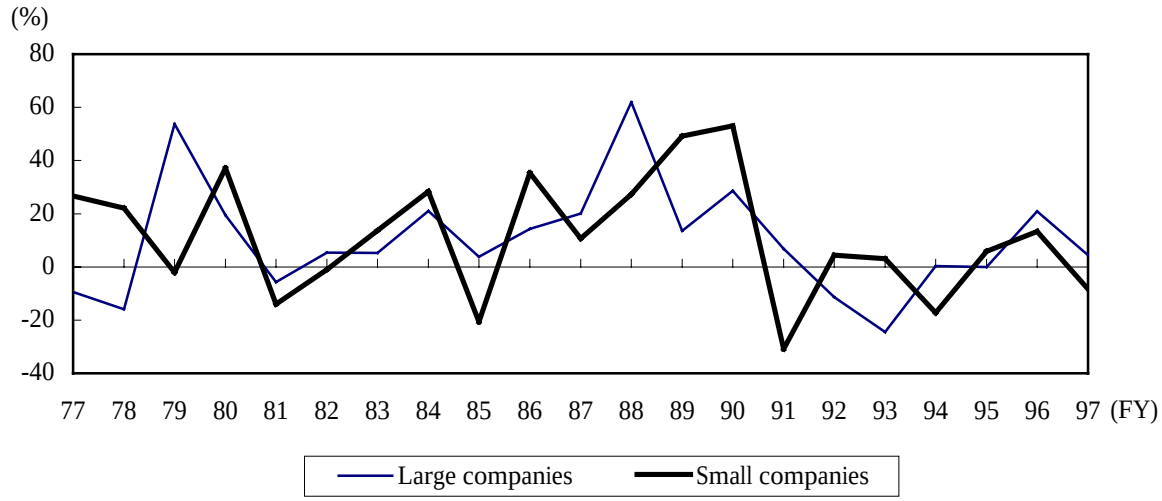
Sources: Ministry of Finance, "Quarterly Report of Statistical Survey of Incorporated Enterprises;" Bank of Japan, "Tankan."

3.3 Case Study of Structural Change in the Retail Industry

In addition to borrowing constraints, another factor appears to have had a major impact on the sudden decline in plant and equipment investment since 1998, which has been especially severe among small corporations in the non-manufacturing sector. That factor is the short-term slump in business caused by a downturn in consumer spending etc. This section examines the structural problems that lie behind the slump, focusing on the retail industry in particular. The retail industry has been buffeted by the winds of deregulation ever since rules under the Large-Scale Retail Stores Act were eased in 1991. We shall describe how the industry has changed by examining plant and equipment investment trends by scale of enterprise.

Figure II-17 plots annual growth in plant and equipment investment by large and small firms in the retail sector. Investment by small firms climbed continuously in annual terms between fiscal 1986 and 1990, then turned negative in fiscal 1991. The drop in that year was especially precipitous, reflecting in part the fact that investment had soared by some 50% for two consecutive years in 1989 and 1990. Capital spending suffered a second year-on-year drop in 1994 before ever really having revived, then once again fell in 1997. Plant and equipment investment by small firms has thus remained for the most part in the doldrums. That by large companies, meanwhile, increased for ten successive years between fiscal 1982 and 1991 before turning negative in 1992, a year later than in the case of small firms. From 1994 it enjoyed a moderate recovery, which however did not prove very substantial. A survey of plant and equipment investment in the retail sector since the collapse of the bubble economy thus reveals no major differences between large and small firms, although the slump has definitely been more severe in the case of the latter.

Figure II-17. Annual Growth in Plant and Equipment Investment in the Retail Sector



Note: Large companies are defined as companies with capital of ¥1 billion or over. Small companies are defined as companies with capital of between not less than ¥10 million and less than ¥100 million.
Source: Ministry of Finance, "Quarterly Report of Statistical Survey of Incorporated Enterprises."

Let us now examine secular trends in retail floor space by number of workers[33] between 1976-97 based on the "Commercial Statistics Tables" compiled every three years (Figure II-18). In 1997 stores with 1-2 workers accounted for the largest single share of floor space, approximately 20% of the total, followed by large-scale stores with 100 workers or more at 17%. Added together, stores with 1-9 workers accounted for 53% of total floor space. This suggests the extent to which the retail sector is dominated by sole proprietors and small shopkeepers.

The retail floor space occupied by stores with 10 or more workers has increased steadily since 1976. Notably, it has continued to expand at an annual rate of over 5% even after the bubble burst in 1991. The amount of retail floor space occupied by stores with 1-4 workers, conversely, has declined since 1991. This can perhaps be ascribed in part to the relaxation of the Large-Scale Retail Stores Act in 1991.

Figure II-19 gives retail floor space efficiency by number of workers (annual sales / retail floor space). Medium-sized stores, comprising chiefly stores with 20-29 workers, display the highest sales efficiency, while large-scale stores with 50 workers or more are less sales-efficient than their smaller counterparts with 5-9 workers. Viewed chronologically, retail floor space efficiency has declined for all sizes of store since peaking in 1991 immediately after the collapse of the bubble economy. Large-scale stores in particular are believed to have undertaken considerable fixed investment in connection with the easing of controls under the Large-Scale Retail Stores Act, a trend further fueled by the bullish sales forecasts of the bubble era. Once consumer spending slumped after the collapse of the bubble, however, they appear to have been unable to generate enough profits to justify their investment.

In the retail sector, therefore, structural change in the form of a relaxation of the Large-Scale Retail Stores Act following the collapse of the bubble led to cutthroat competition. This in turn created harsh business conditions for small and extremely small companies, resulting in an adverse impact on plant and equipment investment.

[33] Data by number of workers (including sole proprietors) are utilized here because the figures publicly available in the "Tables of Commercial Statistics" do not allow one to gauge retail floor space by amount of capital.

Figure II-18. Retail Floor Space by Number of Workers

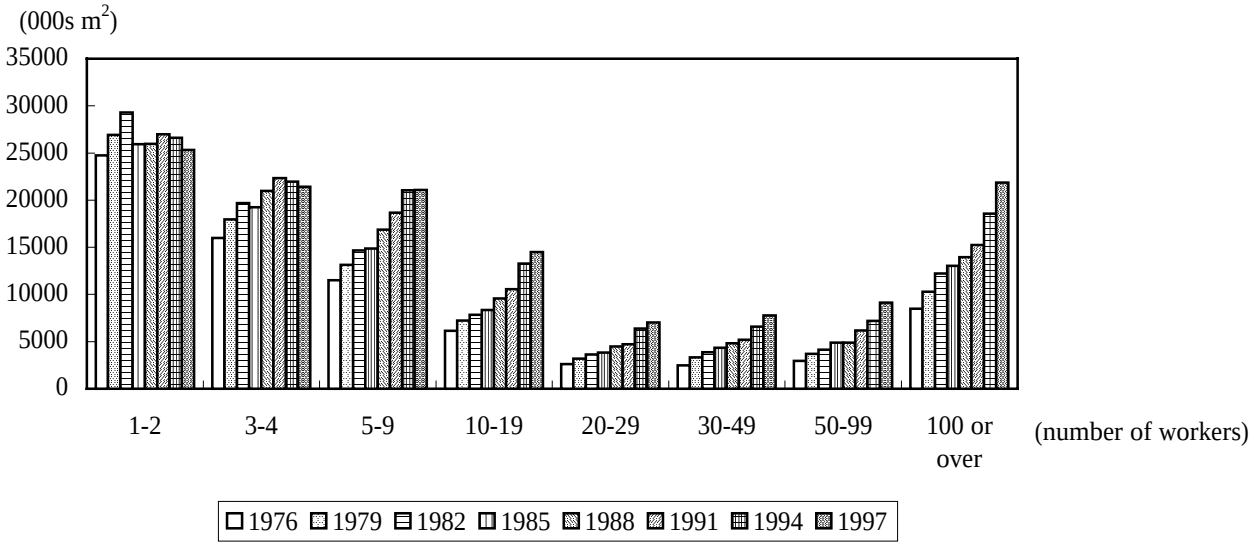
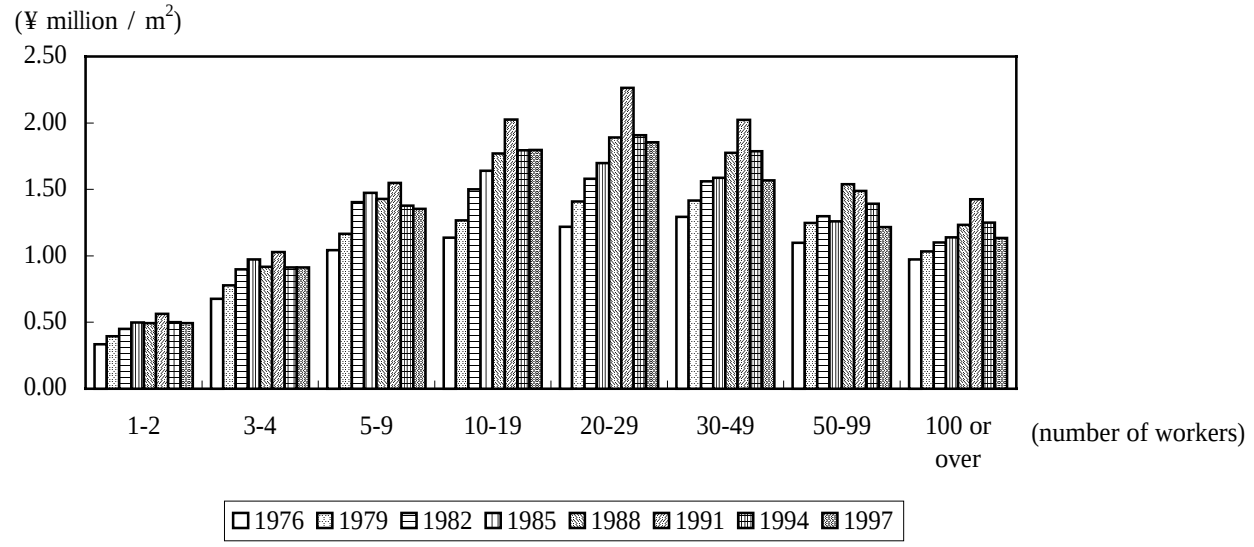


Figure II-19. Retail Floor Space Efficiency by Number of Workers (Annual Sales / Retail Floor Space)



Source: Ministry of International Trade and Industry, "Commercial Statistics Tables."

Conclusion

Chapter I examined the macroeconomic aspects of plant and equipment investment. It was suggested that a structural factor, namely the decline in medium- to long-term expected growth rates, has had an impact on the steep drop in plant and equipment investment. Similarly, it was argued, the capital coefficient, which until now has been climbing at a rate of 2-3% over the medium to long term, is unlikely to continue its rise in light of the fact that the rate of return on capital has plummeted during the 1990s; this too may adversely affect plant and equipment investment. The fact that gross demand has suffered a sustained slump over the course of the 1990s, especially after the collapse of the so-called bubble economy, was identified as one of the cyclical factors responsible for languishing plant and equipment investment. Sluggishness in demand drives down capacity utilization rates, thus driving up excess capacity. Meanwhile the slowdown in plant and equipment investment leads to an increase in the vintage of capital stock, which in turn has a latent impact on the supply side of the economy. Obsolescent facilities thus need to be abandoned in favor of quality investments on a scale commensurate with gross demand.

Chapter II focused primarily on microeconomic trends by scale of enterprise. First, it was demonstrated that the lackluster performance of small business in the non-manufacturing sector since the collapse of the bubble economy is due especially to sluggishness in the services, real estate, and wholesale and retail industries. It was further argued that the present slump in plant and equipment investment by small non-manufacturing firms is related not only to the cyclical decline in the rate of return on real assets but also to constraints on borrowing. A structural reason for languishing plant and equipment investment by small firms appears to be the rapid rise in debt burden over the course of the 1990s. Deregulation has also exerted an impact on plant and equipment investment by small and extremely small enterprises, the retail sector being a case in point.

Thus two sets of factors lie behind the present steep drop in private-sector plant and equipment investment. The first consists of cyclical factors, such as the drop in capacity utilization rates and rates of return caused by a short-term slowdown in demand. The second consists of structural problems that have been lurking deep down since the collapse of the bubble economy: the decline in long-term expected growth rates and the rate of return on capital, a harsh borrowing environment and a heavy debt burden. The current adjustment in plant and equipment investment is for that reason of considerable depth.

The task at hand is for companies to reorganize the way they do business and government to stabilize the financial system in order to solve these structural problems. In this way an environment can be created in which firms pursuing new technologies and commercial opportunities are able to invest in the future.

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