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I. Introduction

After long high economic growth until the beginning of the 1970's from the start of the 1960's, the Japanese economy has shown a rapid decline in the growth rate at the advent of the first oil crisis of 1973 as the other industrialized economies have. Not a few authors have already analyzed the causes of the growth slowdown after the energy crisis in relation to the production structures of industrialized countries (for example, Jorgenson, Gollop and fraumeni [1987] , Kendrick [1984] , Kendrick and Grossman [1980] , Lindbeck [1983]).

Concerning the Japanese economy, Jorgenson has recently investigated the sources of changes in the productivity and the growth rate during the period from 1960 to 1979 in comparison with the U. S. economy (Jorgenson [1988]). His conclusions are that the slowdown in economic growth of both countries after 1973 is not attributable to the decline in the growth rate of capital, that as far as the Japanese economy is concerned, a sharp decline in the rate of technical change is identified as "the most important single factor" for the slowdown, and that it is because Japanese industry is dominantly characterized by energy-using technical change.

In his argument, the slowdown in economic growth is related with increases in energy prices through the energy-using character of technical change of Japanese industry, which made its production methods revert to less energy-using methods of older vintages after the oil crisis. That is to say, a dramatic decline in the rate of technical change owing to this adjustment behavior to the energy prices is considered to be the primary reason of the slowdown in economic growth.

I focus my attention on two questions related to Jorgenson's conclusions. One is whether the reversion of production methods to older vintages will be certified from the point of view of age structure of stock of fixed capital, and the other is whether the energy-using character of Japanese industry will still be preserved in recent years, almost ten years after the second oil crisis, as Jorgenson mentioned in his study based on the observation up to 1979. The objective of this paper is to examine these points by estimating time variations in capital stock structure of Japanese manufacturing industries.

The statistical materials on fixed capital are primarily based on the Survey of National Wealth. In Japan, however, the Survey is carried out only every five years with the first investigation in 1955 after the World War II, and does not give so detailed information as vintages of existing fixed assets by industries in every year of investigation. Therefore, with the comprehensive use of various related materials consisting mainly of capital formation statistics, I estimate the values of stocks of fixed capital, gross capital formations, purchase of used assets, and retirement of assets of each year at constant prices, retrospecting to the past as far as possible from the latest year of 1986. The detailed and specific procedures of estimation are described in SUPPLEMENT.

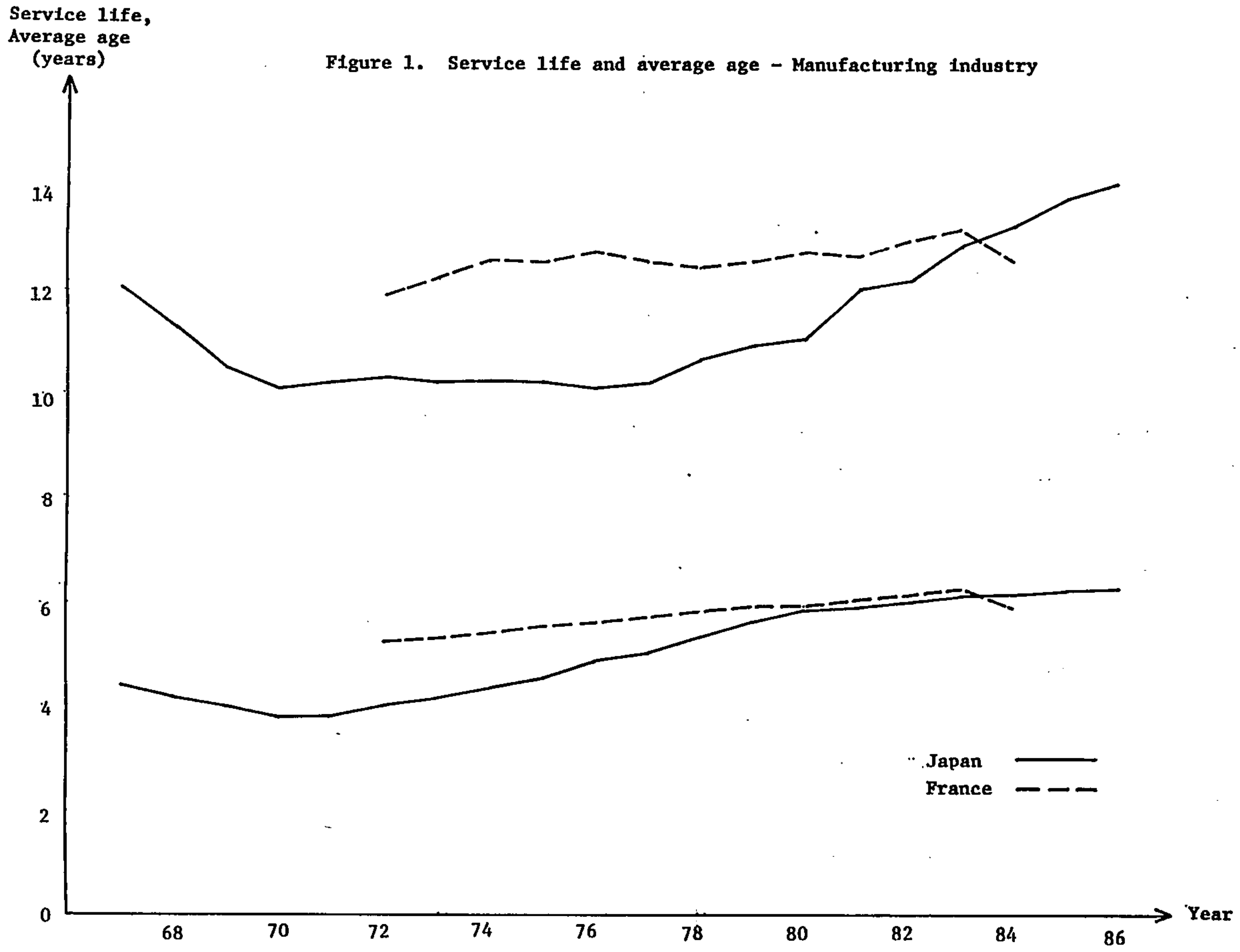
Recently Cette and Szpiro have presented the results of their estimation concerning age structure of fixed capital of French manufacturing industries (Cette et Szpiro [1988]).[1] So, this paper will have an additional purpose of comparing production structures between Japan and France with respect to changes in age structure of capital stocks in both countries. For that purpose, the estimation procedures for retirement of assets and the like adopt the similar suppositions to those of Cette et Szpiro [1988] [2].

II. Change in service life of assets

At first, we look at the results of estimation in Figures 1 to 4. APPENDIX B gives in full the estimated figures of the oldest and average ages of fixed assets existing at the end of each year concerning Japanese manufacturing industries, and the Figures are graphical representations of those estimated results. Figure 1 shows the changes for manufacturing industries as a whole, Figure 2 to 4 represent the changes for intermediate goods (materials) industry, equipment goods industry, and consumption goods industry, respectively, showing together a few of main individual industries belonging to them. The changes for French industries indicated by dotted lines were obtained from the estimates of Cette et Szpiro [1988] for each of three sub-groups of manufacturing industry. In each Figure, the lines appearing in the upper part show the movements of service life (the oldest vintage) of existing assets and those in the lower part represent the movements of average age which is calculated by weighting with the amounts of assets of each vintage.

Looking at the movements of service life of assets of Japanese manufacturing industry as a whole, the service life remains stable at 10.2 years around or rather shortens during some years after the first oil crisis of 1973, and then, it shows an upward trend with an annual rate of 0.4 years in average, starting from about the second oil crisis of 1978-79, and gets to 14.0 years at the end of 1984. Comparing with French industry from 1972 to 1984, the service lives of assets of two countries

Figure 1. Service life and average age - Manufacturing industry



change in opposite direction during the period of two times of the oil crises and this causes a difference of service life between two countries to be enlarged to 2.6 years in 1976 as against 1.5 years in 1972. After that, the rapid upward tendency of Japan as compared with stable change of France brings the service lives of manufacturing industry of both countries to almost the same level of around 13 years in 1983-84.[3]

Examining movements of individual industries, in France, the service life of fixed assets remains stable at about 11 years in equipment and automobile industry during the period of observation, but it shows an obvious rising trend all through the same period in the other two industries of intermediate goods and consumption goods.[4] In Japan, among principal individual industries shown in Figures 2 to 4, the service life of fixed assets rapidly decreases only in textile industry (excluding apparel and other fabricated textile products) until the second oil crisis, and after 1980, the service life undergoes a fast decline only in electrical machine industry. (In the early period of observation of Japanese industry, the oldest age of existing assets declines in a considerable number of individual industries such as electrical, mechanical and so forth. This brings about a rapid decline in the service life of assets in total manufacturing in Japan until 1970.) In all industries other than textile and electrical machinery, the service lives always show an upward tendency all through the period of comparison with French industry (1972-1984). That is to say, when we examine individual movements of the service lives of production equipments in Japanese manufacturing industries, it is known that the service lives of their fixed assets moved with a slight rising trend all through the period except in textile and electrical machine industries where the trend changed after the second oil crisis (a V-shaped movement being shown in the former industry, and an inverse V-shaped in the latter). Ever since, each industry has kept

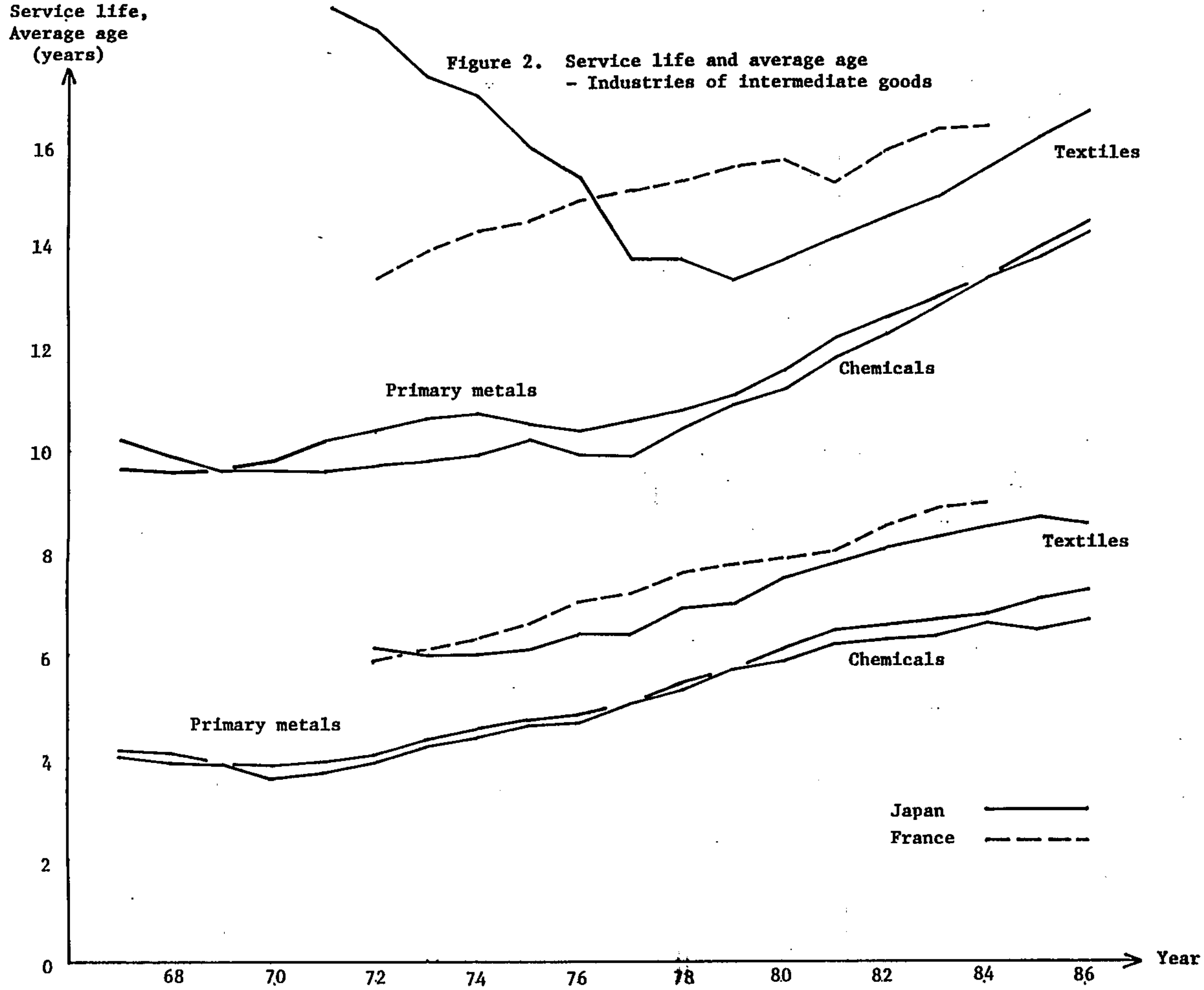


Figure 2. Service life and average age
- Industries of intermediate goods

Figure 3. Service life and average age
- Industries of durable equipment and automobile

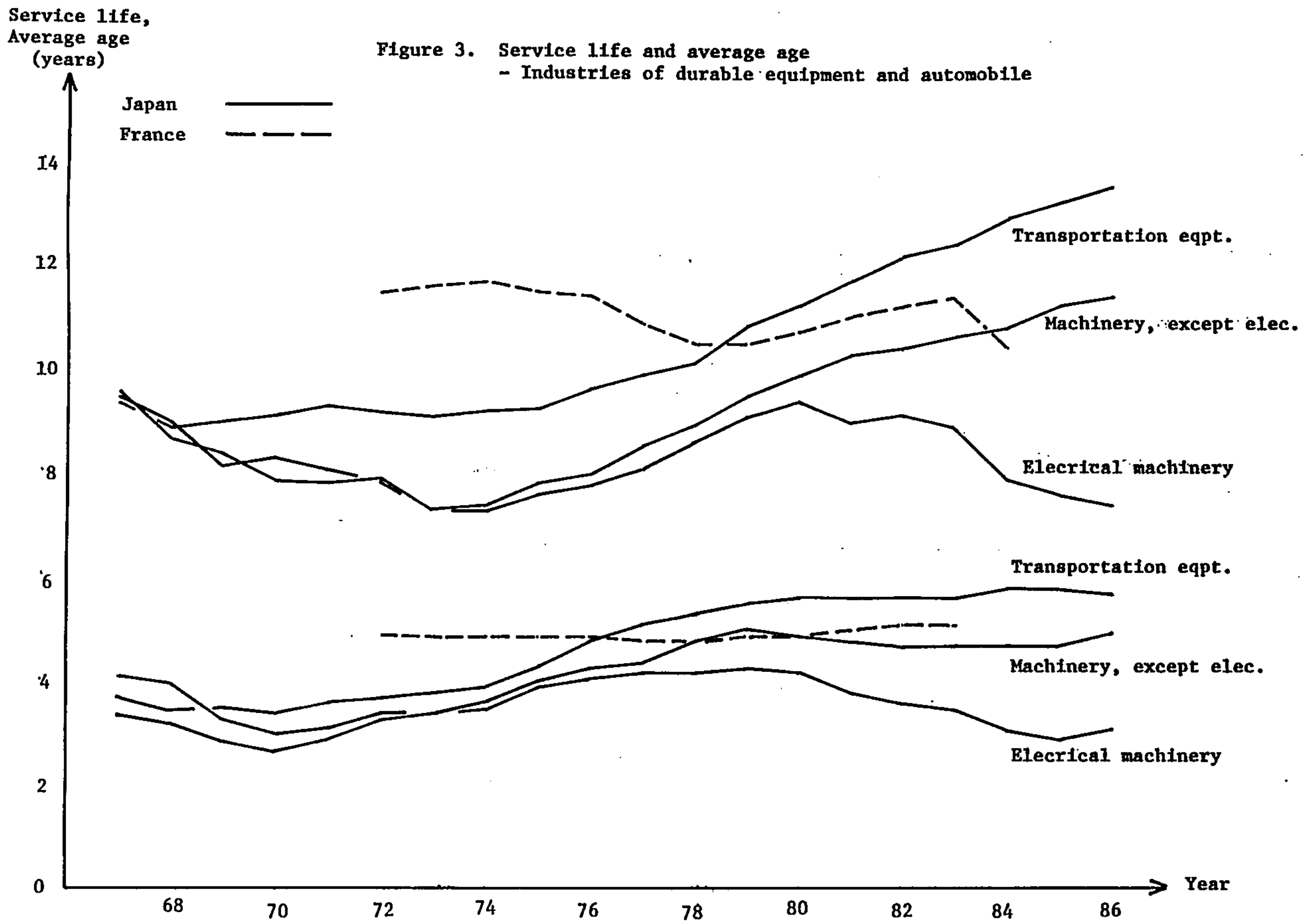
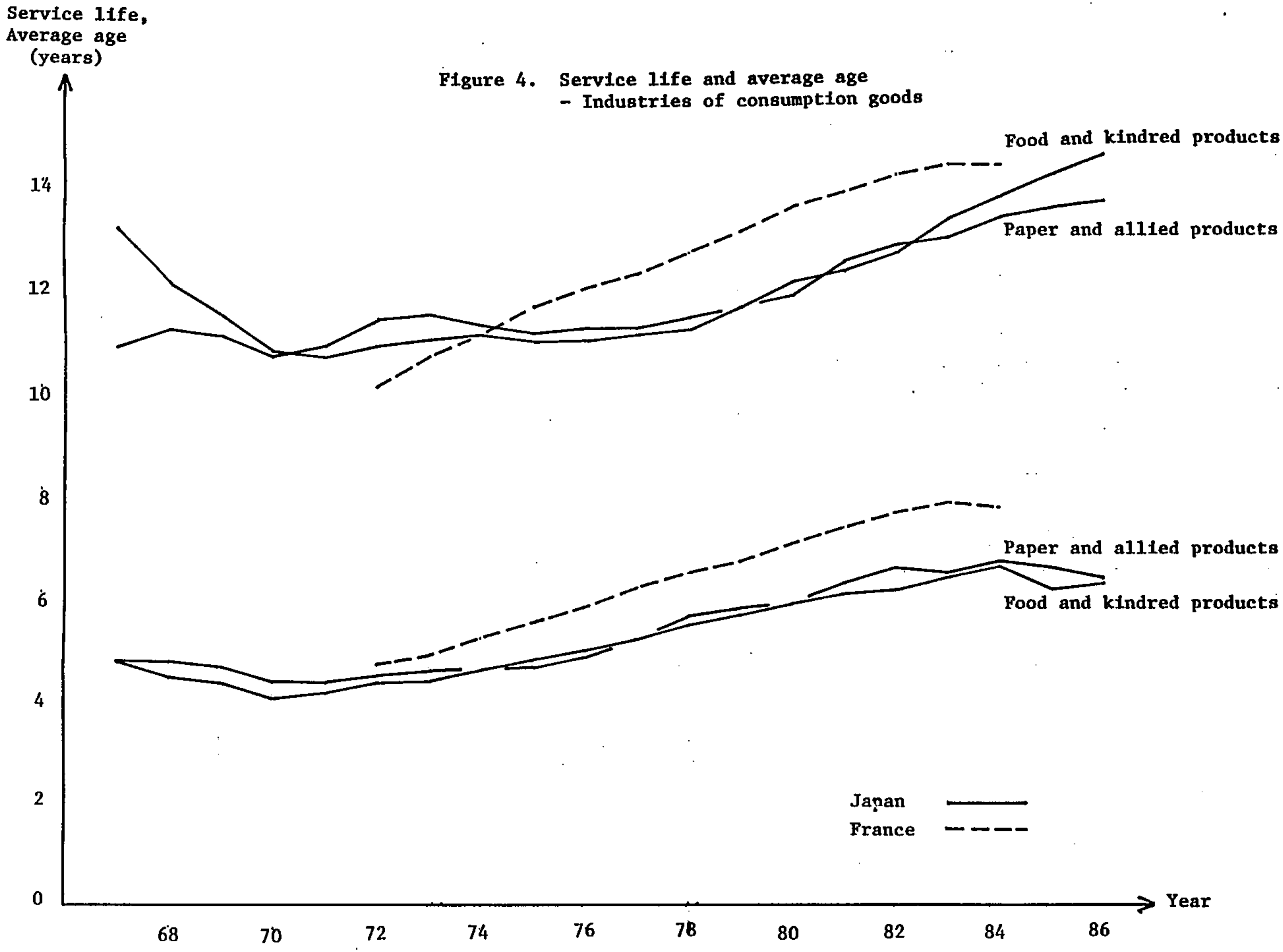


Figure 4. Service life and average age
- Industries of consumption goods



its own tendency up to the end of the latest year of 1986.

There are many other industries which do not appear in the Figures such as apparel and other fabricated textile products, Rubber and miscellaneous plastic products, leather and leather products, lumber and wood products, printing and publishing, and the like. Those industries besides textile and transportation equipments industries had a considerable effect on the difference of service lives of assets between Japan and France, which had a diminishing tendency after the second oil crisis and almost vanished in 1983-84, the level of service lives in both countries becoming the same number of years of about 13. It is known, however, that in spite of the rising tendency of service lives, the oldest existing assets are much younger in Japan than in France, especially in electrical machinery, primary metals, and chemicals which are industries intensive in high technology and competitive in world market.

III. Change in average age of stocks of fixed capital

Now, we examine movements of average age shown in the lower part of the Figures 2 to 4, taking account of the changes in the service lives observed in the preceding section.

At first, for total manufacturing, average age of fixed assets in Japan increased with appreciable rapidity during the period of two times of the oil crises and moved in close to the average age in France which showed a very stable movement at about 5.5 years at a low increasing rate all through the period (an average annual increase rate being 0.2 years in Japan as against 0.1 years in France during the period of 1973 to 1979). But after 1980, both countries have run in parallel with each other with a difference of average ages of 0.1 years. It is noticed as to total manufacturing in Japan that the average age increased rapidly during the period of two times of the oil crises in contrast to the stable movement of the service life during the same period.

Examining movements in individual industries, average age has a rising trend in each industry belonging to intermediate goods and consumption goods industries all through the period of observation, but it changes the movement after the second oil crisis in each industry belonging to equipment goods industry; average age of fixed assets in transportation equipments and machine industries turns to a stable movement from the upward tendency and it declines with considerable rapidity in electrical machine industry after around the second oil crisis. Compared with the movement of service life of fixed assets, in electrical machinery, change in average age of capital stock takes the similar V-shaped curve to that of service life, though the annual change is smaller and the turning point appears somewhat earlier in the movement of average age than in that of service life. In textile industry, however, a movement of average age shows the same upward tendency as that of the other intermediate goods industries, while the service life of assets showed a distinct V-shaped movement.

In comparison with French manufacturing industries, in industries cited in Figures 2 to 4 except transportation equipments, average age of assets in Japan remains younger than that of a corresponding industry in France as seen in the case of service life. It is noted that, in opposition to the case of service life, a difference of service lives between two countries has a tendency to increase as time goes on in not a few industries such as two consumption goods industries as well as electrical machinery.

IV. Change in age structure of fixed capital stock

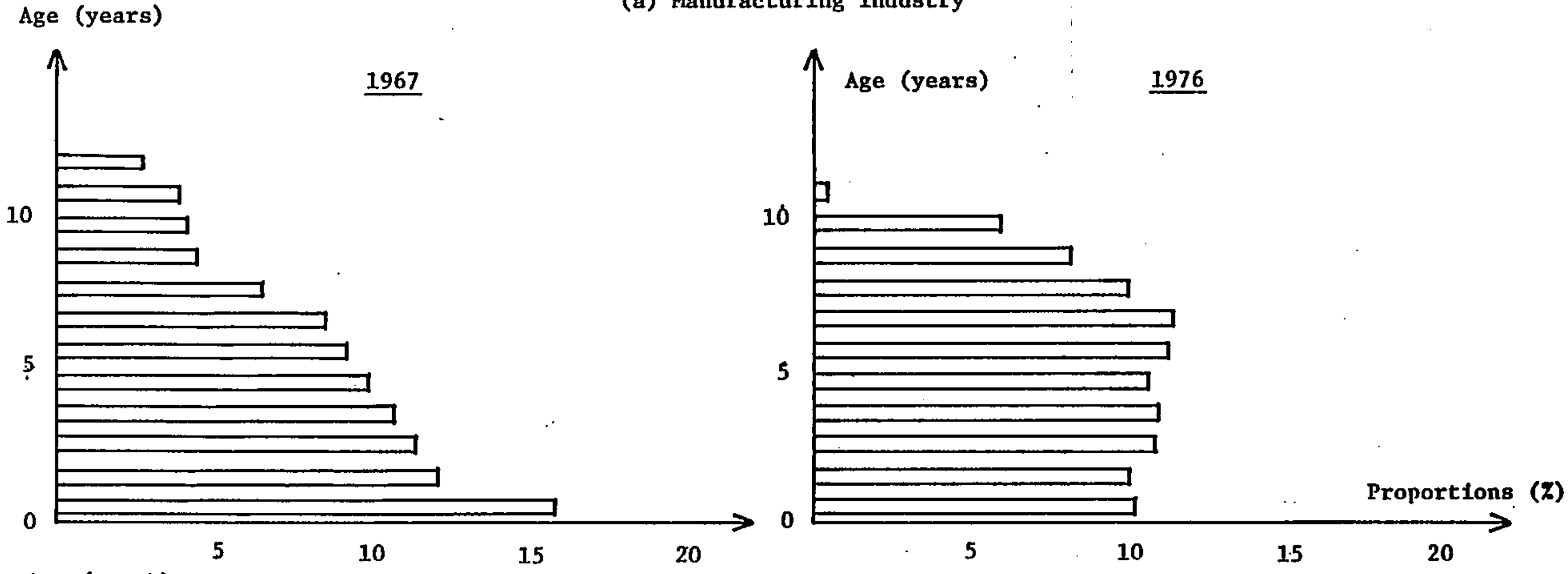
We have observed the general movements of the oldest age (service life) and the average age of production equipments in Japanese manufacturing industries in the preceding sections, and have extracted some characteristics in their movements in individual industries and in comparison between Japan and France. Before investigating them further in relation to Jorgenson's argument summarized in the beginning section, we look at change in age structure of stocks of fixed capital in Japanese manufacturing industry.

Figure 5 shows age structures of fixed assets pertaining to total manufacturing industry and electrical machinery as one of individual industries, which are represented in proportion (in percentage) for three points of time, every ten years with the latest year of 1986. (Concerning total manufacturing, the age structure is shown for 1967 in stead of 1966, because 1967 was the oldest possible year for estimation of the service life.)

Needless to say, age structure of fixed assets of a particular industry in a certain year is a consequence of activities of firms on capital formation and retirement of assets in the past. If we presume a technical combination of production to have an ex-ante and ex-post complementarity between productive factors, that is, a production function of clay-clay type, labor productivity becomes higher as labor input is combined with equipment introduced more recently, on account of technical change of production caused mainly by technical innovation. This is pushed further by disembodied technical progress coming from training, reorganization of labor force, and many other reasons independent from technological transformation of production. Accordingly, an equipment installed more recently has higher profitability in general, and age structure of fixed capital will take a pyramidic form with the latest investment at the base, as far as the conditions of capital formation are

Figure 5. Age structure of capital stock

(a) Manufacturing industry



(b) Electrical machinery

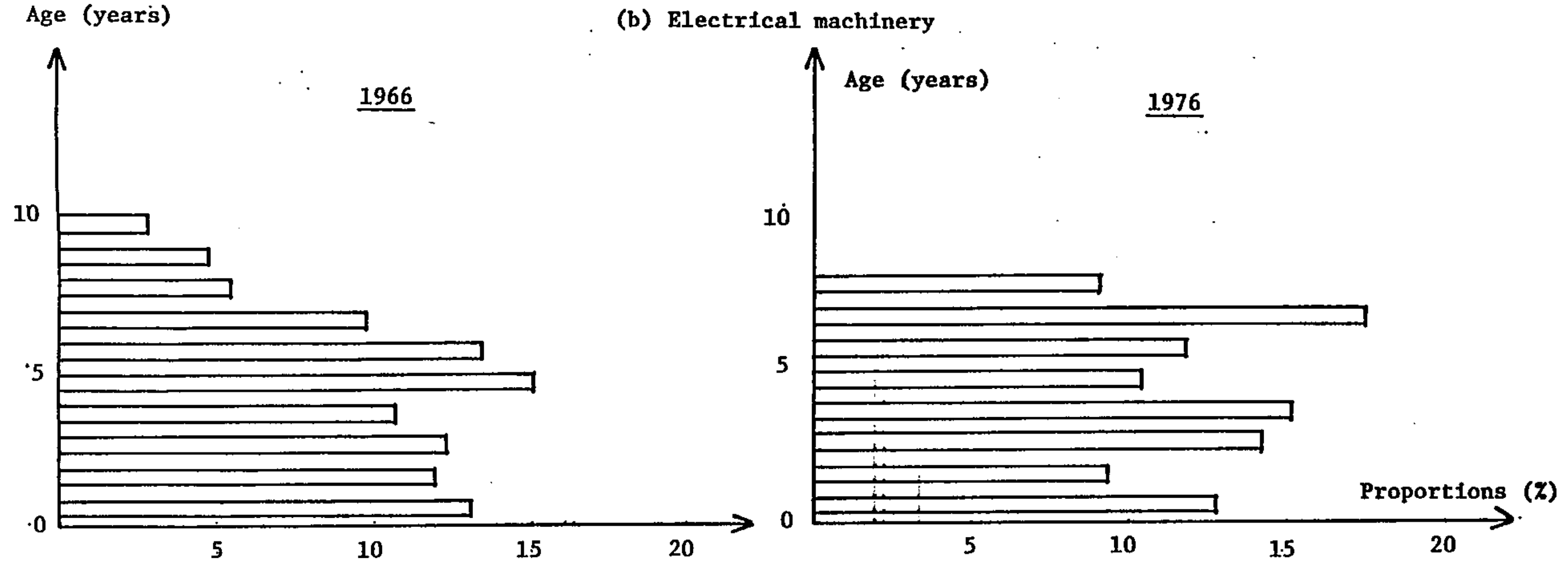
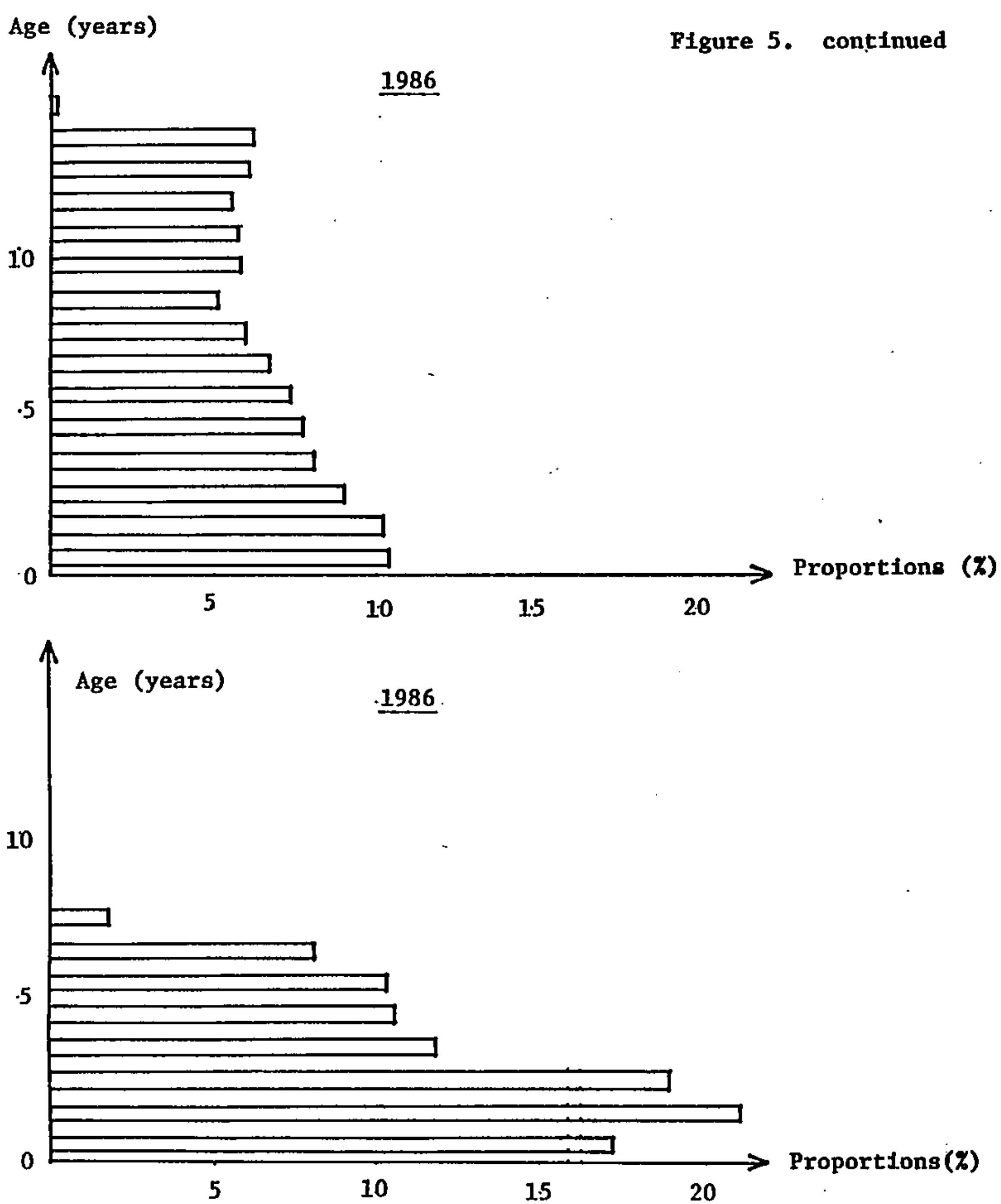


Figure 5. continued



not greatly changed during the period when the existing stock of equipments has been accumulated. It was almost the case at the end of 1960's, which is represented in Figure 5. Particularly, the age structure takes a typical pyramidic form for total manufacturing industry, but for electrical machinery as one of individual industries, the structure is not typically pyramidic owing to the effect of changes in the conditions of capital formation pertaining to the industry.[5] But this industry too is seen to keep basically a pyramidic form in the age structure of fixed capital stock.

At the advent of the first oil crisis in 1973, Japanese industry was suddenly placed in different circumstances of investment. A decline in purchasing power through a rapid rise in energy prices brought about lowering of expected profitability of investment, which led to a fall in actual investment in plant and equipment. Moreover, because more recent production technology was presumably more energy-using in technological development in the circumstances of stable supply of energy at low prices before the oil crisis, the occurrence of the oil crisis forced industries to revert at least temporarily to production system using relatively less energy-using equipments which had been introduced some years before. But, on the other hand, since the production equipments installed more recently give a higher productivity to labor input combined with it, industries have a tendency to take old equipments off the stock so early as to compensate the fall in productivity due to the decrease in new investment. It produced the age structure of 1976 which takes a similar form to a rectangular distribution. It is almost the case for electrical machinery too, though the age structure is accompanied with a yearly variation of investments pertaining to an individual industry. This explains the fact that the average age of stock of fixed capital of total manufacturing in Japan shows an upward trend, while the service life remains at the same level or somewhat shortens during the period from 1973 to 1976, as it was already examined concerning Figure 1.

Looking at age structure of 1986, more ten years after, it is known that total manufacturing is regaining rapidly a pyramidic form, though it still keeps using some facilities installed in early days. Particularly in electrical machinery, age structure of stock has already restored a normal pyramidic form with a large proportion of assets installed recently, having gotten out of a rectangular form of distribution during the period of the oil crisis. It is explained as follows. In face of a rapid rise in energy prices during the period of oil crises, Japanese industries coped with the difficult situation by diverting importance to equipments installed some years before, which were relatively less energy-using than the latest ones, along with curbing an accompanied decline in productivity to the minimum by scrapping equipments installed in the earliest years. They restrained investment in new equipments for the time being because of a fall in expected profitability and of a high degree of an energy-using character that the latest equipments had. And under the newly imposed conditions after the oil crisis, Japanese manufacturing industries have rapidly reformed their technological structure of production from an energy-using character to an energy-saving character. Electrical machinery was the fastest industry that has accomplished this technological transformation. This transformation enabled Japanese industries to have new equipments embodying energy-saving technical progress, which led to the restoration to a pyramid-shaped age structure of fixed capital stock as time goes on.

Concerning French manufacturing industries in this respect, age structure of fixed assets has not shown the restoration to a pyramidic distribution in any industry in 1984 yet (see Graphique 1 in Cette et Szpiro [1988]).

V. Factors of change in average age of fixed capital stock

In the preceding section, we examined every ten years changes in age structure of capital stocks over 20 years and tried to explain causes of the transformation of the distribution in vintages by considering the relationship among investment, retirement, and a character of technological combinations in industries, during the period of a rapid change of market conditions through two times of oil crises. We are going to reinforce the explanation by adding a further analytical consideration to it.

As seen above, an average age of stock of fixed assets in a certain year is determined, depending upon two characteristics of an age structure of existing fixed assets, namely, an age of the oldest equipments (service life) and a distribution pattern of fixed assets by vintages (typically, a pyramid-shaped distribution). Accordingly, a change in an average age for a certain period of time is decomposed into a part caused by a change in service life under the conditions of keeping the structure in vintages of fixed assets constant and a part caused by a change in age structure under the circumstances of keeping the age of the oldest equipments (service life) constant for the same period of time.

In order to obtain the values of these effects of change factors, we calculate at first an average age of fixed assets in each year, supposing that the service life of an equipment in year t is the same as that in the previous year. Denoting this by $\hat{a}_t$ and an actual average age by a_t, a change in average age in one year from t to t+1, $a_{t+1}-a_t$, is decomposed into $a_{t+1}-\hat{a}_{t+1}$ and $\hat{a}_{t+1}-a_t$. The former is taken as a change in average age caused by a change in service life of equipments in this period of time (service life effect) and the latter as the part of change brought about by a change in age structure of stock in the same period (age structure effect).[6]

The results obtained by the above calculations are shown in Table 1 with rates of change in average age and in Figure 6 with values of the change. We have already seen in Figure 1 that average age of equipments always increases over the entire period of observation in Japanese manufacturing industries as a whole. But when we examine the yearly changes, it is shown in Figure 6 that a difference of average ages between two consecutive years, Δa_t turns its upward trend to a declining trend after about the second oil crisis. It is important that the time of the second oil crisis corresponds to a turning point with respect to the influence of factors of change in average age as well. Namely, during the first half period of observation, almost all the amount of increase in average age of equipments is explained by an age structure effect which continuously shows large positive values, while a service life effect is very small (in particular, until 1976 after the advent of the first oil crisis, it shows even negative values).

Curves of these two factors, however, intersect each other in 1979, and this explains a clear reversal in the role of two factors around the second oil crisis. The service life effect begins to show great positive values in such a way that one effect negates the other. As a result, a change in average age, Δa_t declines as time goes on.

The above analysis explains numerically the actual process of transformation in age structure of fixed assets observed in Figure 5 at three points of time with the interval of ten years, in relation to changes in service life and average age. As a matter of fact, during the period between two oil crises, age structure showed a rapid rising effect on the change in average age and this means that Japanese industries set importance in the fixed capital on equipments installed some years before, by restraining new investment. And the almost zero or negative service

Table 1. Changes in average age, a_t
(Total manufacturing industry)

(years)

Year	Δa_t	Service life effect	Age structure effect
1968	−0.227	−0.177	−0.050
1969	−0.251	−0.165	−0.050
1970	−0.204	−0.203	−0.001
1971	0.040	0.017	0.023
1972	0.173	0.045	0.128
1973	0.129	−0.028	0.157
1974	0.192	−0.003	0.195
1975	0.250	0.001	0.249
1976	0.218	−0.039	0.257
1977	0.260	0.042	0.218
1978	0.325	0.131	0.194
1979	0.250	0.175	0.075
1980	0.179	0.213	−0.034
1981	0.157	0.491	−0.334
1982	0.090	0.264	−0.174
1983	0.087	0.396	−0.309
1984	0.032	0.203	−0.171
1985	0.036	0.224	−0.188
1986	0.004	0.136	−0.132

Figure 6. Factors of change in average age

(a) Manufacturing industry

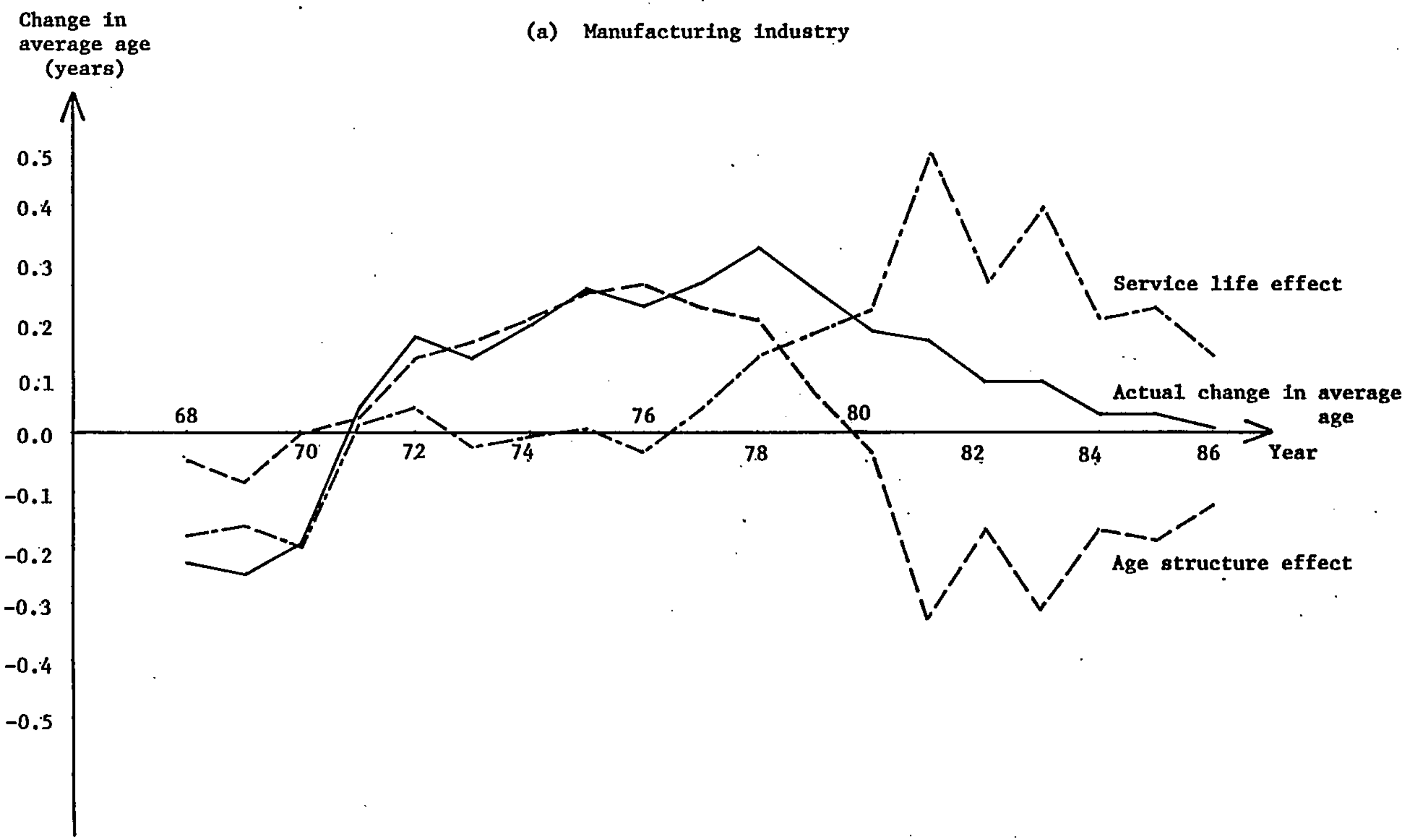
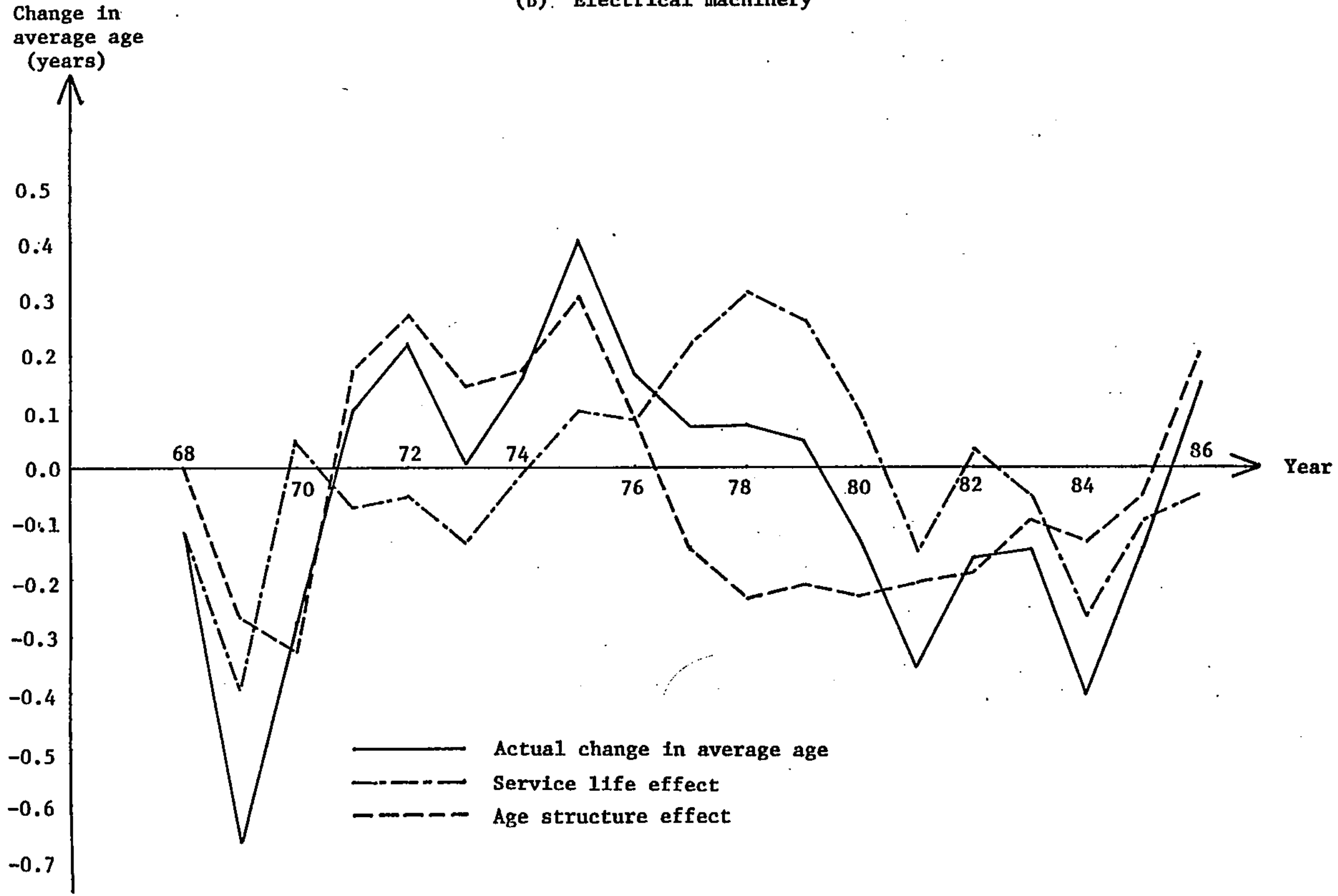


Figure 6. continued

(b). Electrical machinery



life effect in the period is explained by the behavior that they tried to make haste with scrapping equipments of the oldest model in order to minimize a productivity slowdown owing to a decline in embodied technical progress which was brought about as a result of adaptation of their technological combination of production to the new circumstances formed under the energy crisis. Jorgenson indicated a decline in the rate of technical change as " the most important single factor " in the slowdown of Japanese economic growth, and attributed it to an energy-using character of technical change in Japan. He says " . . . production methods reverted to vintages of technological development that existed before the energy crisis . . . . These earlier technological strata were appropriate to the new energy price situation " (Jorgenson [1988]), and explains that this caused the decline in technical progress. His explanation can be supported from the point of view of the change in age structure of stock of fixed capital by the analysis conducted so far, as far as Japanese industry through 1979 is concerned. (But we need more investigation into whether the production methods of Japanese industry reverted to vintages of technological development that existed in the middle 1960's with the energy crisis as a turning point, as Jorgenson conjectured.)

The state of things, however, underwent a dramatic change in the period after the second oil crisis. Japanese industry moved rapidly ahead with technical innovation so as to meet the new energy price situation through the latter half of 1970's suffering from the oil crises, while it tried to adjust temporarily to the situation by changing its production structure into that of less energy-using nature. And it went on renovating its character of technical change so that it might raise productivity along with suppressing consumption of energy. This is the attainment of so-called "energy-saving technical innovation" by Japanese industries. This innovation enabled them to increase their productivity, evading a rise in consumption of energy by new investment in equipments embodying the energy-saving technical change and at the same time to take a strategy to suppress energy consumption by using less energy-using equipments of older model for a shortage of productive capacity. A decline in productivity caused by using old equipments could be filled up by high productivity of new ones. This explains two phenomena observed after 1979, namely, a rapid decline in the age structure effect and a steep increase in the service life effect on the change of average age of fixed capital stock. Under the conditios given by a new energy price system after the oil crisis, Japanese industry seeked after as effective technological combinations of production as possible, in order to maintain and increase productivity, while making every effort to suppress energy cost, and the findings in this analysis justify it from the standpoint of the change in age structure of fixed capital stock.

Jorgenson's conclusions concerning the Japanese economy after the first oil crisis are mainly based on his finding of its energy-using bias of technical change and his analysis ends in 1979. The present study has shown that the Japanese economy appeared to have changed its character of technical progress around the second oil crisis in 1978-79 to an energy-saving type from an energy-using type of the earlier days, and the Japanese economy after 1979 is left for further investigation, for it involves such a new technological combination of production as above indicated and might have other factors of growth than before.

VI. Conclusions

Main findings obtained in this analysis are summarized as follows.

Firstly, the service life of fixed assets which total manufacturing industry in Japan possessed remained almost stable at about 10.2 years, though with a slight declining tendency, during several years until the second oil crisis after the first oil crisis, but after the second oil crisis, it began to have a considerable rising trend with an annual change of 0.4 years, attaining to 14.0 years at the end of 1986. As compared with France, the service lives of fixed assets in total manufacturing showed the largest difference between both countries in 1976, when it was 10.7 years in Japan as against 12.7 years in France, but after then, the difference diminished with the passage of time, and in 1983-84, the service life in Japan came up to almost the same level as that in France.

Secondly, as to the average age of stock of fixed capital, after it showed a rather fast rising tendency from 3.8 years in 1970 to 5.8 years in 1980, it passed to a stable movement at around 6 years. As far as the average age was concerned, there was not a declining tendency over the period of the oil crises which was recognized in the movement of the service life of equipments. In France, the average age of equipments moved stable from 5.2 years in 1972 to 6.2 years in 1983 at a very slight rising rate. Accordingly, the difference in average ages between two countries diminished with rapidity starting from 1.2 years in 1972, and after 1980, curves of the average ages of those two countries kept pace with each other, preserving a constant difference of 0.1 years.

Thirdly, when we observe every decade transformation in age structure of capital stock in Japanese manufacturing industry, it is found that the age structure, which had shown a clear pyramid-shaped distribution in the middle 1960's before the oil crisis, was transformed into an almost rectangular distribution after ten years, amidst the oil crises and that it has regained such a pyramidic form of structure as before, in the middle 1980's further ten years later. The development of age structure in this way is not seen in French manufacturing industries.

Fourthly, by decomposition of change in average age into a part attributed to a change in age of the oldest equipments (service life) and a part coming from trasformation of age structure of stock of fixed assets, it is found that the effects of these two factors on average age amidst the oil crises formed a remarkable contrast with the effects after them. That is, during the period of the oil crises, almost all the change in average age was explained by the change in age structure of capital stock, while a service life factor had a zero or even negative effect on it. On the contrary, during the period starting from 1979-80 after the second oil crisis, age structure appeared as an important factor of reducing average age on one hand and service life changed itself into an increasing factor of average age from a neutral or even decreasing factor during the same period on the other.

Fifthly, the above statistical findings can be coherently explained by the behavior of Japanese industries of adapting technologically to the economic conditions under the new energy price situation which were made up after the oil crises. Namely, at the advent of the oil crisis, Japanese manufacturing industries took, so to speak, "emergency evacuation" by moving importance of production methods to older technological combinations which were relatively less energy-using, refraining from new investment in the latest equipments that had developed under the low energy price situation before the oil crisis, while they made every effort to minimize a decline in productivity caused by the evacuation. On the other hand, they proceeded with technical innovation of a character suitable to the new energy price situation at the same time, and the fruit of their efforts began to appear in actual production processes after the second oil crisis. Since then, by increasing new investment, Japanese industries have moved relative importance in their fixed assets to the latest equipments embodying energy-saving technical progress which had been proceeded with through the period of the oil crises and have filled up a shortage of production capacity with vintages of equipments before the oil crises which were relatively less energy-using. In this way, they have strived for productivity increase, suppressing a rise in total energy cost. Thus, an industry which succeeded earlier in development of new technology of energy-saving character has first restored a pyramid-shaped distribution of age structure of capital stock at a result of scrapping older equipments and of possessing a greater proportion of newer ones. The first industry was electrical machinery, in which existing equipments were all composed of new investments embodying the latest technology developed after the oil crises and an almost complete pyramidic form of distribution was recovered in the age structure of stock in 1986.

Sixthly, Jorgenson indicated in his article that the most important single factor in the slowdown in Japanese economic growth after the first oil crisis was the sharp decline in the rate of technical change which was caused by the reversion of production methods to vintages of technological development that existed before the oil crisis in order for the Japanese economy to meet the requirements of the new energy price situation (Jorgenson [1988]). His indication seems to be justified by the analysis made in this paper from the standpoint of the change in age structure of production equipments in Japanese manufacturing industry. However, the biased technical change in the average Japanese industry has undergone a clear alteration in its character to be energy-saving since the second oil crisis, though it was indeed energy-using until then as Jorgenson mentioned.

Lastly, as seen above, technological combination of productive factors in Japanese industry appears to have been reorganized in such a way that it could meet conditions of the external environment since around 1979-80 passing the period of the oil crises. This gives us a next subject of investigation on growth of the Japanese economy in the 1980's from a new point of view.

Notes

1. The causes of slowdown in productivity of French industry after the energy crisis are discussed by Cette et Joly (1984) and many other authors whose articles appeared in Economie et Statistique published by INSEE.

2. The estimation in the present paper takes the values of purchase of used assets into account, while Cette et Szpiro (1988) does not.

3. The figure of French industry in 1984 loses continuity in statistical time series owing to the application of the new account Plan (see page 10 in Cette et Szpiro (1988)).

4. In spite of that, the change in service life of fixed capital remains stable in total manufacturing of France as seen in Figure 1. Cette and Szpiro explain it by a change in industrial structure with a continuous increase in the weight of equipment industry which has a shorter service life of fixed assets (Cette et Szpiro (1988)).

5. Japanese electrical machine industry increased investment in plant and equipment enormously during 1960-62, when demand for household electric appliances such as televisions, refrigerators and washing machines expanded with great rapidity among Japanese consumers. After then, investment activities went down in that industry owing to a tight money policy taken by the economic authorities under the aggravation of balance of payments.

6. The analytical procedure in this respect is as follows. Let us denote an actual average age in year t by a(t) and a service life of fixed capital (a change factor of average age) by T(t), and use a variable S(t) as an index which stands for age structure of stock of fixed capital in the same year. Then,

$$a(t) = f(T(t),\ S(t)) \qquad \text{(i)}$$

Differentiating this with respect to time variable t,

$$\frac{da}{dt} = \frac{\partial f}{\partial T}\cdot\frac{dT}{dt} + \frac{\partial f}{\partial S}\cdot\frac{dS}{dt} \qquad \text{(ii)}$$

Therefore, for a discrete time interval, we obtain

$$\Delta a \fallingdotseq a_T \cdot \Delta T + a_S \cdot \Delta S \qquad \text{(iii)}$$

where a_T and a_S are partial derivatives of the function f with respect to T(t) and S(t), respectively. Accordingly, denoting average age in year t+1 calculated under the condition of keeping service life invariable during one year by $\hat{a}_{t+1}$, we obtain the effects of those two factors on a change in average age by

$$\text{(Service life effect):} \quad a_T \cdot \Delta T = a(t+1) - \hat{a}(t+1), \qquad \text{(iv)}$$

$$\text{(Age structure effect):} \quad a_s \cdot \Delta S = \hat{a}(t+1) - a(t). \qquad \text{(v)}$$

and a(t), average age under the condition of constant service life, is calculated by the following equation:

$$\begin{aligned}
\hat{a}(t) = \Big[& \{N(t-1) + \alpha(t-1) \cdot \tfrac{1}{2}\} \cdot I_{t-N(t-1)} \cdot (1+\sigma_e) \cdot \alpha(t-1) \\
& + \{N(t-1) - \tfrac{1}{2}\} \cdot I_{t-N(t-1)+1} \cdot (1+\sigma_e) \\
& + \{N(t-1) - \tfrac{3}{2}\} \cdot I_{t-N(t-1)+2} \cdot (1+\sigma_e) \\
& + \cdots\cdots \\
& + \{2 - \tfrac{1}{2}\} \cdot I_{t-1} \cdot (1+\sigma_e) + \{1 - \tfrac{1}{2}\} \cdot I_t \cdot (1+\sigma_e) \Big] \\
/ \Big[& I_{t-N(t-1)} \cdot (1+\sigma_e) \cdot \alpha(t-1) + I_{t-N(t-1)+1} \cdot (1+\sigma_e) \\
& + \cdots\cdots \\
& + I_{t-1} \cdot (1+\sigma_e) + I_t \cdot (1+\sigma_e) \Big], \qquad \text{(vi)}
\end{aligned}$$

where N(t) and $\alpha(t)$ are an integral part and a fractional part of years of service life, respectively, I_t stands for new investment in year t, and σ_e means a ratio of acquisition of used assets (= acquisition of used assets / investment in new assets) in the same year as I in the same term of the equation.

SUPPLEMENT

Estimation of Average Ages of Fixed Capital in Japanese Manufacturing Industries

The basic idea of the estimation is as follows. The capital stock at the end of year t, K_t, is composed of new investments, I_i ($i = t, t-1, \ldots, t-N+1$) which represent the fixed assets of each vintage proceeding retroactively from the investment of year t, I_t, to the investment of the year t-N+1, I_{t-N+1}. Furthermore, in general, K_t has an additional assets of a part of the investment in year t-N, left as the assets of the 0-th generation, apart from a rare case that $K_t = \sum_{i=1}^{N} I_{t-i+1}$. We assume that retirement of assets occurs on a historical basis; the oldest existing assets are first retired due to wear and tear in the fixed capital stocks.

Disposal of assets by sale to other firms is treated in the same way. We suppose that a firm sells the assets which have still some productive ability among the oldest ones to others. On the other hand, used assets are assumed to be installed in one united investment of the year, their economic values being revaluated at the same standard price as new assets.

Before estimating age of the oldest existing assets and age structure of stock of fixed capital by industry and by year, we need to obtain time series data of gross capital stock, K_t, investment in new assets, I_t, acquisition of used assets, S_t, retirement (wear and tear, sale to others), R_t, as retroactively as possible. The change in age structure of fixed capital stock is subject to a long run transformation of industrial structure, and it is required to have an observation period of at least thirty years in order for us to make a comparison of age structures between the latest year and twenty years before, for instance. Such long time series data do not exist for any of those four basic variables, and it is of imperative need to conduct a large amount of estimation works based on a certain number of relevant statistical materials. In particular, data sources to refer to are reticent about acquisition of used assets and retirement from the existing capital stocks.

First, I describe the estimation procedures on the four basic variables, and then present the values of the ages of the oldest assets and the average ages of fixed capital stocks in each year for each industry, calculated using those variables. The data sourses used in this estimation are listed collectively in APPENDIX A to this supplement. The number of industries considered here are under a limitation of availability of related information, and those names and the periods of estimation are found in Table S.1.

I. Estimation of four basic variables

(1) Data sources

Gross capital stock at the end of each year is estimated on an installation basis as a value of fixed assets before an abatement of depreciation, being evaluated at yearly price of 1980.

In Japan, estimations of time series on gross capital stock of private enterprises were carried out intermittently in the past, and in recent years the results have been published every year in "Minkan-Kigyou Shihon Sutokku (Gross Capital Stock of Private Enterprises)"

Table S.1. Industry Classification

	Industry	Period of Estimation
(F)	Total manufacturing	1955–86
(12)	Food, beverage, and tobacco	1955–86
(14)	Textiles, except apparel and other fabricated textile products	1955–86
(18)	Pulp, paper, and allied products	1955–86
(20)	Chemicals and allied products	1955–86
(26 • 27)	Primary metal industries	1955–86
(26)	Iron and steel	1965–86
(27)	Non-ferrous metals and products	1965–86
(28)	Fabricated metal industries	1956–86
(29)	Machinery, except electrical	1956–86
(30)	Electrical machinery, equipment, and supplies	1956–86
(31)	Transport equipment	1956–86

(Note) A parenthesised letter or figure before industry name indicates the symbol or number in the Japan Standard Classification of Industries.

by the Department of National Account of the Economic Research Institute in the Economic Planning Agency (Data Source [a]). However, the latest edition has figures at prices in 1980, beginning in the year 1965, for capital stock, investment in new assets, and net retirement, not presenting acquisition of used assets and retirement itself which are necessary for estimation of age structure in the present paper.

The time series data on capital stock and new investment retroactive to earlier years than 1964 are found in "Kokumin Keizai Keisan (National Economic Account)", No.33 (Data Source [b]) and "Keizai Bunseki (Economic Analysis), No.17 (Data Source [c]). The former publication, however, gives only time series of gross capital stock from 1955 to 1974 at market prices in 1970 and does not provide us with data on investment. The latter gives us estimates of time series from 1952 to 1964 on investment and its deflators as well as capital stock at prices in 1960.

Concerning industry classification of those three publications, manufacturing industry is classified into 15 industries in Data Source [a] but four of them, namely, Publishing, printing and allied industries, Petroleum and coal products, Ston, clay and glass products, and Professional and photographic equipment and watches were not separated from Other manufacturing industries until 1975, while Data Sources [b] and [c] have a common classification of 10 industries including Others. More specifically, after 1965, the classification in Data Source [a] differs from that in the other two Data Sources [b] and [c], only in that Primary metal in the latter two is divided into Iron and steel and Non-ferrous metals in the former, and the classification is common to all three data sources for the other 8 industries; Food, Textiles, Pulp and paper, Chemicals, Fabricated metals, Machinery, Electrical machinery, and Transport equipment.

Data on capital stock and new investment before 1964 are obtained from Data Sources [b] and [c], but we need to prepare a time series of deflators in order to connect those with the data at prices in 1980 in Data Source [a]. This preparation is also conducted on the basis of the former two sources.

Concerning acquisition of used assets and retirement due to wear and tear or sale, we can not get any clue to estimate them in the above three data sources, and so we have to seek further materials for them. Once time series of capital stock and acquisition of used assets are obtained, a time series of retirement is calculated from an identity equation.

Acquisition of used assets is calculated with the use of a ratio of the acquisition to investment in new assets. Accordingly, we concentrate our efforts on estimation of this ratio of used assets, for which we have two available materials; "Kougyou Toukei Hyou (Census of Manufactures)" (Data Source [d]) and "Houjin Kigyou Toukei Kihou (Corporate Enterprises Statistics Quarterly)" (Data Source [e]).

From the standpoint of industry classification, we have to use statistics collected on firm records in the estimation of a ratio of used assets, because data sources [a], [b] and [c] are all obtained on the basis of "Kokufu Chousa (National Wealth Survey)". In this respect, we have no problem about "Houjin Kigyou Toukei Kihou (Corporate Enterprises Statistics Quarterly)", but in "Kougyou Toukei Hyou (Census of Manufactures)" we can obtain the data on acquisition of used assets only for a head office of a firm. Therefore, we cannot help relying on "Sangyou-Hen (Report by Industries)" of the Census whose data are collected on the basis of individual office, plant or shop records, in the estimation of acquisition of used assets by industries. This may admit of argument on a degree of errors coming into the estimation, but it does not appear to be so large as to give a substantial defect to the estimated values of acquisition ratios of used assets.

(2) Estimation of deflators

In order to obtain time series of gross capital stock and investment through 1954 retroactively at prices in 1980, we need to estimate deflators of capital stock over the same period.

(i) First, concerning gross capital stock, a figure of 1965 in Data Source [a] (at 1980 prices) is divided that of the same year in Data Source [b] (at 1970 prices). We multiply a figure of 1960 in the latter data source by the value derived from that division (1.7446 for total manufacturing), obtaining a figure of 1960 evaluated at 1980 prices. Let this figure be a figure #1.

(ii) Next, since a figure of 1960 in Data Source [c] at 1960 prices naturally represents a nominal value of that year, the division of this by the figure #1 makes a deflator of capital stock for 1960 on the base year of 1980. (The figure #1 stands for an estimate of a real figure for 1960 at 1980 prices.) We denote this deflator by figure #2.

(iii) In order to estimate deflators of capital stock for years from 1954 to 1964 except 1960, we use deflators of investment given in Data Source [c] (Table 11 at pages 90-91 in that publication) as a second best procedure. That is, we make a series of deflators on the base year of 1980 by multiplying the series of deflators in that data source by the figure #2 obtained above. These estimates of deflators are used for a series of investment, too.

(3) Estimation of investment in new assets, I_t, 1954-1964

(iv) Values of new investment of Data Source [c] (at 1960 prices) multiplied by the deflators of investment given in the same publication make nominal values of new investment over the period 1954-1964.

(v) Then, those values, divided by the deflators on the base year of 1980 estimated in (iii), give us a time series of new investments in real terms evaluated at 1980 prices.

(4) Estimation of gross capital stock, K_t, 1954-1964

(vi) We estimate a time series of gross capital stocks in real terms at 1980 prices over the period 1954-1964 by multiplying figures in Data Source [b] (evaluated at 1970 prices) over the same period by figure #1 obtained in (i). This estimation is based on the following supposition.

Let x_t^i and x_t^N be a real value at prices in the year i and a nominal value, respectively, of a figure x of the year t. Then,

$$x_{65}^{70} = x_{65}^{N} / d_{65}^{70}, \quad x_{65}^{80} = x_{65}^{N} / d_{65}^{80} \qquad (1)$$

where d_t^i is a deflator of x of the year t on the base year t.

The latter divided by the former makes

$$a_{65} = x_{65}^{80} / x_{65}^{70} = d_{65}^{70} / d_{65}^{80}. \qquad (2)$$

This estimation procedure supposes relations,

$$a_t = d_t^{70} / d_t^{80} = a_{65} \qquad (t = 54, \ldots, 65) \qquad (3)$$

The above supposition is related to a rate of change in price as follows.

Letting ${}_{70}p_{80}$ be a rate of change in price between 1070 and 1980, we obtain

$$a_t = 1 + {}_{70}p_{80} = a_{65} \qquad (t = 54, \cdot \cdot \cdot , 65) \qquad (4)$$

from the relation (3).

This means that a ratio of a deflator on the base year of 1970 to that on the base year of 1980 in the year t depends only upon a rate of change in price from the year 1970 to the year 1980.

The above is taken as granted under the supposition of a negligible change in the component ratios (weights) of various tangible assets in quantities between the years t and 1965. In this respect, note that the change taken to be negligible is in the contents of capital assets and not in the age structures of capital stocks with which we are concerned in this paper.

(5) Ratio of acquisition of used assets

(vii) For the years 1957-1975, "Census of Manufactures - Report by Industries)" (Data Source [d]) provides us with the values of acquisition of used assets by industries (for places of business having over three employees until 1960 and for those having over nine after 1960). We use these values divided by the values of acquisition of new assets corresponding to the same year given in the above document as a ratio of acquisition of used assets of each year over the above period.

(viii) Land is included in the values of acquisition of used assets given in the Census until 1956 and therefore the work to eliminate it must be done. In doing so, we take an expedient measure of removing land using a mean value of ratios of the values of land to the acquisition of used assets in three years of 1957, 1958 and 1959.

(ix) Furthermore, since the Census gives the data on acquisition of used assets only every five years after 1975, it is needed to estimate the ratios of acquisition of used assets for four years between reporting years. We find a clue to this estimation in "Corporate Enterprises Statistics Quarterly" (Data Source [e]) published on the survey conducted by the Securities Bureau of the Ministry of Finance. The report of survey, made as of the end of each quarter, differs in the number of firms investigated, and consequently there is a drawback to this document in using the figures as time series data. But we can estimate the ratios of acquisition of used assets by industries from the contents of changes in fixed assets possessed by firms.

That document shows us those contents of changes in the form of Table S.2. Considering from the items of the change in assets described in the table, the amount of used assets acquired during a quarter t is due to be obtained by deducting the amount of transfer owing to completion of construction from the amount of purchase and transfer. In many cases, however, the actual deduction makes the remainder to be negative. It is pointed out as the reason that a considerable amount of b_{23} is disposed as a cost when the amount of temporary account on construction is transferred to tangible fixed assets owing to completion of construction, and further that not a small part of b_{23} is transferred to the account of land or that of intangible fixed assets on that occasion (see pages 71 to 72 of Data Source [c]).

Now, let a be a fraction representing an amount of ommisions from b_{23} due to various reasons including those mentioned above on the occasion of transfer from temporary account on construction to the account of other tangible fixed assets. Then, a ratio of the amount actually

Table S.2. Changes in fixed assets in Data Source [e]

	Land	Other tangible fixed assets	Temporary account on construction	Intangible fixed assets	Investment and other assets
Balance at the end of the previous quarter	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
Addition					
New installation;	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
Purchase, transfer	a_{21}	a_{22}	a_{23}	a_{24}	a_{25}
Reduction					
Depreciation;	b_{11}	b_{12}	b_{13}	b_{14}	b_{15}
Sale, tear and wear, transfer	b_{21}	b_{22}	b_{23}	b_{24}	b_{25}
Balance at the end of the present quarter	x_{21}	x_{22}	x_{23}	x_{24}	x_{25}

transferred to the account of other tangible fixed assets to the total amount of b_{23} is $1 - \alpha$. We call this a ratio of transfer from temporary account, denoting by β .

The amount of used assets purchased in the year t is represented to be

$$a_{22} - (1 - \alpha)\, b_{23} = a_{22} - \beta \cdot b_{23}. \qquad (5)$$

On the other hand, since a ratio of acquisition of used assets σ is acquisition of used assets divided by new installation plus transfer from temporary account, we obtain the next relation:

$$a_{22} - \beta \cdot b_{23} = \sigma\, (a_{12} + \beta \cdot b_{23}) \qquad (6)$$

Therefore, a ratio of transfer from temporary account, , is written as

$$\beta = 1 - \alpha = \frac{a_{22} - \sigma\, a_{12}}{(1 + \sigma)\, b_{23}} . \qquad (7)$$

When we estimate σ for the years without the data of acquisition of used assets in the Census of Manufactures, we first assume the ratio of transfer from transfer account, β , to be constant during those four years between the reporting years of the data, whose mean value is used as β for them. Under this assumption, we are going to estimate the value of β for the years 1976-1979 which have not the data on acquisition of used assets. From the Census, we can calculate the ratios of acquisition of used assets, σ_{75} and σ_{80}, for the years 1975 and 1980 as 0.0419 and 0.0345, respectively (in the case of total manufacturing. The same to the following). With the use of these figures, we calculate the mean values of β 's for four quarters of the years 1975 and 1980 by the equation (7), obtaining 0.8617 for 1975 and 0.8733 for 1980, which show that a ratio of transfer from temporary account is fearly stable over five years or so.

It is the same for the period from 1980 to 1985. Therefore, we use a mean value of β's of these two years, 0.8675, as a ratio of transfer from temporary account, common to the years over the period from 1976 to 1979.

By equation (6), a ratio of acquisition of used assets, σ, is given as

$$\sigma = (a_{22} - \beta \cdot b_{23}) / (a_{12} + \beta \cdot b_{23}), \quad (8)$$

and we can calculate the value of σ for each quarter of this period of years, using the figure, β, above obtained. The mean value of these σ's for four quarters gives estimates of the ratios of acquisition of used assets for each year of the period from 1976 to 1979 for which the data on used assets are not available in the Census of Manufactures.

The same procedure is applied to the estimation for the period from 1981 to 1984 but, for 1986, σ is calculated using the ratio of transfer from temporary account, β, obtained for 1985.

This estimation is carried out for each industry of Food, beverage and tobacco and so forth, and series of estimates of ratios of acquisition of used assets are ready for use by industries.

(6) Calculation of retirement, R_t

Using the long time series of estimates (at market prices in 1980, on an installation basis in one calendar year) of gross capital stochs, K_t, investments in new plant and equipment, I_t, and ratios of acquisition of used assets, σ_t, obtained so far, a series of retirements of assets, R_t, is calculated by the following relation:

$$R_t = K_{t-1} + I_t (1 + \sigma_t) - K_t \quad (9)$$

It is also obtained at prices in 1980.

II. Estimation of age structure of stock of fixed capital

(1) Estimation of age of the oldest existing assets (service life)

In estimating lapse of time with regard to the oldest assets which an industry possesses in each year, we assume the following:

(i) assets are retired due to tear and wear or sale to others according to seniority,

(ii) the values of acquisition of used assets are evaluated at base year (1980) prices, being handled as newly produced goods after revaluation of their economical usefulness, and

(iii) the difference in the degree of embodied technical change between the year of the first installation as new goods and the year of the next installation by another firm as used assets has already been taken into account in the revaluation of the assets at the time of the second installation.

Referring to the assumption (i), it is supposed that the embodied technical change with respect to the equipments installed in a certain year increases as time goes on and the productivity of labor combined with the equipments rises acordingly (see Cette et Pierre [1984]). In this way, retirement is took place on the oldest assets whose profitability vanishes under the present wage rate, and among them, those which are still profitable to other firms are sold as used assets. As a matter of fact, in the case of business transfer, for example, even newly installed assets may be sold to other firms, older ones being kept. But lack of information on the age of used assets makes it inevitable for us to take this assumption.

Assumptions (ii) and (iii) will be plausible if we reflect on the fact that firms will actually take economic value of used assets into account as compared with the new ones of the same sort when they install them.

Now, under those assumptions, we first find the year of the earliest investment in existing assets except the investment whose part has already been retired. The year is given by the largest integer N among figures which satisfy the following inequalities:

$$0 < K_t - \sum_{i=t-N+1}^{t} (I_i + S_i) = K_{t-N} - \sum_{i=t-N+1}^{t} R_i \leq I_{t-N} + S_{t-N} \qquad (N = 1, 2, \cdots\cdots) \tag{10}$$

Then, the assets installed in year t-N correspond to the oldest among the production equipments which exist at the end of the year t.

Next, we estimate the lapse of time of the oldest assets in the existing stock of fixed capital by adding a fraction of one year for the remaining assets built by the investment in year t-N, $I_{t-N} + S_{t-N}$, to the figure N obtained above:

$$N + (K_{t-N} - \sum_{i=t-N+1}^{t} R_i) / (I_{t-N} + S_{t-N}). \tag{11}$$

Namely, it is supposed here that fixed assets are installed at a constant rate during one year.

In addition, though it rarely happens, in the case where K_{t-1} is less than or equal to R_t, the year of installation of the oldest existing assets is t, and the lapse of time (service life) of them becomes

$$(I_t + S_t) - (R_t - K_{t-1}) / (I_t + S_t). \tag{12}$$

(2) Estimation of average age of stocks of fixed capital

Under the supposition that the amounts of plant and equipment built in one year are subject to a sort of rectangular distribution, namely, installed at a constant rate through the year, the average age of stocks existing at the end of year t, a_t, is calculated with weights of the values of installation in each year of the past by the following equation:

$$a_t = [\ A_t + \sum_{i=1}^{N} \{ (i - \frac{1}{2}) \cdot I_{t-i+1} \cdot (1+ \sigma_{t-i+1}) \}\ ] \ / \ K_t \qquad (13)$$

where A_t is the term representing the average age of the oldest assets weighted with the amounts of the investment remaining at the end of year t:

$$A_t = \{ N + \frac{K_{t-N} - \sum_{i=t-N+1}^{t} R_i}{I_{t-N} \cdot (1+ \sigma_{t-N})} \cdot \frac{1}{2} \} \cdot (K_{t-N} - \sum_{i=t-N+1}^{t} R_i). \qquad (14)$$

APPENDIX A

Data Sources

〔a〕 Economic Planning Agency of Japan, Economic Research Institute (Department of National Account), 昭和55年基準・民間企業資本ストックー昭和40～61－(Gross Capital Stock of Private Enterprises－1965～1986), February 1988.

〔b〕 ————, ———— (————), 国民経済計算 (National Economic Account), No.33, November 1975, Tokyo: Ministry of Finance, Printing Bureau.

〔c〕 ————, ————, 経済分析 (Economic Analysis), No.17, March 1966, Tokyo: Ministry of Finance, Printing Bureau.

〔d〕 Ministry of International Trade and Industry of Japan, Minister's Secretariate (Research and Statistics Department), 工業統計表－産業編 (Census of Manufactures －Report by Industries), each year, Tokyo: Ministry of Finance, Printing Bureau.

〔e〕 Ministry of Finance of Japan, Securities Bureau, 法人企業統計季報 (Corporate Enterprises Statistics Quarterly), each quarter, Tokyo: Ministry of Finance, Printing Bureau.

APPENDIX B

Results of Estimation

Results of estimation of the service lives of fixed capital assets, the average ages of the stocks, and related items are presented in the subsequent tables. Figures have been estimated on private enterprises in manufacturing industries and evaluated at market prices in calender year of 1980 on an installation basis, being expressed in billions of yen. The amounts of capital stock and the ages of the oldest assets (service lives) are at the end of year, and the average ages of stocks are calculated in the middle of year.

Table B.1. Total manufacturing

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	9,542.9	822.0	108.7	---	--	--
1955	10,080.0	711.7	76.5	251.1	--	--
1956	10,563.8	992.0	106.3	614.5	--	--
1957	11,717.7	1,452.8	132.8	431.7	--	--
1958	12,807.9	1,557.6	119.9	587.3	--	--
1959	13,969.3	1,693.0	102.9	634.5	--	--
1960	16,122.3	2,685.3	127.8	660.1	--	--
1961	18,992.7	3,365.1	143.4	638.1	--	--
1962	22,465.7	3,624.4	137.4	288.8	--	--
1963	25,804.2	3,899.9	157.2	718.6	--	--
1964	29,800.2	4,234.2	177.4	415.6	--	--
1965	33,362.9	4,668.8	198.4	1,304.5	--	--
1966	36,465.6	4,660.3	311.3	1,868.9	--	--
1967	41,098.5	6,263.2	247.4	1,877.7	4.43	12.05
1968	47,686.8	8,525.6	305.2	2,242.5	4.21	11.30
1969	55,491.7	10,509.6	295.3	3,000.0	3.95	10.53
1970	65,213.4	12,798.3	364.8	3,441.4	3.75	10.12
1971	74,312.8	11,757.9	553.8	3,212.3	3.79	10.18
1972	82,831.9	11,254.0	384.9	3,119.8	3.96	10.34
1973	90,446.3	11,628.4	346.5	4,360.5	4.09	10.24
1974	97,942.2	11,565.5	306.5	4,376.1	4.28	10.23
1975	104,172.1	10,516.5	440.6	4,727.2	4.53	10.23
1976	109,571.4	10,532.7	627.7	5,761.1	4.75	10.07
1977	115,276.7	10,596.6	570.1	5,461.4	5.01	10.21
1978	119,913.7	9,503.5	481.8	5,348.3	5.34	10.55
1979	125,750.9	10,746.0	694.2	5,603.0	5.59	10.93
1980	132,743.2	12,513.4	431.7	5,952.8	5.77	11.01
1981	141,301.1	13,707.4	493.5	5,643.0	5.92	11.88
1982	149,336.0	14,277.1	711.0	6,953.2	6.01	12.06
1983	158,020.4	14,811.2	833.9	6,960.7	6.10	12.82
1984	168,235.1	16,770.1	783.2	7,338.6	6.13	13.22
1985	181,727.1	19,320.2	537.1	6,365.3	6.17	13.69
1986	194,031.1	19,152.6	789.1	7,637.7	6.17	14.03

Table B.2. Food, beverage and tobacco

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	999.1	107.1	22.1	---	--	--
1955	1,061.2	71.9	0.0	9.8	--	--
1956	1,092.4	81.2	15.2	65.2	--	--
1957	1,144.7	109.1	19.7	76.5	--	--
1958	1,218.9	110.7	16.2	52.7	--	--
1959	1,292.5	122.7	11.8	60.9	--	--
1960	1,393.1	147.7	12.1	59 2	--	--
1961	1,495.9	197.3	22.3	116.8	--	--
1962	1,767.0	318.2	13.4	60.5	--	--
1963	2,046.0	304.3	15.2	40.5	--	--
1964	2,290.0	291.7	13.0	60.7	--	--
1965	2,563.4	362.2	21.8	110.6	--	--
1966	2,836.8	396.8	22.7	146.1	--	--
1967	3,121.8	396.9	15.8	127.7	4.68	13.09
1968	3,586.8	596.8	50.4	182.2	4.38	11.98
1969	4,018.3	606.1	25.6	200.2	4.27	11.42
1970	4,621.8	805.2	30.8	232.5	4.05	10.72
1971	5,250.8	804.8	29.2	205.0	4.13	10.59
1972	5,937.5	843.0	32.1	188.4	4.25	10.82
1973	6,535.4	856.3	34.3	292.7	4.33	10.94
1974	7,040.5	774.8	29.1	298.8	4.52	11.00
1975	7,448.9	737.2	24.3	353.1	4.73	10.88
1976	7,858.6	745.2	27.3	362.8	4.95	10.94
1977	8,287.7	806.9	29.9	407.7	5.13	10.97
1978	8,725.2	781.4	24.9	368.8	5.38	11.07
1979	9,364.0	964.2	0.0	325.4	5.59	11.54
1980	9,902.3	886.7	32.5	380.9	5.80	11.95
1981	10,433.5	903.1	56.6	428.5	5.99	12.27
1982	10,952.3	985.3	40.7	507.2	6.10	12.60
1983	11,706.7	1,041.4	54.9	341.9	6.30	13.19
1984	12,328.2	950.5	47.4	376.4	6.50	13.74
1985	14,024.1	1,210.6	31.8	550.7	6.11	14.08
1986	14,786.0	1,225.7	77.3	541.1	6.17	14.46

Table B.3. Textiles, except apparel and other fabricated textile products

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	1,760.3	107.1	27.4	---	--	--
1955	1,839.2	81.4	14.9	17.4	--	--
1956	1,928.2	155.7	20.8	87.5	--	--
1957	2,066.4	153.3	17.6	32.7	--	--
1958	2,165.9	119.4	17.6	37.5	--	--
1959	2,281.4	145.8	21.7	52.0	--	--
1960	2,423.2	158.3	14.1	30.6	--	--
1961	2,550.8	150.3	12.5	35.2	--	--
1962	2,665.5	141.7	10.8	37.8	--	--
1963	2,787.5	154.1	13.8	45.9	--	--
1964	3,010.9	228.2	28.4	33.2	--	--
1965	3,212.1	278.4	21.3	98.5	--	--
1966	3,349.4	256.6	21.8	141.1	--	--
1967	3,633.7	394.9	34.4	145.0	--	--
1968	3,863.9	376.3	17.6	163.7	--	--
1969	4,209.6	477.1	26.1	157.5	--	--
1970	4,700.6	659.3	29.5	197.8	--	--
1971	5,217.6	669.3	27.4	179.7	--	--
1972	5,664.9	644.4	35.8	232.9	6.10	18.26
1973	6,079.6	616.7	29.7	231.7	5.98	17.43
1974	6,329.4	478.9	23.7	252.8	6.04	16.95
1975	6,453.7	395.5	35.8	307.0	6.13	15.95
1976	6,623.9	378.9	46.1	254.8	6.35	15.44
1977	6,554.2	326.1	61.1	456.9	6.42	13.75
1978	6,593.3	253.0	30.5	244.4	6.86	13.82
1979	6,607.7	380.3	36.5	402.4	7.02	13.44
1980	6,759.5	322.8	26.3	197.3	7.45	13.83
1981	6,847.0	346.9	17.2	276.6	7.78	14.18
1982	7,020.8	397.5	23.2	246.9	8.07	14.57
1983	7,282.0	438.6	33.9	211.3	8.34	15.04
1984	7,660.6	566.0	36.7	224.1	8.45	15.58
1985	8,048.6	541.6	32.7	186.3	8.65	16.21
1986	8,417.7	573.4	97.7	302.0	8.63	16.72

Table B.4. Pulp, paper and allied products

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	560.4	58.9	5.2	---	--	--
1955	609.0	48.6	0.0	0.0	--	--
1956	640.4	76.4	5.5	50.5	--	--
1957	715.0	100.3	6.1	31.8	--	--
1958	791.9	117.2	4.4	44.7	--	--
1959	856.2	112.6	6.7	55.0	--	--
1960	960.7	171.9	5.7	73.1	--	--
1961	1,108.2	215.1	10.0	77.6	--	--
1962	1,278.1	212.7	5.6	48.4	--	--
1963	1,381.1	150.2	4.2	51.4	--	--
1964	1,547.2	211.3	9.2	54.4	--	--
1965	1,731.8	240.5	10.3	66.2	4.35	11.11
1966	1,854.4	198.6	7.3	83.3	4.56	10.67
1967	2,045.5	252.2	9.9	71.0	4.71	10.84
1968	2,303.2	335.0	7.3	84.6	4.73	11.05
1969	2,565.0	384.5	8.0	130.7	4.63	10.97
1970	2,917.3	531.8	9.0	188.5	4.32	10.59
1971	3,278.1	503.7	8.6	151.5	4.30	10.79
1972	3,670.3	506.6	8.0	122.4	4.42	11.25
1973	3,999.3	504.8	12.6	188.4	4.48	11.39
1974	4,323.1	528.8	10.1	215.1	4.54	11.16
1975	4,698.8	603.9	12.6	240.8	4.57	11.02
1976	4,941.0	451.6	19.0	228.4	4.81	11.11
1977	5,198.9	444.1	22.2	208.4	5.10	11.12
1978	5,432.2	404.3	28.3	199.3	5.45	11.33
1979	5,697.6	456.3	57.0	247.9	5.68	11.53
1980	6,050.6	576.9	24.2	248.1	5.84	11.83
1981	6,311.5	420.1	16.7	175.9	6.24	12.38
1982	6,449.5	363.7	99.3	325.0	6.46	12.68
1983	6,715.1	523.1	151.0	408.5	6.41	12.92
1984	7,000.1	543.7	35.9	294.6	6.58	13.34
1985	7,277.0	710.5	14.7	448.3	6.48	13.47
1986	7,763.9	839.7	92.8	445.6	6.27	13.61

Table B.5. Chemicals and allied products

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	973.8	110.0	4.3	---	--	--
1955	1,063.4	113.7	3.3	27.4	--	--
1956	1,092.8	201.2	5.0	176.8	--	--
1957	1,336.3	285.7	9.8	52.0	--	--
1958	1,532.3	251.9	5.8	61.8	--	--
1959	1,773.5	293.2	4.8	56.8	--	--
1960	2,069.2	348.1	8.4	60.8	--	--
1961	2,474.6	459.8	13.8	68.2	--	--
1962	2,859.4	443.8	13.4	72.4	--	--
1963	3,311.7	509.2	14.2	71.1	--	--
1964	3,967.4	714.8	11.3	70.4	--	--
1965	4,668.5	795.2	12.1	106.2	--	--
1966	4,951.4	706.9	14.6	438.6	4.00	10.17
1967	5,548.4	846.1	13.5	262.5	4.03	10.23
1968	6,338.3	1,102.7	39.1	351.9	3.91	9.91
1969	7,275.9	1,319.2	25.9	407.5	3.79	9.62
1970	8,632.4	1,760.0	25.0	428.5	3.64	9.56
1971	9,852.1	1,638.5	29.5	448.3	3.70	9.60
1972	10,798.9	1,374.4	20.3	447.9	3.93	9.67
1973	11,494.9	1,209.3	18.0	531.3	4.21	9.75
1974	12,270.9	1,379.4	34.1	637.5	4.41	9.89
1975	13,254.2	1,504.3	30.1	551.1	4.62	10.20
1976	13,713.3	1,428.0	30.7	999.6	4.72	9.87
1977	14,175.9	1,250.6	47.5	835.5	4.97	9.92
1978	14,694.1	1,108.4	50.7	640.9	5.33	10.36
1979	15,185.4	1,058.2	13.3	580.2	5.74	10.87
1980	15,575.2	1,316.1	34.7	961.0	5.90	11.16
1981	16,401.9	1,314.1	21.8	509.2	6.22	11.83
1982	16,964.2	1,423.9	79.7	941.5	6.33	12.31
1983	17,791.3	1,602.7	78.5	854.1	6.41	12.82
1984	18,600.5	1,569.4	16.2	776.4	6.56	13.35
1985	19,720.8	2,003.0	28.4	911.1	6.54	13.77
1986	20,879.0	1,835.4	30.5	707.7	6.67	14.26

Table B.6. Primary metal industries

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	2,040.0	136.3	---	---	--	--
1955	2,020.9	96.6	3.8	119.5	--	--
1956	2,048.8	103.5	8.1	83.7	--	--
1957	2,178.5	226.2	13.9	110.4	--	--
1958	2,354.4	391.0	12.5	227.6	--	--
1959	2,502.1	371.3	9.2	232.8	--	--
1960	2,975.2	640.3	14.7	181.9	--	--
1961	3,578.9	789.4	13.9	199.6	--	--
1962	4,231.5	734.3	14.0	95.7	--	--
1963	5,034.0	879.1	23.5	100.1	--	--
1964	5,634.4	769.1	16.8	185.5	--	--
1965	6,186.0	839.7	15.5	303.6	--	--
1966	6,781.6	887.5	48.3	340.2	4.16	10.64
1967	7,572.5	1,215.6	22.4	447.1	4.09	9.66
1968	8,754.4	1,560.6	31.4	410.1	4.02	9.63
1969	10,442.1	2,150.6	44.1	507.0	3.82	9.59
1970	12,164.6	2,260.5	18.8	556.8	3.77	9.79
1971	13,950.2	2,250.1	38.9	503.4	3.86	10.16
1972	15,676.2	2,220.7	60.4	555.1	4.02	10.43
1973	16,791.9	1,769.2	23.2	676.7	4.29	10.61
1974	17,970.3	1,909.4	21.4	752.4	4.53	10.74
1975	19,182.1	2,152.2	85.2	1,025.6	4.65	10.48
1976	20,539.4	2,238.0	127.1	1,007.8	4.80	10.36
1977	22,129.3	2,294.5	168.6	873.2	5.00	10.57
1978	22,669.8	1,422.4	77.8	959.7	5.42	10.84
1979	23,343.6	1,590.7	221.3	1,138.2	5.71	11.12
1980	23,663.9	1,325.6	27.0	1,032.3	6.14	11.62
1981	24,239.8	1,502.8	66.3	993.2	6.51	12.17
1982	24,962.8	2,028.6	45.4	1,351.0	6.62	12.57
1983	25,906.1	2,088.4	119.9	1,265.0	6.73	13.01
1984	26,942.7	2,001.7	350.7	1,315.8	6.81	13.44
1985	27,587.4	1,729.7	22.5	1,107.5	7.09	13.95
1986	28,436.3	1,940.0	0.0	1,091.1	7.32	14.48

Table B.7. Iron and steel

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	---	---	---	---	--	--
1955	---	---	---	---	--	--
1956	---	---	---	---	--	--
1957	---	---	---	---	--	--
1958	---	---	---	---	--	--
1959	---	---	---	---	--	--
1960	---	---	---	---	--	--
1961	---	---	---	---	--	--
1962	---	---	---	---	--	--
1963	---	---	---	---	--	--
1964	---	---	---	---	--	--
1965	5,240.0	701.2	12.9	---	--	--
1966	5,764.8	743.0	38.7	256.9	--	--
1967	6,522.7	1,058.6	19.3	320.0	--	--
1968	7,496.5	1,293.3	29.7	349.2	--	--
1969	8,877.1	1,769.3	40.0	428.7	--	--
1970	10,250.8	1,827.2	14.1	467.6	--	--
1971	11,785.2	1,939.1	31.0	435.7	--	--
1972	13,340.0	1,926.7	25.6	397.5	--	--
1973	14,230.9	1,432.0	19.5	560.6	--	--
1974	15,208.0	1,543.6	17.1	583.6	--	--
1975	16,285.9	1,767.6	21.0	710.7	--	--
1976	17,502.8	1,944.5	109.1	836.7	4.93	10.86
1977	18,860.5	1,936.8	160.0	739.1	5.12	10.94
1978	19,282.9	1,151.1	49.4	778.1	5.55	11.22
1979	19,807.8	1,307.1	121.6	903.8	5.87	11.49
1980	20,071.5	965.4	22.4	724.1	6.36	11.96
1981	20,440.6	1,110.0	50.1	791.0	6.76	12.52
1982	21,075.9	1,544.8	29.7	939.2	6.98	13.00
1983	22,006.5	1,607.8	62.9	740.1	7.21	13.60
1984	22,845.4	1,451.0	324.7	936.8	7.36	14.09
1985	23,414.7	1,200.8	13.0	644.5	7.77	14.76
1986	24,258.8	1,396.3	0.0	552.2	8.19	15.48

Table B.8. Non-ferrous metals and products

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	---	---	---	---	--	--
1955	---	---	---	---	--	--
1956	---	---	---	---	--	--
1957	---	---	---	---	--	--
1958	---	---	---	---	--	--
1959	---	---	---	---	--	--
1960	---	---	---	---	--	--
1961	---	---	---	---	--	--
1962	---	---	---	---	--	--
1963	---	---	---	---	--	--
1964	---	---	---	---	--	--
1965	946.0	138.5	2.6	---	--	--
1966	1,016.9	144.5	9.0	82.6	--	--
1967	1,049.8	154.0	3.0	124.1	--	--
1968	1,258.0	267.3	2.6	61.7	--	--
1969	1,565.0	381.3	3.9	78.2	--	--
1970	1,913.7	433.3	4.4	89.0	--	--
1971	2,165.0	311.1	7.0	66.8	--	--
1972	2,336.2	293.9	26.7	149.4	--	--
1973	2,561.0	337.2	3.9	116.3	--	--
1974	2,762.3	365.9	4.1	168.7	3.99	9.07
1975	2,896.2	384.6	63.7	314.4	3.85	8.03
1976	3,036.6	293.5	17.7	170.8	4.19	8.39
1977	3,268.8	357.7	8.6	134.1	4.50	8.92
1978	3,386.8	271.3	30.1	183.4	4.83	9.45
1979	3,535.8	283.6	97.7	232.3	4.97	9.86
1980	3,592.4	360.2	4.3	307.9	5.03	10.16
1981	3,799.1	362.8	15.1	171.2	5.32	10.68
1982	3,887.0	483.8	15.4	411.3	5.01	10.39
1983	3,899.6	480.5	60.4	528.3	4.63	9.83
1984	4,097.3	550.7	10.9	363.9	5.51	9.88
1985	4,172.7	528.9	9.9	463.4	4.32	9.77
1986	4,177.5	543.6	0.0	538.8	4.10	9.19

Table B.9. Fabricated metal industries

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	---	---	---	---	--	--
1955	115.4	14.9	3.8	---	--	--
1956	134.2	19.2	4.1	4.5	--	--
1957	169.3	35.8	0.0	0.7	--	--
1958	189.8	21.8	5.3	6.5	--	--
1959	238.2	56.9	6.8	15.3	--	--
1960	333.4	95.2	0.0	0.0	--	--
1961	427.5	94.1	0.0	0.0	--	--
1962	591.3	163.8	0.0	0.0	--	--
1963	723.7	132.4	0.0	0.0	--	--
1964	899.6	175.9	0.0	0.0	--	--
1965	1,041.5	177.8	15.4	51.3	--	--
1966	1,251.1	217.1	39.4	46.9	4.20	10.58
1967	1,516.4	309.1	19.5	63.3	3.08	9.48
1968	1,874.8	438.7	17.6	97.9	2.90	8.77
1969	2,345.4	549.4	28.4	107.2	2.82	8.65
1970	2,903.6	672.1	27.6	141.5	2.81	8.51
1971	3,436.7	629.8	323.7	420.4	2.48	6.85
1972	3,885.0	551.1	28.7	131.5	2.90	7.17
1973	4,424.5	730.5	29.1	220.1	3.12	7.27
1974	4,971.2	726.6	27.4	207.3	3.42	7.58
1975	5,295.2	486.2	27.3	189.5	3.90	8.00
1976	5,662.9	669.7	24.4	326.4	4.14	8.29
1977	6,053.6	575.3	16.1	200.7	4.56	8.88
1978	6,408.4	571.1	45.6	261.9	4.91	9.43
1979	6,936.3	698.9	12.4	183.4	5.24	10.11
1980	7,588.4	882.9	41.4	272.2	5.37	10.70
1981	8,235.3	854.9	43.0	251.0	5.57	11.34
1982	8,814.5	797.3	42.4	260.5	5.83	11.98
1983	9,376.0	881.9	23.2	343.6	6.00	12.62
1984	10,367.1	1,255.5	47.2	311.6	5.99	13.29
1985	11,210.0	1,071.0	50.7	278.8	6.15	13.61
1986	12,138.1	1,216.7	39.8	328.4	6.27	14.43

Table B.10. Machinery, except electrical

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	---	34.9	12.7	---	--	--
1955	357.6	22.9	7.0	---	--	--
1956	386.0	44.3	15.1	31.0	--	--
1957	466.9	82.4	0.0	1.5	--	--
1958	523.8	65.5	11.7	20.3	--	--
1959	612.9	89.1	0.0	0.0	--	--
1960	782.6	173.1	14.7	18.1	--	--
1961	1,068.3	285.7	0.0	0.0	--	--
1962	1,504.0	435.7	0.0	0.0	--	--
1963	1,789.3	285.3	0.0	0.0	--	--
1964	2,139.3	350.0	0.0	0.0	--	--
1965	2,362.4	337.3	21.3	135.5	--	--
1966	2,592.4	350.2	30.4	150.6	3.51	11.02
1967	2,971.3	533.6	26.4	181.1	3.30	9.50
1968	3,573.0	781.6	31.1	211.0	3.09	8.56
1969	4,407.4	1,113.7	31.4	310.7	2.84	8.28
1970	5,195.1	1,311.7	46.4	570.4	2.62	7.81
1971	5,988.6	1,089.3	44.2	340.0	2.84	7.69
1972	6,644.8	915.9	39.5	299.2	3.16	7.83
1973	7,126.4	1,042.0	41.2	601.6	3.28	7.21
1974	7,756.2	1,083.3	32.3	485.8	3.52	7.27
1975	8,286.9	915.0	37.0	421.3	3.89	7.67
1976	8,629.0	873.9	75.9	607.7	4.16	7.94
1977	8,872.9	840.0	78.2	674.3	4.33	8.36
1978	9,141.3	850.1	54.6	636.3	4.67	8.83
1979	9,582.9	1,003.0	54.9	616.3	4.85	9.38
1980	10,168.0	1,268.8	67.8	751.5	4.83	9.79
1981	11,198.1	1,641.3	62.5	673.7	4.74	10.19
1982	12,113.7	1,674.4	97.1	855.9	4.62	10.34
1983	12,920.6	1,481.6	163.3	838.0	4.62	10.52
1984	13,778.7	1,674.4	70.3	886.6	4.62	10.71
1985	15,309.1	2,136.1	82.5	688.2	4.62	11.10
1986	16,413.0	1,795.2	60.1	751.4	4.76	11.32

Table B.11. Electrical machinery, equipment and supplies

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	---	---	---	---	--	--
1955	311.5	54.4	4.8	---	--	--
1956	323.9	52.3	5.1	45.0	--	--
1957	420.3	100.3	9.4	13.3	--	--
1958	527.1	108.7	7.4	9.3	--	--
1959	640.9	125.3	7.1	18.6	--	--
1960	871.0	230.5	8.6	9.0	--	--
1961	1,142.9	312.1	16.5	56.7	--	--
1962	1,509.6	366.7	0.0	0.0	--	--
1963	1,736.3	248.4	10.3	32.0	--	--
1964	2,035.5	299.2	0.0	0.0	--	--
1965	2,230.3	278.6	13.8	97.6	3.92	10.42
1966	2,428.7	299.7	19.2	120.5	4.05	9.65
1967	2,750.2	440.9	25.2	144.6	4.01	9.37
1968	3,129.4	554.1	17.9	192.8	3.90	8.93
1969	3,430.5	797.0	22.1	518.0	3.23	8.10
1970	4,196.8	1,054.3	31.1	319.1	2.95	8.22
1971	4,581.5	697.5	36.8	349.6	3.05	7.96
1972	4,877.0	601.0	45.2	350.7	3.26	7.79
1973	5,347.8	901.4	41.1	471.7	3.27	7.24
1974	5,791.1	855.1	32.1	443.9	3.43	7.21
1975	5,993.0	544.1	35.1	377.3	3.83	7.51
1976	6,236.4	731.7	62.0	550.3	4.00	7.69
1977	6,686.4	922.0	56.1	528.1	4.07	8.04
1978	7,075.7	910.0	53.8	574.5	4.15	8.50
1979	7,720.6	1,091.2	52.2	498.5	4.19	9.04
1980	8,651.9	1,481.5	48.3	598.5	4.05	9.25
1981	9,660.0	1,870.3	79.3	941.5	3.70	8.88
1982	10,785.7	1,867.6	131.9	873.8	3.53	8.95
1983	12,032.2	2,139.0	95.0	987.5	3.39	8.75
1984	14,228.0	3,437.2	150.5	1,391.9	2.98	7.83
1985	16,914.8	3,885.3	113.1	1,311.6	2.84	7.49
1986	18,898.7	3,127.6	138.9	1,282.6	2.99	7.29

Table B.12. Transport equipment

Year	Stock of fixed capital	Investment in new assets	Acquisition of used assets	Retirement	Average age of stocks	Service life of capital
t	K_t	I_t	S_t	R_t	a_t	l_t
1954	---	45.8	9.2	---	--	--
1955	632.0	41.9	4.7	---	--	--
1956	657.6	68.7	7.2	50.3	--	--
1957	739.6	114.8	9.0	41.8	--	--
1958	808.3	99.8	7.1	38.2	--	--
1959	892.4	115.9	8.0	39.8	--	--
1960	1,080.6	260.2	14.2	86.2	--	--
1961	1,395.4	348.6	9.0	42.8	--	--
1962	1,727.6	360.7	19.8	48.3	--	--
1963	1,970.7	287.1	13.9	57.9	--	--
1964	2,363.2	424.0	21.0	52.5	--	--
1965	2,777.3	513.0	16.6	115.5	--	--
1966	3,072.7	433.5	15.2	153.3	3.74	9.85
1967	3,601.2	679.1	29.1	179.7	3.63	9.30
1968	4,459.8	1,038.2	29.7	209.3	3.42	8.81
1969	5,237.0	1,003.4	22.6	248.8	3.42	8.92
1970	6,271.6	1,348.2	28.9	342.5	3.28	8.97
1971	7,133.9	1,119.5	37.2	294.4	3.45	9.19
1972	7,967.8	1,157.7	32.2	356.0	3.63	9.06
1973	8,968.6	1,455.4	32.9	487.5	3.68	8.96
1974	9,930.7	1,416.1	18.8	472.8	3.84	9.06
1975	10,519.8	956.2	54.0	421.1	4.24	9.14
1976	10,899.2	787.2	22.4	430.2	4.71	9.48
1977	11,472.9	1,096.4	1.4	524.1	5.00	9.83
1978	12,144.7	1,252.6	0.0	580.8	5.22	10.28
1979	12,786.6	1,265.7	33.9	657.7	5.39	10.65
1980	13,872.0	1,627.0	29.4	571.0	5.49	11.10
1981	15,145.2	1,868.7	56.2	651.7	5.50	11.60
1982	16,446.3	1,968.7	66.5	734.1	5.49	12.07
1983	17,496.1	1,874.7	34.1	859.0	5.53	12.34
1984	18,558.9	1,731.2	4.7	673.1	5.73	12.76
1985	20,301.7	2,501.1	58.3	816.6	5.68	13.07
1986	22,211.0	2,794.2	35.5	920.4	5.60	13.44

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