Industrial Labor Statistics in Taiwan, c. 1929-66 : Bridging the Gap of WWII

LIU, I-Ling / ODAKA, Konosuke

(出版者 / Publisher)
法政大学比較経済研究所 / Institute of Comparative Economic Studies, Hosei University
(雑誌名 / Journal or Publication Title)
比較経済研究所ワーキングペーパー / 比較経済研究所ワーキングペーパー
(巻 / Volume)
81
(開始ページ / Start Page)
1
(終了ページ / End Page)
29
(発行年 / Year)
2000-04-05

近現代アジア比較数量経済分析シリーズ No. 1

Industrial Labor Statistics in Taiwan, c. 1929–66: Bridging the Gap of WWII

Konosuke Odaka and I-Ling Liu

Industrial Labor Statistics in Taiwan, c.1929-66: Bridging the Gap of WWII*

by

Konosuke Odaka and I-Ling Liu

Abstract

Labor statistics appended to pre-war Taiwan industrial statistics seem to have included, in addition to factory workers, shop workers in cottage industries and side-jobbers from primary industries. Based on this interpretation, we attempt to ascertain the total number of gainfully occupied persons in the manufacturing sector by adding the figures for clerical workers, engineers and miscellaneous workers obtained from the Manufacturing Resource Survey to the aforementioned statistics of shop workers. Combining them with the figures for mining and utility service labor and linking them to the corresponding figures in the post-war employment statistics, we may discern employment trends in Taiwan's secondary industries before and after the Second World War. Combined with the estimates of real value added in these industries during the period, they provide clues to capture the trends in the real average labor productivity during the period in question.

(Note) Konosuke Odaka is professor of economics at Hosei University and I-Ling Liu is a graduate student at Tokyo Keizai University. For communications, please use the following address: kodaka@mt.tama.hosei.ac.jp

Introduction

On manufacturing labor in pre-war Taiwan, at least seven sets of statistics are known to exist. They include a series derived from *Sotokufu Tokeisho [Statistical Yearbook of the Governer-General's Office of Taiwan]* (called series A from here on), two sets of series stemming from *Taiwan Shoko Tokei [Statistical Yearbook of Taiwan Commerce and Industry]* (series B and C), the *Kojo Shigen Chosa [Manufacturing Resources Survey]* series (series D), the *Rodo Gijutsu Tokei [Laborers and Engineers Statistics]* series (series E), the *Romu Dotai Chosa [Labor Mobility Survey]* series (series F), and *Kojo Meibo [Factory Registry]* (series G). All these statistics, except for the series C, were accompanied by brief descriptions on their source materials, allowing us to roughly understand the purpose, target and method of the survey (see Table 1). Whereas the statistics issued by the Japanese colonial authorities in Taiwan are considered to be fairly accurate and in no way inferior in quality to those conducted in the homeland (see Matsuda, 1978, pp.119-22; Mizoguchi 1996, pp.5-6; Liu, Saito, and Taniguchi 1998, p.146, etc.), it is nevertheless unclear whether the aforementioned seven sets of statistics were as accurate as the Population Census of Taiwan.

<Insert Table 1: List of Labor Statistics in Pre-war Taiwan>

Using the results of a statistical survey without knowing its nature is like cooking without examining the quality of ingredients. We must therefore try our best to determine for what purposes, on what targets, by whom and with what method the surveys in question were conducted and complied, and their reliability. This paper attempts to establish consistent annual manufacturing labor statistics for Taiwan running through the period before and after the Second World War, by using comparative analyses of the aforementioned pre-war manufacturing labor statistics. We place a special focus on the series C in order to determine the size of the workforce in small cottage industry and then link the pre-war to the post-war employment statistics of Taiwan.

1. Seven Sets of Pre-War Manufacturing Labor Statistics

Among the aforementioned seven sets of pre-war manufacturing labor statistics, the series A and B seem to have been an outgrowth of *kojo tokei*, literally, factory statistics in Japan proper, where census of manufacturers began in 1909. (From 1933 onward the series A became just a straight copy of the series B.) The series A was part of the results from annual surveys conducted by the *Shokusan Kyoku* [Industrial Promotion Bureau] of the Governor-General's Office of Taiwan. The survey covered "all factories and cottage industries either employing an average (per day) of ten or more workers who were directly engaged in production, or those with capital asset of 1,000 yen or more," up to 1917. From 1918 on, the survey covered "workshops (business establishments) either employing five or more shop workers on regular basis, or those equipped with motorized machines for industrial production[1]." As with the case of factory statistics in Japan proper,

---

*This paper is part of FY1999's research outcome of a project entitled as "Comparative Economic History of Modern Asia: A Quantitative Appraisal (Leader: Konosuke Odaka, Grant No. 11803002)," financially supported by the Ministry of Education and Science, government of Japan. Liu I-Ling was mainly responsible for the examination of source materials and Odaka for the wrap up of hypotheses and writing of the final paper.

In the course of preparation, we received valuable suggestions from Yoshiro Matsuda and Tadayoshi Taniguchi. Subsequently, when we had an opportunity to report on the on-going paper at a regular seminar meeting of the Institute of Economic Research, Hitotsubashi University (27 January 1998), we received helpful comments from Messrs. Yoshiro Matsuda, Yukihiko Kiyokawa, Noriyuki Hirai, Yoshiaki Nishimura, Osamu Saito, Masaaki Kuboniwa, Hwang Insang, and several others. Many of these suggestions are reflected the final paper and we would like to express our thanks here. Remaining flaws in the paper, if any, are Odaka's.

The preparation of this paper was commenced when Odaka was visiting fellow at the Australian-Japan Research Centre, Australian National University, whose

these statistics reported only the number of men and women directly engaging in production (so-called factory hands [*koin*]) as employees, and classified them into Taiwanese, Japanese, and foreigners.

The definition of "factory" is a major concern for the readers of these statistics. However, neither the statistics nor the survey manual (issued by the Governor-General's Office of Taiwan in 1917) provided an explicit definition. We would suppose that the survey resorted to common sense to determine the boundary between "factory" and other forms of manufacturing setup. "Factory" presumably covered every manufacturing establishment, regardless of its legal status (e.g. incorporated or unincorporated), so long as there was a premise reserved for manufacturing production (i.e. factory building) and a group of workers engaged in the production of industrial goods on a regular basis. In any case, we may reasonably assume that minor household workshops and open-space manufacturing sites were not included in these statistics. Meanwhile, any compilation of factory statistics requires the standardization of industrial nomenclature of manufactured goods. Naturally, these colonial statistics basically adopted the industrial classification scheme used by the Japanese system of statistics. The classification adopted in these surveys appeared in several documents, including those issued by the Governor-General's Office of Taiwan (1936a, pp. 17-16), which we will touch upon later.

The source of the series D was the *Manufacturing Resources Survey,* which was based on Article 3 of the 1929 Act on Resources Survey (Code no. 53, April 1929), which read "the government, for the purpose of surveying human and material resources, if necessary, shall ordain individuals and corporations to declare facts or to submit themselves to on-site inspections." Accordingly, the

---

secretarial support is gratefully acknowledged. Draft English translation was undertaken by Makiko Nakano.

[1] See Matsuda (1978, p.123). The quotation was taken from the survey manual (instructions for factory form entries) by the Governor-General's Office of Taiwan (1917, p. 378). Note that Chang and Liu (1997) compares factory statistics with industrial employment figures in the national census.

government introduced a decree on "extending the Act over Korean peninsula, Taiwan and Sakhalin islands" (Imperial decree no. 327, 1929), which was duly implemented on December 1 of the same year. (The annual surveys of factory resources were then conducted to report the conditions of production as of December 31)[2].

The implementation of the Act was accompanied by the abolition of the Munitions Survey Ordinance (as made clear by the supplementary article of the Act on Resources Survey). This suggests that the new Act intended to serve a military purpose in addition to facilitate conservation and stock-taking of economic resources. The Act comprised seven articles, consisting, in the first four articles, of the definitions of relevant concepts and the purpose of the survey and punitive provisions in the remaining three.[3] Judging from the extent of vigor that

---

[2] The Ordinance on Taiwan Resources Survey (Provincial decree no. 69, issued on 1 December 1929) laid down the target as establishments possessing machines with prime movers (with one horse power and above) and requiring five or more hands to operate, or those employing five or more factory workers on a regular basis. The owners and their family members were included in the number of factory hands if they were engaged in production. While factories suspending operation for 12 months or longer were omitted, those engaging in seasonal operations and thereby not operating at the end of the year were "naturally included." In cases where a factory subcontracted out a part of the main production process, the subcontractors' employees were not counted in the employment of the factory (for instance, gold- or silver-coated paper factories lent all their equipment, including brushes and cutters, to mainly female workers to work at home). Although the ordinance also required reports on skill components of the workers (e.g. their numbers classified by their skill levels), we have found no such reports in the documents published. The above descriptions of the survey are taken from Governor-General's Office. (1936a, pp. 1-16)

[3] The penalties were: fine of no larger than 200 yen for negligence of declarations or falsification (Article 5); a fine of not exceeding 500 yen for interference with government officials' on-site investigation or false deliveries (Article 6); and a penal servitude of less than two years or a forfeit of maximum 2,000 yen for leaking or

went so far as to provide penalties, Japanese officials must have wished to ensure maximum accuracy of the factory statistics. The surveys conducted in Taiwan would have well reflected the census takers' enthusiasm.

The *Manufacturing Resources Survey* covered the same target as the series B. However, *Source Materials for Factories Based on the Resources Survey Ordinance* (series D), which reports a compilation of the *Manufactruring Resources Survey* results, contains additional information: (1) figures for non-production labor, such as clerical workers, engineers, and other employees (waiters, handymen, doormen, sweepers, kitchen help, porters, etc.) working for factories, although these figures were exclusively for in-house workers so that the persons working outside, such as those employed by subcontractors, were not included; (2) employment classified by the age of employees and by the size of factories; and (3) average actual daily wages of factory workers. Especially noteworthy is the inclusion of the number of white-collar workers, which was unseen even among the labor statistics of Japan proper. The total employment figures reported by the survey roughly match those shown in the series B. Like in the series B, these figures were classified by two-digit industrial classification, and, in most cases, were further broken down by sex and nationality (Taiwanese, Japanese and foreigners), as shown in Table 2.

<Insert Table 2: Comparison of the Number of Factories and Workers Extracted from the Six Series of Labor Statistics in Pre-war Taiwan>

The series E was started shortly before the outbreak of the Second World War in the Pacific (1941).[4] It corresponded to the Field Survey of Labor Statistics conducted in Japan proper. In the case of Taiwan, however, the survey must have been strongly motivated to enlist all the available labor resources for the conduct

---

appropriation of trade secrets of individuals or corporations obtained through the survey (Article 7) (*op. cit.*, Appendix pp.1-2).

[4] It, however, was preceded by a provisional survey conducted in 1938 (Matsuda 1978, pp. 113-14).

of the War. The nature of the statistics is quite close to that of the series A, and in fact there were few discrepancies in the 1941 figures between the two groups (see Table 2). Whereas the series E contains nothing new, its great merit is the information it provides for the period for1942-43, immediately after Japan's entry to the Second World War, not available anywhere else.

The series F, like the series E, had its primary objective in the preparation for war mobilization. With its focus set on capturing labor mobility, the series F naturally included seasonal laborers and extended the scope of survey to cover non-manufacturing sectors as well.

All the five series of statistics that we have looked at (A, B, D, E and F)-- the series A, which became a copy of the series B after a certain point, and the series D, E and F, which reported largely the same figures -- essentially descended from *Factory Statistics* in Japan proper. It is only natural, therefore, that figures in these statistics roughly agree with the figures taken from *Factory Registry* (series G); for example, 8,141 for the total number of factories and 87,270 for the total number of factory hands for 1937 (Liu 1996, p. 27).

However, the series C has distinctive traits quite unlike the other six sets (i.e. A, B, D, E, F and G): the figures for factory hands cited in the series C are far greater than the figures provided in the other six sets (Table 2)[5]. In addition, a comparison of the series C and D on the number of factory hands, broken down by the two-digit industrial classification in 1940, reveals that their discrepancies tend to be larger in the sub-sectors that have a strong tint of traditional industries, such as spinning and textiles, ceramics, chemicals and woodworks. Especially, figures for female workers in the "other industries" category show noticeable differences (see Table 3).

<Insert Table 3: Number of Production Workers

---

[5] Note that the *Labor Mobility Survey* (series F) was supposed to cover all the factories employing five or more workers regardless of the possession of prime movers. Its first survey (1940), however, was exceptional in that it covered all factories without imposing any conditions on their size.

Immediately before and after WWII >

Apparently, the series C deviate significantly from all the rest, i.e. A, B, D, E, F, and G, which are roughly in mutual agreement. Does this indicate that the former is not trustworthy? The series C covers the period from 1920 and 1941 without interruptions, and the aforementioned distinctiveness was observable throughout the period. We are inclined to believe therefore that there must have been some particular reason behind this. Solving this puzzle is an alternative approach we are attempting in the remainder of the paper.

2. The Enigma of Commerce and Industry Statistics (Series C)

The figures in the series C were not contained in the statistical tables of the original sources. It was the result of the authors' compilation, adding up employment figures (men and women) that appeared in the tables of industrial output (volume and value) by product. The source document is the *Statistical Yearbook of Taiwan Commerce and Industy,* renamed into *Taiwan Industrial Statistics* in 1941 (see Odaka, 1972, pp. 127-30).[6] This means that the main purpose of the source material was to survey manufacturing output, not employment. It should be recalled that particularly prominent discrepancies between the series C and D were the figures of female workers in "other industries." It would seem that manufacturing production activities being left out of the *Factory Statistics* were concentrated in this "other industries" category. In other words, one may conjecture that the figures for the "other industries" in the C series embraced not only workers at petite workshops but also a significant number of workforce (mainly women) who participated in manufacturing production as a sideline business[7].

---

[6] The compliation was cnducted mainly on the basis of the 1940 (or 1939) volume of Statistical Yearbook of *Taiwan Commerce and Industry.* The data were supplemented by the same yearbook issued in previous years for the number of workforce engaging in miscellaneous staples that could not be obtained from the main source book.

[7] These side-jobbers could have included people who did not have principal

Powerful evidence supporting this interpretation is the composition of the "other industries" in the industrial production statistics of the *Taiwan Commerce and Industry Statistics*. For instance, the figure included many women who produced hats at home. Hat production was a well known typical auxiliary business in Taiwan at that time[8]. While the series C provided a figure of 144,258 for hat makers (women) for 1933, figures cited in the *Resources Survey* (series D) was only 45 workers (for four factories). For 1940, these figures were 104,073 and eight (two factories), respectively.

Other than hat making, relatively common sideline work included the following. The number of workers are as of in 1933, all taken from the Governor-General's Office (1936b).

Bamboo works	(Nei hu, Tai bei Province)	male 80	female 450	p. 54
Straw bags	(Tou cherng, Tai bei Province)	male 230	female 500	p. 102
Straw ropes	(Xin zhu, Xin zhu Province)	male 3	female 20	p. 142
Baskets	(Sheh to, Tai zhong Province)	male 71	female 10	p. 200
Rush mats	(Dah tsuen, Tai zhong Province)	male 0	female 868	p. 204
Sandals	(Nan to, Tai zhong Province)	male 0	female 675	p. 216
Bamboo brooms	(Lu guu, Tai zhong Province)	male 0	female 480	p. 223
Metal coated papers	(Pei gang, Tai nan Province)	male and female 168		p. 267
Straw ropes, mats	(Gao xiong, Gao xiong Province)	male 0	female 520	p. 279
Net strings	(Gao xiong, Gao xiong Province)	male 0	female 220	p. 280

---

occupations but contributed to production nonetheless (they were called "side-jobbers with no principal occupations" by the Taiwan population census). See Lieu, Saito and Taniguchi (1998).

[8] Production of hats in Taiwan had a long history. Originally, *Dah-jia* hats and *Lin-to* hats dominated the market. But the paper hats introduced in 1915, dubbed as Toyo Panama, were a sweeping success, eventually taking over the position of *Linb-to* hats (Koike 1943, pp. 6-9). Dah jia and Lin to are both place names, located in Taizhong and Tainan provinces respectively.

For all these cases, the most common style of business was to procure raw materials from makers and sell the finished products to retail dealers or brokers, although some operations did take the form of a factory system.

We now estimate the number of off-factory workers for manufacturing production according to the interpretation introduced above. Let us first take the year 1940, near the closing of the series C, as a target of the experiment.

The series C figures to be estimated comprise of (a) factory workers (N_f), (b) workers for cottage industries not meeting the criteria of factories (N_c), and (c) the "side-jobbers with no principal occupations," who were engaged in manufacturing production while being based mostly in primary industries (agriculture, forestry and fishery) (N_s). In other words,

$$C = N_f + N_c + N_s$$

First, we assume that N_s was found nowhere else other than among women working in "other manufacturing (Assumption 1)."[9] Under this assumption, the difference between the series C and the series D figures accounts for the size of the cottage industry workforce, with the only exception of "other manufacturing."

By definition, N_f may be taken to be equal to the series D figures for both men and women (Definition 1). The total number of manufacturing workers working outside factories (N_c and N_s) can then be obtained by deducting the series D figures from the series C figures.

In order to estimate the size of N_s, we next concentrate on the "other industries" expressed by the subscript "$_o$", and assume that, for reasons of production technology, the men-to-women ratio (r) applied equally to both factories and non-factory workshops within a short span of time (say, 12 months)

---

[9] According to Taiwan censuses, male workers accounted for only a minor proportion of "side-jobbers with no principal occupation." They stood at 0.4% in 1905, 0.2% in 1915 and 1.5% in 1930, according to a table (Table 1) in Liu, Saito, Taniguchi (1998). In reality, N_f and N_c also may have included side-jobbers (with or without principal occupations).

(Assumption 2).

Under these assumptions, the number of the side-jobbers with no principal occupations in the cottage industries (in "other manufacturing") can be deduced as follows. Dividing the number of male workers in cottage industries with "r", we can obtain the estimated number of female workers in cottage industries ($N'_{oc} = N^*_{oc}/r$, where the apostrophe represents female, and the asterisk male). Subtracting this from the number of female workers working outside factories ($C'_o - D'_o$) should lead to the number of side-jobbers with no principal occupations (N_s).

$$
\begin{aligned}
N_s &= C - (N_f + N_c) \\
&= C'_o - (N'_{of} + N'_{oc}) && \text{(due to Assumption 1)} \\
&= C' - N'_{of} - N^*_{oc}/r && \text{(due to Assumption 2)} \\
&= (C'_o - D'_o) - N^*_{oc}/r && \text{(due to Definition 1)} \\
&= (C'_o - D'_o) - N^*_{oc}(N'_{of}/N^*_{of}). && \text{(since } r = N^*_{of}/N'_{of}\text{)}
\end{aligned}
$$

For instance, applying the figures shown in Table 3 to the formula, we get estimates of N_h and N_b in 1940 as 37,396 and 117,903, respectively. This means in the Taiwanese manufacturing sector just before WWII, that cottage industries accounted for slightly over 13% of total factory workers, and that around 64% of female workers were side-jobbers with no principal occupations.

The national census of Taiwan conducted in 1905 and 1930 reported there were 263,436 and 105,740 female side-jobbers with no principal occupations in the overall island, respectively. Among these workers, 43,578 (in 1905) and 35,955 (in 1930) were engaged in manufacturing production (calculated from the worksheet in Liu, Saito and Taniguchi 1997). Taking a commonsense view, these figures should have gradually declined subsequently.

In comparison with these censuses, the above estimated figures pf side jobbers of ours may appear too large. In fact, our calculations above do have some inflating factors: (i) they do not count occasional workers at factories; (ii) the men/women ratio for cottage industries could have been significantly lower than that for factories; and (iii) among the self-employed and cottage industries, manufacturing business could have included all commercial (sales) activities. At

the same time, however, the above calculations also contain factors that could underestimate the figures; they ignored side-jobbers with no primary occupations, which could have also existed in the categories other than "other manufacturing," and the national census did not survey the third and/or fourth sideline businesses, if any. On the other hand, as stated earlier, of the female workers in the "other manufacturing" in 1940, slightly more than 100,000 women were hat producers. On balance, we would conclude that the results of our estimates are probably not far out of the mark.

Applying the same method to other years between 1929 and 1941, we have obtained breakdowns of manufacturing workers into workers of factories, cottage industries and (female) side-jobbers with no principal occupations, as indicated in Table 4. These estimates are limited to the period after 1929 because the series C only reports separate figures for men and women only from this year onward.

<Insert Table 4: Estimates of the Number of Production Workers in Taiwan Manufacturing: 1929-41>

3. Bridging the Gap in Pre-War and Post-War Industrial Labor Statistics

We now proceed to connect the pre-WWII industrial labor statistics to their postwar counterparts. We have first complemented the number of factory production workers for 1942 and 1943 in the series C, which ends at 1941, by applying the ratio of C to E in 1941 to the E figures for years 1942 and 1943.[10] That is,

$$C_t = (C_{41}/E_{41})\, E_t \quad (t=1942, 1943).$$

---

[10] The ratios of C/D showed a noticeable down trend since the mid-1930s, especially for male worker figures. In case that this trend continued through 1942 and beyond, our estimate here for the series C should be larger than the actual figures.

Next, we work out the total number of manufacturing labor. As stated earlier, the series D provides the numbers of white-collar workers in the broadest sense, including business-office (or clerical) workers (W_b) and engineers (W_e), and miscellaneous workers (W_m). Assuming that cottage and home-based (non-factory) manufacturing did not require full-time white-collar workers nor miscellaneous workers, we can simply add these figures to the number of factory workers (series C) to obtain the total number of manufacturing labor (= $C + W_b + W_e + W_m$).

Note, however, that figures for white-collar workers in the series D are only available up to 1940. Fortunately, the series E contains figures for engineers (W_e; including the number of qualified engineers and those who had equivalent skills) for 1941-1943, so we can complement the missing figures for W_b and W_m for the period using their proportions to W_e in the series D in 1940. That is,

$$W_{b,t} = (W_{b,40}/W_{e,40})W_{e,t} \quad (t = 1941,...1943), \text{ and}$$
$$W_{m,t} = (W_{m,40}/W_{e,40})W_{e,t} \quad (t = 1941, ...1943).$$

Like in the estimates for the series C, we have calculated the figures separately for men and women.[11] Table 5 shows our attempt to combine the total number of manufacturing labor before the war obtained through these calculations with the total manufacturing workforce provided in post-war labor statistics.

<Insert Table 5: Estimated Time Series of Manufacturing Workforce>

Furthermore, adding the number of labor in the mining and public utility

---

[11] The proportion of male engineers (W_e) to male clerks ($W_{b,40}/W_{e,40}$) rose from 1929 to 1935, and then noticeably declined every year until 1940 (the corresponding ratio for females remained largely flat for the entire period of the survey). On the other hand, the ratios of the number of engineers to "miscellaneous employees" ($W_{m,40}/W_{e,40}$) continued to fall until 1935 for both men and women, and then turned to pick up until 1938, when they leveled off for the following three years. Considering this, our extrapolation for male clerks could be slightly excessive.

(i.e. electricity, gas and water) sectors to the total manufacturing workforce, we can grasp the total size of the workforce in the secondary industries. Pre-war figures for mining industry workers (sum of factory hands, clerical workers and engineers) can be obtained from *Taiwan Mining Industry Statistics* (up to 1940) and *Taiwan Labor Skill Statistics Survey Results* (1941-1943). (refer also to Odaka, 1969). The public utility sector workforce may be ignored for the time being because of their negligible size.[12] We have thus determined the time series of labor statistics for the secondary industries (Table 6 and Chart 1) by combining the total workforce in the manufacturing and mining sectors for the pre-war period, and adding figures for the utility sector to these two sectors for the post-war period.

<Insert Table 6: Trends in Workforce in Secondary Industries >
<Insert Chart 1: Employment in Taiwan's Secondary Industries>

Looking at Chart 1, the number of labor in secondary industries in Taiwan appears to have been fairly stable during 1935 to 1955. However, the female workforce, which accounted for a relatively large portion of manufacturing workers in pre-war Taiwan, started to decline from the mid-1930s. This made a strong contrast to the size of male workers, which began to expand around the same time as the Japanese war effort built up. Perhaps this could mean that male labor that moved from the primary industries into the secondary industries replaced female labor[13]. It was only from the mid-1950s that female labor for the

---

[12] For example in 1940 when the utility business gained weight, the number of factory workers (male only) in the gas and electricity companies amounted to only 52. (*Showa 15 nen, Shigen Chosarei ni Motozuku Kojo Kankei Shiryo-shu [Source Materials Relating to Factories Based on the Resources Survey Act*, 1940], p. 3)

[13] Concerning this, we have received a comment that the higher rate of female employment was not necessarily a common feature in Asia, and that the structure of labor demand could have been distorted by the special conditions of Taiwan at that period related to the Japanese war making (the island was considered to be the forefront of air force bases, etc.), which could have expanded labor demand for commerce and services to

industrial sector began to regain significant growth momentum from.

We can obtain an overview of the trends in the real average labor productivity in the secondary industries in Taiwan through the combination of the sequential labor statistics and the statistics of real value-added in the sector induced as a part of the long-term GDP trend estimate (Mizoguchi, 1997, pp. 27-28), as shown in Chart 2. The chart indicates that the labor productivity in the Taiwanese secondary industries posted a pre-war peak in the early 1940s and then tumbled during the war. In the post-war period, productivity recovered to the pre-war peak by the first half of the 1950s and thereafter accelerated in the 1960s. Of course, this process was accompanied by the significant transformations in the industrial structure; the pre-war structure of industrial production dominated by food processing shifted after the war to production dominated first by textiles and then to metal and machinery industries.

<Insert Chart 2: Average Value-Added Per Worker in Taiwan's Secondary Industries>

Naturally, this change must have been reflected in the changing structure of employment. What happened to the side-jobbers who once accounted for the dominant proportion of industrial labor in the course of the change is, at this moment, beyond our means of inquiry. It would be unrealistic after all to expect that the phenomenon of by employment continued on to the war-embracing period. In any case, the syndrome of disguised unemployment including side-jobbers may have returned in the chaotic period immediately after the war, but must have dissipated fairly quickly in the 1960s, when the Taiwanese economy got on to a growth track.

---

satisfy the final demand of soldiers. Inquiry into these issues shall be reserved for future study.

4. Remaining Tasks

This paper argued that greater attention should be paid to the value of labor statistics derived from the manufacturing output surveys. If this argument is acceptable, we need to reexamine the finer classification figures of manufacturing industries in the series C and compare the findings with those from national census and factory statistics. Consistency with the classifications of industrial products should also be investigated. That would give more accuracy to the argument in this paper, and facilitate the compatibility between labor statistics and industrial production statistics. As part of such efforts, we also call for a comprehensive and critical review of materials, not just for the series A and B but also for other sets of labor statistics which have been relatively under-utilized, to be carried out. In the process of putting all these statistics together, may we gain additional hints as to how we should best connect them with comparable, post-war statistics.

Another challenge left to us is to uncover labor conditions in the primary (agriculture, forestry and fisheries) and the tertiary (commerce and services) industries, in addition to the secondary industries. Given the relative abundance of labor statistics of Taiwan, we may reasonably anticipate certain achievements in the study of these fields. The caveat here is that unlike this paper, which exclusively focused on secondary industries, any studies that deal with the question of side-jobbers on a macro-economic level have to face up to the onerous problem of avoiding double counting.

Bibliography

Chang, Ching-his and Ying-chan Liu (1997). "The Estimation of Employment in Taiwan, 1898-1942," Discussion Paper D 97-3, Asian Historical Statistics Project, Institute of Economic Research, Hitotsubashi University.

Koike, Kinnosuke (1943). *Taiwan Boshi no Hanashi* {A Story of Taiwan Hats},

Sanseido Taiwan.

Liu, I-Ling (1996). *Shokuminchi-ki Taiwan no Kogyoka to Rodoryoku no Keisei (Industrialization and the Formation of Labor Force in Colonial Taiwan)*, MA thesis, Graduate School in Tokyo Keizai University.

Liu, I-Ling, Osamu Saito and Tadayoshi Taniguchi (1997). "The Size and Structure of the Workforce in Taiwan, 1905-1930," Discussion Paper D 97-2, Asian Historical Statistics Project, Institute of Economic Research, Hitotsubashi University.

Liu, I-Ling; Osamu Saito and Tadayoshi Taniguchi (1998). "Senzen Taiwan ni okeru Yugyo Jinko no Shin-suikei (A Renewed Estimate for Labor Demographics in Pre-war Taiwan)" in *Keizai Kenkyu (The Economic Review)*, Vol. 49 No. 2 (April 1998), pp. 145-53.

Matsuda, Yoshiro (1978). *Deta no Riron – Tokei Chosa no Deta Kozo no Rekishi-teki Tenkai (A Theory of Data– Historical Development of the Data Structure of Statistical Researches)*, Tokyo: Iwanami Shoten, Publishers.

Mizoguchi, Toshiyuki (1996). "Taiwan Choki Keizaitokei Data Besu (Long-term Database of Economic Statistics in Taiwan)," Discussion Paper D 96-4, Asian Historical Statistics Project, Institute of Economic Research, Hitotsubashi University.

Mizoguchi, Toshiyuki (1997). "Revising Long-term National Accounts Statistics of Taiwan 1912-1990: A Comparison of Estimates of Production Accounts to Expenditure Accounts," Discussion Paper D 97-8, Asian Historical Statistics Project, Institute of Economic Research, Hitotsubashi University.

Mizoguchi, Toshiyuki and Mataji Umemura eds. (1988). *Kyu Nihon Shokuminchi Keizai Tokei, Suikei to Bunseki (Economic Statistics of Former Japanese Colonies – Estimates and Analysis)*, Tokyo: Toyo Keizai Shimposha.

Odaka, Konosuke (1969). "Nihon Tochika ni okeru Taiwan no Rodo Keizai (Labor Economy in Taiwan under Japanese Rule)" in *Keizai Kenkyu (The Economic Review)*, Vol. 20 No. 2 (April 1969), pp.128-39.

Odaka, Konosuke (1972). "Nihon Tochika ni okeru Taiwan no Koyo to Chingin (Employment and Wages in Taiwan under Japanese Rule)" in Miyohei Shinohara and Shigeru Ishikawa eds., *Taiwan no Keizai Seicho – Sono Suryo-keizai-teki Kenkyu (Economic Growth in Taiwan – A Quantitative Economic Study)*, Tokyo: Institute of Developing Economies, Background Papers No. 181, Chapter 3.

Taiwan Sotokufu (Governor-General's Office, Taiwan) (1917). *Taisho 6-nen 3-gatsu 10-ka Genko Meiji 40-nen 12-gatsu 14-kka Taiwan Sotokufu Kunrei Dai 208-go Bessatsu Taiwan Sotokufu Hokokurei (Commentaries on the Governor-General's Decree No. 208 Issued on 14 December 1910, As It Stands on 10 March 1917).*

Taiwan Sotokufu, Kanbo Chosa-ka (Research Section, Governor-General's Office, Taiwan), (1936a) *Kojo Shigen Chosa Yoko (An Outline of Manufacturing Resources Survey).*

Taiwan Sotokufu, Shokusan-kyoku Kogyo-ka (Commerce and Industry Section, Industrial Bureau, Governor-General's Office,Taiwan), (1936b). *Taiwan no Fukugyo (Auxiliary Businesses in Taiwan).* Report No. 6.

Table 1 List of Labor Statistics in Pre-war Taiwan

Appellations in This Paper	Series A	Series B	Series C	Series D	Series E	Series F	Series G
Document Names	Statistical Yearbook of Governor-General's Office of Taiwan (Taiwan Sotokufu Tokeisho)	Statistical Yearbook of Taiwan Commerce and Industry (*Taiwan Shoko Tokei*)	Statistical Yearbook of Taiwan Commerce and Industry (*Taiwan Shoko Tokei*)	Source Materials for Factories Based on the Manufacturing Resources Survey Ordinance (*Shigen Chosa-rei ni Motozuku Kojo Shiryoshu*)	Statistical Survey Reports on Laborers and Engineers (*Rodo Gijutsu Tokei Chosa Kekka Hokoku*)	Survey Reports on Labor Mobility (*Romu Dotai Chosa Kekka Hokoku*)	Factory Registry (*Kojo Meibo*)
Targets	Manufacturing establishments equipped with motored machines or employing 5 or more workers on daily average.	Same as Series A	Values of outputs and corresponding factory hands per day, both according to detailed industrial classification	Manufacturing establishments owning machines with prime motors or requiring 5 or more hands to operate, or those employing 5 or more factory hands on a regular basis (as of the year end).	Manufacturing establishments employing 5 or more hands or equipped with facilities which require 5 or more workers on a regular basis.	Establishments regularly employing 5 or more workers or seasonally employing 10 or more workers consecutively for more than a month. Included were non-manufacturing establishments, offices and retail stores.	Based on the Resources Survey Act, manufacturing establishments equipped with motored machines or employing 5 or more hands on a regular basis (as of the year end).
Surveyor	Governor-General's Office of Taiwan	Industrial Promotion Bureau, Governor-General's Office	Industrial Promotion Bureau, Governor-General's Office	Industrial Promotion Bureau, Governor-General's Office	General Affairs Bureau of govenor-General's Office	General Affairs Bureau of govenor-General's Office	Industrial Promotion Bureau, Governor-General's Office
Period Covered	1910-41	1914-24 & 1925-36	1920-41	1929-41	1941-43	1940-42	1929-40

(Notes to Table 1)

1. For the series A, the 1914 and 1915 volumes define the target as "establishments with capital asset of 1,000 yen or more, or employing 10 or more factory hands on average." Also, the 1917 volume notes "Figures are concerned with factories (including cottage industries) employing 10 or more workers directly engaging in production or with capital asset of 1,000 yen or more."

2. For the series F, the first survey (unlike subsequent surveys) defined the object of its "report to establishments that regularly employ workers, including factories, offices, retail stores, home or other places of employment."

Table 2 Comparison of the number of factories and workers extracted from the six labor statistics in the pre-war Taiwan

	Statistical Yearbook of Governor-General's Office of Taiwan		Statistical Yearbook of Taiwan Commerce and Industry		Statistical Yearbook of Taiwan Commerce and Industry	Source Materials for Factories Based on the Manufacturing Resources Survey Ordinance		Statistical Survey Reports on Laborers and Engineers		Survey Reports on Labor Mobility
	Series A		Series B		Series C	Series D		Series E		Series F
	Number of establish-ments	Number of workers	Number of establish-ments	Number of workers	Number of workers	Number of establish-ments	Number of workers	Number of establish-ments	Number of workers	Employment
1929	5,870	62,877	5,870	62,877	188,258	5,839	62,673	-	-	-
1930	6,128	58,330	6,128	58,330	176,103	6,097	58,116	-	-	-
1931	6,094	57,780	6,094	57,780	208,648	6,037	57,396	-	-	-
1932	6,292	60,089	6,292	60,089	224,463	6,261	59,145	-	-	-
1933	6,618	64,743	6,618	64,743	263,993	6,596	64,507	-	-	-
1934	6,776	66,559	6,776	66,559	272,234	6,749	66,431	-	-	-
1935	7,032	66,723	7,032	68,773	272,142	7,005	68,468	-	-	-
1936	7,881	81,559	7,881	81,589	306,221	7,846	81,462	-	-	-
1937	n. a.	87,244	-	-	279,228	8,025	78,571	-	-	-
1938	n. a.	97,212	-	-	283,963	8,491	95,641	-	-	-
1939	n. a.	104,027	-	-	272,177	8,623	107,507	-	-	125,193
1940	n. a.	127,245	-	-	270,594	8,940	126,005	-	-	133,017
1941	n. a.	129,932	-	-	235,238	-	-	4,459	132,796	112,708
1942	-	-	-	-	-	-	-	4,893	137,281	124,891
1943	-	-	-	-	-	-	-	4,969	147,698	-

(Notes to Table 2)

1. Statistical Yearbook of Governor-General' s Office lacks the number of factories and factory hands for 1921-32 and figures from 1933 onward are exactly the same as those in Statistical Yearbook of Taiwan Commerce and Industry.

2. Figures for factory hands in the series C are daily averages.2.

3. "-" indicates that no surveys were conducted for the year.

4. In the series F, 125,193 for 1939 (as of 31 December) and 133,017 for 1940 (as of 30 June) include civil engineering.

5.From 1937 onward, all the figures including "gas and electricity utilities" except those in the series C.

Table 3 Number of Production Labors Immediately Before and After W.W.II
(Taiwan Manufacturing)

ID	Industry	1940 Statistical Yearbook of Taiwan Commerce and Industry (Series C)				Source Materials for Factories Based on the Manufacturing Resources Survey Ordinance (Series D)				1954 Census of Manufacturing			
		Male(M)	Female(F)	Total	F/M	Male(M)	Female(F)	Total	F/M	Male(M)	Female(F)	Total	F/M
1	Textile	5,931	11,139	17,070	1.88	1,338	3,880	5,218	2.90	21,717	39,295	61,012	1.81
2	Metal	2,721	323	3,044	0.12	2,682	1,311	3,993	0.49	16,978	1,483	18,461	0.09
3	Machinery	8,354	146	8,500	0.02	6,902	86	6,988	0.01	29,929	1,701	31,630	0.06
4	Ceramics	10,825	3,164	13,989	0.29	8,877	2,734	11,611	0.31	19,088	7,625	26,713	0.40
5	Chemical	6,896	2,106	9,002	0.31	5,619	1,676	7,295	0.30	19,774	7,977	27,751	0.40
6	Wood & Wood Products	12,671	9,318	21,989	0.74	3,797	890	4,687	0.23	16,343	3,867	20,210	0.24
7	Printing & Binding	3,404	763	4,167	0.22	2,732	582	3,314	0.21	7,233	1,496	8,729	0.21
8	Food & Beverages	31,984	24,913	56,897	0.78	41,441	29,126	70,567	0.70	42,872	16,642	59,514	0.39
9	Others	5,894	130,042	135,936	22.06	2,751	9,529	12,280	3.46	6,280	3,890	10,170	0.62
	合計	88,680	181,914	270,594	2.05	76,139	49,814	125,953	0.65	180,214	83,976	264,190	0.47

(Sources of Table 3)

Series C figures are from Statistical Yearbook of Taiwan Commerce and Industry Volume Twenty: 1940, issued in 1942. Series D figures are from Source Materials for Factories based on the Manufacturing Resource Survey Ordinance: 1940, issued in 1943. The source material for 1954 Census figures is Summery Statistics on Republic of China Taiwan Province, issued in 1971.

(Notes to Table 3)

The food-industry figures in 1940 Resources Survey Ordinance (series D) exceeded original figures of Commerce and Industry Statistics (series C) for both men and women (by nearly 10,000 for men and slightly more than 4,000 for women). This seems attributable to the lack of figures for sugar factories in the series C, for some reason. Both statistics do not include figures for "gas and electric utilities."

Table 4 Estimates of the Number of Production Workers

	Number of Factory Hands in Manufacturing			Total Number of Factory Employees in Manufacturing			Number of Cottage Industry Employees			Number of Side-jobbers without Primary Occupations
	Male	Female	Total	Male	Female	Total	Male	Female	Total	
1929	74,124	114,134	188,258	43,686	18,987	62,673	30,438	13,229	43,667	81,918
1930	73,327	102,776	176,103	41,469	16,647	58,116	31,858	12,789	44,647	73,340
1931	71,081	137,567	208,648	40,033	17,528	57,561	31,048	13,594	44,642	106,445
1932	72,738	151,725	224,463	41,965	17,902	59,867	30,773	13,128	43,901	120,695
1933	75,282	188,711	263,993	43,947	20,560	64,507	31,335	14,660	45,995	153,491
1934	76,931	195,303	272,234	45,531	20,900	66,431	31,400	14,413	45,813	159,990
1935	79,582	192,560	272,142	47,881	20,687	68,568	31,701	13,696	45,397	158,177
1936	89,766	216,455	306,221	54,901	26,561	81,462	34,865	16,868	51,733	173,026
1937	90,867	200,097	290,963	57,309	29,962	87,271	33,558	17,545	51,102	152,590
1938	88,035	207,322	295,357	59,763	35,878	95,641	28,272	16,973	45,244	154,472
1939	89,573	193,656	283,229	67,722	39,785	107,507	21,851	12,837	34,689	141,034
1940	98,803	182,501	281,305	76,191	49,814	126,005	22,612	14,784	37,396	117,903
1941	88,129	157,478	245,607	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

(Notes to Table 4)

1. The total number of factory hands in the manufacturing industries are from the series C. Note that missing figures for sugar and molasses manufacturing in the series C for 1937-41 have been interpolated by using the 1935 output figures from the series C and the 1941 employment figures. The employment statistics (male and female separately) have been extracted from Statistical Survey Reports on Laborers and Engineers. However, the latter figures may include employees other than factory hands.
2. The number of factory employees have been taken from the series D.
3. Numbers of cottage industry employees and of side-jobbers without primary occupations are our own estimates (for the method of their computation, please refer to the text).

Table 5 Estimated time Series of Manufacturing Workforce

(Number of persons)

	Factory Hands (Series C)			Office Workers			Engineers			Other Workers			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
1929	74,124	114,134	188,258	3,830	45	3,875	1,180	32	1,212	4,848	824	5,672	83,982	115,035	199,017
1930	73,327	102,776	176,103	3,810	32	3,842	1,228	10	1,238	4,330	1,564	5,894	82,695	104,382	187,077
1931	71,081	137,567	208,648	3,394	26	3,420	1,236	9	1,245	4,501	1,342	5,843	80,212	138,944	219,156
1932	72,738	151,725	224,463	3,299	17	3,316	1,375	6	1,381	3,595	522	4,117	81,007	152,270	233,277
1933	75,282	188,711	263,993	3,199	18	3,217	1,415	7	1,422	3,693	587	4,280	83,589	189,323	272,912
1934	76,931	195,303	272,234	3,479	43	3,522	1,594	5	1,599	3,708	521	4,229	85,712	195,872	281,584
1935	79,582	192,560	272,142	3,812	53	3,865	1,751	3	1,754	3,484	622	4,106	88,629	193,238	281,867
1936	89,766	216,455	306,221	4,468	45	4,513	1,999	10	2,009	4,653	690	5,343	100,886	217,200	318,086
1937	90,867	200,097	290,963	5,150	104	5,254	2,597	22	2,619	5,661	826	6,487	104,275	201,049	305,323
1938	88,035	207,322	295,357	5,889	220	6,109	2,984	26	3,010	6,801	1,562	8,363	103,709	209,130	312,839
1939	89,573	193,656	283,229	6,514	259	6,773	3,583	50	3,633	7,416	1,713	9,129	107,086	195,678	302,764
1940	98,803	182,501	281,305	8,195	420	8,615	3,877	96	3,973	8,343	2,176	10,519	119,218	185,193	304,412
1941	88,129	157,478	245,607	10,015	335	10,350	4,209	5	4,214	10,196	1,733	11,930	112,550	159,551	272,101
1942	94,156	150,005	244,161	10,700	319	11,019	4,035	7	4,042	10,894	1,651	12,545	119,785	151,982	271,767
1943	100,310	165,542	265,852	11,400	352	11,751	4,396	13	4,409	11,606	1,822	13,428	127,711	167,729	295,440
1954	180,224	83,976	264,200	40,969	4,718	45,687	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	221,193	88,694	309,887
1961	238,866	128,786	367,652	66,826	11,189	78,015	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	305,692	139,975	445,667
1966	286,134	199,695	485,829	81,676	16,448	98,124	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	367,810	216,143	583,953

(Sources of Table 5)
Figures of factory hands for 1929-43 are based on Table 4. Figures of office workers, engineers and other kinds of employees for 1929-40 are based on the series D. Figures of factory hands for 1942-43 and office workers and other kinds of employees for 1941-43 are our estimates (please refer to the text). In the post-war period, figures of engineers and other kinds of employees are consolidated in those of office workers.

Table 6 Overtime Changes in Secondary Employment in Taiwan

(Number of persons)

	Mining			Total of Mining and Manufacturing		
	Male	Female	Total	Male	Female	Total
1929	18,742	1,796	20,538	102,724	116,831	219,555
1930	18,389	1,958	20,347	101,084	106,340	207,424
1931	18,046	1,805	19,851	98,258	140,749	239,007
1932	19,250	1,809	21,059	100,257	154,079	254,336
1933	20,062	2,263	22,325	103,651	191,586	295,237
1934	25,659	2,256	27,915	111,371	198,128	309,499
1935	27,673	2,541	30,214	116,302	195,779	312,081
1936	30,756	2,637	33,393	131,642	219,837	351,479
1937	32,049	3,094	35,143	136,324	204,143	340,466
1938	38,882	3,800	42,682	142,591	212,930	355,521
1939	47,094	5,366	52,460	154,180	201,044	355,224
1940	47,827	6,158	53,985	167,045	191,351	358,397
1941	38,307	5,485	43,792	150,857	165,036	315,893
1942	35,544	5,553	41,097	155,329	157,535	312,864
1943	32,161	5,421	37,582	159,872	173,150	333,022
1954	46,065	9,351	55,416	267,258	98,045	365,303
1961	71,876	12,048	83,924	377,568	152,023	529,591
1966	73,913	10,901	84,814	441,723	227,044	668,767

(Sources) See the text.

Chart 1 Employment in Taiwan's Secondary Industries

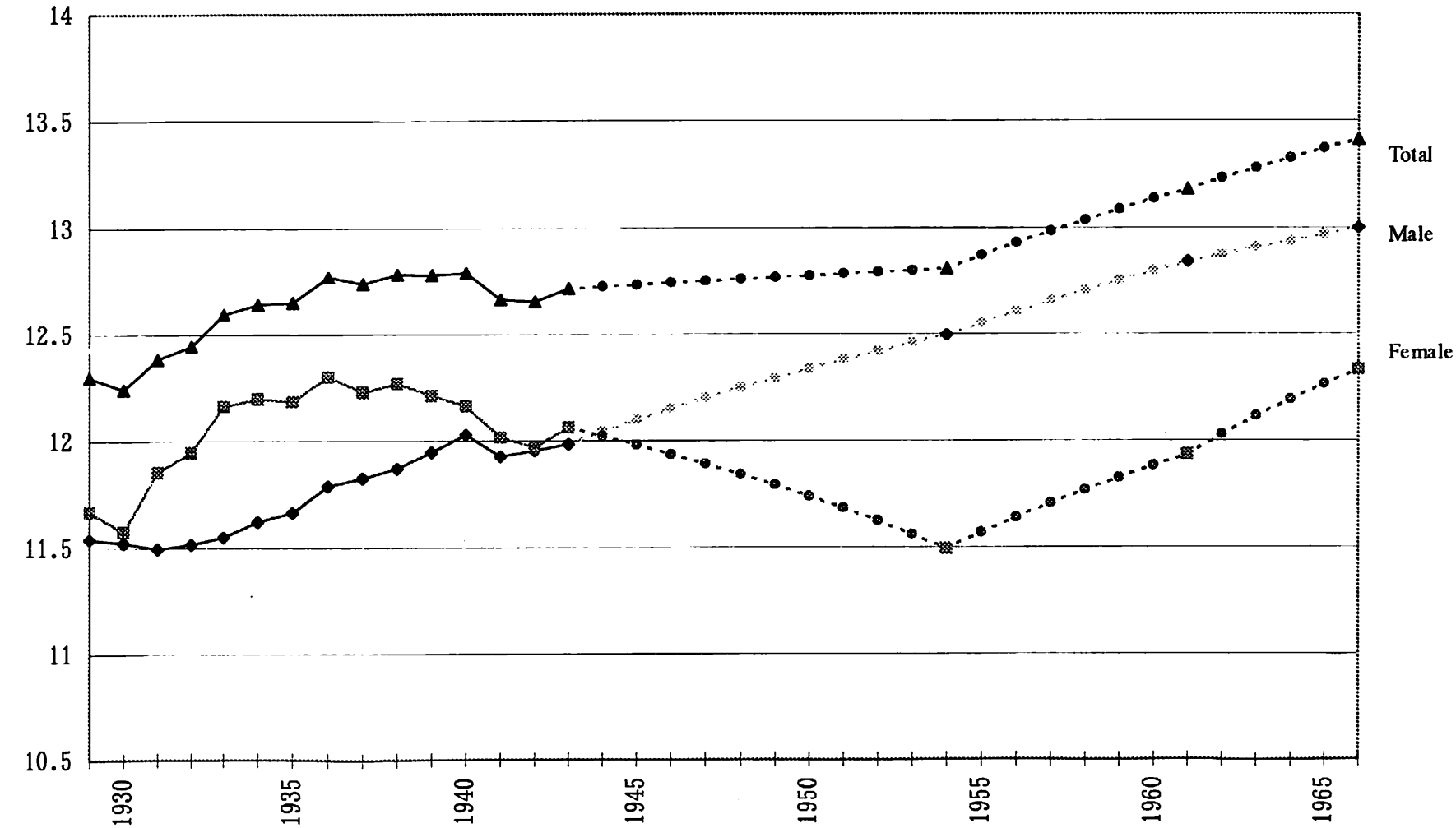

Chart 2 The Average Value-added per Worker in Taiwan's Secondary Industries

Note: ln natural logarithm of million yuan, at 1960 prices.