OECD Trade Policy Working Papers
No. 127

Trade and Employment in Japan

Kozo Kiyota

A product of the **International Collaborative Initiative on Trade and Employment (ICITE)**

OECD TRADE POLICY WORKING PAPERS

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Abstract

TRADE AND EMPLOYMENT IN JAPAN

Kozo Kiyota

*Faculty of Business Administration, Yokohama National University
and Consultant to the OECD*

In light of the importance of the relationship between trade and employment in Japan, this paper examines the effects of exports on employment (i.e. the number of workers), working-hours, and total worker-hours (i.e. employment times working-hours). This paper utilized the Japanese input-output table for the period from 1975 to 2006, which enables us to estimate the effects of exports on the industry's employment (i.e. direct effect) but also on other industries' employment (i.e. indirect effect).

The major findings are threefold. First, the demand for worker-hours from exports increased but this is not large enough to offset the decreases in demand for worker hours from domestic final demand. As a result, total worker-hours in Japan have declined since 1990. Second, the demand for employment from exports has increased since 1985 both in manufacturing and non-manufacturing. This result implies that the manufacturing exports affected indirectly non-manufacturing employment through inter-industry linkages. Finally, the overall demand for working-hours from exports and domestic final demand declined between 1980 and 2006 although it increased slightly in manufacturing after 1995.

There are two possible policy influences behind these adjustment processes. One is the change in Japanese labour standard law. The other is the change in the Japanese worker dispatch law. Although these two policies have different implications, policy makers need to recognize the importance of the flexibility of the adjustment in either case.

Acknowledgements

Table of contents

Tables

Executive Summary

In light of the importance of the relationship between trade and employment in Japan, this paper examines the effects of exports on employment (i.e. the number of workers), working-hours, and total worker-hours (i.e. employment times working-hours). This paper utilized the Japanese input-output tables for the period from 1975 to 2006, which enable us to estimate the effects of exports on an industry's employment (i.e. direct effect) but also on other industries' employment (i.e. indirect effect).

The major findings are threefold. First, the demand for worker-hours from exports increased but it is not large enough to offset the decreases in demand from domestic final demand. As a result, total worker-hours in Japan have declined since 1990. Second, the demand for employment from exports has increased since 1985 both in manufacturing and non-manufacturing. This result implies that the manufacturing exports affected indirectly non-manufacturing employment through inter-industry linkages. Finally, the demand for working-hours from exports and domestic final demand declined between 1980 and 2006 although it increased slightly in manufacturing after 1995.

There are at least two possible policy influences behind these adjustment processes. One is the change in Japanese labour standard law. The other is the change in the Japanese worker dispatch law. These two policies have different implications. If working-hours adjustment is flexible, a negative external (demand) shock on exports can be absorbed by the adjustment of hours. The issue thus is the flexibility of the adjustment: how much room for adjustment do workers have? A recent study by Kuroda (2010b) found that the average daily working-hours of Japanese male workers in the age bracket from 20 to 49 years increased from the 1970s while their average hours of sleep decreased. Kuroda (2010b) also pointed out that "people shifted their hours worked from weekends to weekdays after the five-day work week replaced the six-day work week at the end of the 1980s" (p. 498). Thus, adjustment may be possible only within overtime hours on weekdays.

On the other hand, if the shift between part-time and full-time work is flexible, the negative external shock on exports can be absorbed by the shift from full-time to part-time work. Note that this adjustment requires a shift from part-time to full-time work once the negative external shocks subside. However, it can be difficult for part-time workers to become full-time workers. If the shift is one-way, the increases in part-time workers may cause other problems because their employment is sometimes unstable. Because of the limited data availability, it is impossible to decompose the effects of the Japanese labour standard law and worker dispatch law. Although more detailed analysis is needed to clarify the possible policy influences, policy makers need to recognize the importance of the flexibility of the adjustment in either case.

In conclusion, there are several research issues for the future that are worth mentioning. First, further investigation of employment and hour adjustments would be an

important extension of the research. For instance, adjustment processes may be different for part-time and full-time workers, and differentiated policy responses may be appropriate. Second, further studies on the linkage between trade and income (and wage) inequality between regular and irregular workers in Japan would provide policy makers with useful and important information for policy design. Third, research on the relationship between trade and employment stability would be useful in order to help policy makers target an appropriate degree of market flexibility. Finally, it is also important to examine the effects of the yen appreciation on employment in the current economic environment. The effects of the yen appreciation in the 2000s may be different from those in the 1990s

1.   Introduction[1]

The Japanese economy, which relies on exports in recent years, was affected severely by the financial turbulence in 2008.[2] One of the important lessons is that the relationship between trade and employment matters. Although several studies have discussed the effects of trade on the Japanese labour market, most of the earlier studies have focused not on the effects of exports but on those of imports.[3] This is mainly because, in the 1990s, a major concern for business circles and policy makers was the growing imports from the low-wage countries. For example, Tachibanaki, Morikawa, and Nishimura (1998) have examined the effects of manufacturing imports from Asian countries on employment and wages in Japan. Tomiura (2003) and Sasaki (2007) have used more detailed data to extend Tachibanaki et al. (1998). Sakurai (2004) has examined the effect of import penetration on manufacturing employment, using Japanese input-output tables in 1980 and 1990.

With the growth of exports in the 2000s, more recent studies started to focus on the effects of exports. Kiyota (2011a, b) examined the effects of exports on employment for 1975—2006. These studies utilized the Japanese input-output table to estimate the effects of exports on the exporting industry's employment (i.e. direct effect) but also on other industries' employment (i.e. indirect effect). One of the major findings of these studies is that the magnitude of the indirect effect exceeded that of the direct effect over almost the whole period. This in turn implies that more than half of the effects of exports appeared through inter-industry linkages.

Although these studies made significant contributions to understanding the relationship between trade and employment in Japan, the adjustment through working-hours has not been addressed. Because the labour input can be adjusted not only through employment but also through working-hours, a study that focuses on employment and

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2.   For example, OECD (2009) pointed out that "[t]he global crisis has taken a heavy toll on Japan's trade-dependent economy" (p. 73).

3.   Another related study is Dekle (1998) that focused on the effects of exchange rate movements on manufacturing employment in Japan.

working-hours contributes to deeper understanding of the labour adjustment process. Indeed, a recent study by OECD (2010) emphasized the adjustment through working-hours during the 2008—2009 recession in OECD countries (OECD, 2010, pp. 56-75).

In light of the importance of the relationship between trade and employment in Japan, this paper examines the effects of exports on employment (i.e. the number of workers), working-hours, and total worker-hours (i.e. employment times working-hours). The analysis of this paper has three main features. First, this paper examines not only the adjustment through the number of workers but also the adjustment through working-hours. Second, building on Kiyota (2011a), this paper estimates both direct and indirect effects, using the Japanese input-output table for 1975—2006. The analysis thus enables us to examine the effects that appear through inter-industry linkages. Finally, building on Kiyota (2011b), the analysis of this paper covers non-manufacturing as well as manufacturing. The analysis thus allows me to examine the effects of manufacturing exports on employment in non-manufacturing. This paper thus clarifies the labour adjustment processes more precisely than the previous studies.[4]

In Section 2 following, I explain the methodology and data. Section 3 presents the results and discusses possible policy influences on the adjustment processes. A summary and policy implications are contained in Section 4.

2.   Methodology and data

Methodology

Denote LH_t as total worker-hours in Japan in year t: $LH_t = L_t \times H_t$ where L_t and H_t stand for total employment and working-hours, respectively. Let Δ be the differences between years t and $t-1$. The growth of total worker-hours between years t and $t-1$ is written as:

$$\Delta LH_t / LH_t \sim \Delta L_t / L_t + \Delta H_t / H_t \qquad (1)$$

Equation (1) indicates that the growth of total worker-hours can be decomposed into the growth of employment and that of working-hours.

Following Kiyota (2011a, b), this paper estimates the direct and indirect demand for workers from exports, based on input-output (IO) tables for Japan.[5] The growth of the direct and indirect demand is then decomposed into the contribution of domestic final demand and exports. The methodology is summarized as follows (time subscript t is omitted for the moment to avoid heavy notation).

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4.   Although this paper focuses only on the effects of trade, employment can be affected by other channels of globalisation such as foreign direct investment and offshoring. These issues are not pursued here because of the limited availability of space. For the effects of the expansion of multinational activities on employment, see Yamashita and Fukao (2010).

5.   Note that the standard IO model employed in this paper is based on a number of restrictive assumptions. For more detail about these assumptions, see Kiyota (2011b).

Let n be an index of an industry in Japan. Denote $n \times 1$ vectors of domestic final demand, exports, and imports as $\mathbf{D}$, $\mathbf{E}$, and $\mathbf{M}$, respectively, whose elements are D_i, M_i, and E_i ($i = 1, ..., n$). Let $\mathbf{Q}$ and $\mathbf{F}$ be $n \times 1$ vectors of gross output and final demand, respectively. Final demand consists of domestic final demand and net external demand (i.e. exports minus imports): $\mathbf{F} \equiv \mathbf{D} + \mathbf{E} - \mathbf{M}$. Denote an $n \times n$ intermediate input matrix as $\mathbf{q}$, whose element is q_{ij} ($i = 1, ..., n$; $j = 1, ..., n$). Let $\mathbf{A}$ be an $n \times n$ input coefficient matrix, whose element is $a_{ij} = q_{ij}/Q_j$ where Q_j is the gross output of industry j. Output thus is written as:

$$\mathbf{Q} \equiv \mathbf{AQ} + \mathbf{F} = \mathbf{AQ} + \mathbf{D} + \mathbf{E} - \mathbf{M} \tag{2}$$

Note that imports are "endogenously" determined in the sense that imports depend upon domestic demand. To take account of this "endogeneity," assume that imports are proportional to sectoral domestic demand at $\bar{m}_i$, where $\bar{m}_i = M_i/(\sum_j q_{ij} + D_i)$. Denote an $n \times n$ diagonal matrix as $\bar{\mathbf{M}}$, whose diagonal element is $\bar{m}_i$. Equation (2) is rewritten as:

$$\mathbf{Q} \equiv \mathbf{AQ} + \mathbf{D} + \mathbf{E} - \bar{\mathbf{M}}(\mathbf{AQ} + \mathbf{D}) \tag{3}$$

Solving equation (3) for the output vector $\mathbf{Q}$, we have:

$$\mathbf{Q} = \{\mathbf{I} - (\mathbf{I} - \bar{\mathbf{M}})\mathbf{A}\}^{-1}\{(\mathbf{I} - \bar{\mathbf{M}})\mathbf{D} + \mathbf{E}\}, \tag{4}$$

where $\mathbf{I}$ is an $n \times n$ identity matrix. Let $\mathbf{Q}^D$ and $\mathbf{Q}^E$ be the direct plus indirect demand for outputs from domestic final demand and exports, respectively. Therefore, the effects of domestic final demand and exports on the gross output are written as:

$$\mathbf{Q}^D = \{\mathbf{I} - (\mathbf{I} - \bar{\mathbf{M}})\mathbf{A}\}^{-1}(\mathbf{I} - \bar{\mathbf{M}})\mathbf{D} \tag{5}$$

and

$$\mathbf{Q}^E = \{\mathbf{I} - (\mathbf{I} - \bar{\mathbf{M}})\mathbf{A}\}^{-1}\mathbf{E}, \tag{6}$$

respectively.

Let l_j be the industry j's labour-input coefficients: $l_j = L_j/Q_j$, where L_j is industry j's employment. Let $\mathbf{L}$ be the $n \times 11 \times n$ employment vector, whose element is L_j. Let $\bar{\mathbf{L}}$ be the $n \times n$ diagonal matrix, whose diagonal element is l_j. Denote the direct plus indirect demand for workers from domestic final demand and exports as $\mathbf{L}^D$ and $\mathbf{L}^E$. The effects of domestic final demand and exports on employment thus are written as:

$$\mathbf{L}^D = \bar{\mathbf{L}}\mathbf{Q}^D = \bar{\mathbf{L}}\{\mathbf{I} - (\mathbf{I} - \bar{\mathbf{M}})\mathbf{A}\}^{-1}(\mathbf{I} - \bar{\mathbf{M}})\mathbf{D}, \tag{7}$$

and

$$\mathbf{L}^E = \bar{\mathbf{L}}\mathbf{Q}^E = \bar{\mathbf{L}}\{\mathbf{I} - (\mathbf{I} - \bar{\mathbf{M}})\mathbf{A}\}^{-1}\mathbf{E}, \tag{8}$$

respectively.

Let L_{jt}^D and L_{jt}^E be the direct plus indirect demand for workers from domestic final demand and exports in industry j at year t, respectively. I now note subscript t in order to explicitly take into account time. Let L_t^D and L_t^E be the direct plus indirect demand for workers in Japan from domestic final demand and exports at year t, respectively. Total employment is decomposed into the direct plus indirect demand for workers from domestic final demand and exports:

$$L_t = \sum_j L_{jt}^D + \sum_j L_{jt}^E = L_t^D + L_t^E \tag{9}$$

The export dependence ratio of employment is defined as: L_t^E/L_t. Taking the difference of Equation (9) between years t and $t-1$, we obtain:

$$\Delta L_t \sim \Delta L_t^D + \Delta L_t^E \tag{10}$$

Similarly, the difference of worker-hours is written as:

$$\Delta LH_t \sim \Delta LH_t^D + \Delta LH_t^E \tag{11}$$

where LH_t^D and LH_t^E are the direct plus indirect demand for worker-hours from domestic final demand and exports at year t, respectively. From equations (1), (10), and (11), the growth of total worker-hours between years t and $t-1$ is decomposed into the employment growth from domestic final demand and exports and the working-hours growth from domestic final demand and exports:

$$\frac{\Delta LH_t}{LH_t} \sim \left(\frac{\Delta L_t^D}{L_t^D}\right)\theta_t^D + \left(\frac{\Delta H_t^D}{H_t^D}\right)\theta_t^D + \left(\frac{\Delta L_t^E}{L_t^E}\right)\theta_t^E + \left(\frac{\Delta H_t^E}{H_t^E}\right)\theta_t^E \tag{12}$$

where $\theta_t^D = LH_t^D/LH_t$ and $\theta_t^E = LH_t^E/LH_t$. Equation (12) is used to decompose the effects of exports on the changes in employment and working-hours.

Data

The data cover 108 industries in Japan between 1975 and 2006. The major source of the data is the Japan Industrial Productivity database 2009 (JIP database 2009), which is compiled as a part of a research project of the RIETI and Hitotsubashi University. The database covers 52 manufacturing and 56 non-manufacturing industries on annual basis for 1970—2006, which enables us to capture detailed intra-industry linkages.[6] The database compiles detailed information on sectoral output and inputs, including information on the number of workers.[7] From the JIP database 2009, I use the input-output table and sectoral employment (i.e. the number of workers) for 1975-2006. Exports and imports include trade in services. All input-output tables are valued at 2000 constant prices. Note that, in the JIP database 2009, the IO table is available on an annual

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6.   Input-output tables for 1971—1972 are not available in the JIP database 2009. Table A1 presents the industry classification in the JIP database 2009.

7.   For more details about the JIP database, see Fukao, Hamagata, Inui, Ito, Kwon, Makino, Miyagawa, Nakanishi, and Tokui (2007).

basis for 1975–2006. This means that the input coefficient changes every year. The analysis of this paper thus is less restrictive than that of previous studies.

Descriptive statistics

Table 1 presents the evolution of employment in Japan.[8] There are two major findings in this table. First, although the number of workers increased until the early 1990s, it decreased after the late 1990s. This finding reflects the Japanese population dynamics. Second, however, the number of workers in non-manufacturing increased throughout the period. On the flip side, the decline in the number of workers occurs in manufacturing. As a result, the share of manufacturing workers declines from 25.4% in 1975 to 17.7% in 2006.

Table 2 presents the evolution of working-hours and wages in Japan.[9] The annual average working-hours increased from 2 100 hours in 1975 to 2,130 hours in 1980 and declined afterwards. The annual average working-hours in 2006 was 1 816 hours. The decline of working-hours is observed not only in manufacturing but also in non-manufacturing although the decline in non-manufacturing is more prominent than in manufacturing. A remarkable decline is confirmed between 1990 and 1995 when the annual average working-hours decreased by 1.4% in both manufacturing and non-manufacturing. This decline in working-hours may be attributable to the effects of policy (a point that is discussed in more detail in Section 3).

Table 1. Evolution of employment in Japan

Number of workers (1000)	1975	1980	1985	1990	1995	2000	2006
All industry	55 797	58 571	60 945	64 187	66 632	65 252	64 199
Manufacturing	14 158	14 165	15 297	15 307	14 106	12 649	11 344
Non-manufacturing	41 639	44 406	45 649	48 880	52 526	52 603	52 855

Annual average growth rate (%)		1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2006
All industry		1.0	0.8	1.0	0.7	-0.4	-0.3
Manufacturing		0.0	1.5	0.0	-1.6	-2.2	-1.8
Non-manufacturing		1.3	0.6	1.4	1.4	0.0	0.1

Share (all industry = 100%)	1975	1980	1985	1990	1995	2000	2006
All industry	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Manufacturing	25.4	24.2	25.1	23.8	21.2	19.4	17.7
Non-manufacturing	74.6	75.8	74.9	76.2	78.8	80.6	82.3

Note: For the industry classification, see Table A1. Detailed sectoral figures are presented in Table A2.
Source: JIP database 2009.

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8. For more information from the JIP, see the Annex Tables. The industry classification is shown in Table A1. Detailed sectoral figures are presented in Table A2.

9. Detailed sectoral figures are presented in Tables A3 and A4.

Table 2. Evolution of working hours and wages in Japan

A. Working-hours (per year)

	1975	1980	1985	1990	1995	2000	2006
All industry	2 100	2 130	2 097	2 056	1 918	1 861	1 816
Manufacturing	2 040	2 143	2 123	2 100	1 956	1 947	1 959
Non-manufacturing	2 120	2 126	2 089	2 042	1 907	1 840	1 786

Annual average growth rate (%)	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2006
All industry	0.3	-0.3	-0.4	-1.4	-0.6	-0.5
Manufacturing	1.0	-0.2	-0.2	-1.4	-0.1	0.1
Non-manufacturing	0.1	-0.4	-0.5	-1.4	-0.7	-0.6

B. Nominal wages JPY (per hour)

	1975	1980	1985	1990	1995	2000	2006
All industry	906	1 278	1 577	1 956	2 358	2 493	2 433
Manufacturing	941	1 313	1 631	1 988	2 416	2 542	2 654
Non-manufacturing	894	1 267	1 559	1 946	2 342	2 481	2 381

Annual average growth rate (%)	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2006
All industry	6.8	4.2	4.3	3.7	1.1	-0.5
Manufacturing	6.6	4.3	3.9	3.9	1.0	0.9
Non-manufacturing	6.9	4.1	4.4	3.7	1.1	-0.8

Note: For the industry classification, see Table A1. Detailed sectoral figures for working hours and wages are presented in Tables A3 and A4, respectively.

Source: JIP database 2009.

Nominal wages increased from 1975 to 2000 in both manufacturing and non-manufacturing although the annual average growth rate declined from 6.8% for 1975—1980 to 1.1% for 1995—2000. The difference of the annual average growth rate between manufacturing and non-manufacturing is negligibly small. However, between 2000 and 2006, annual average growth rate of nominal wages in manufacturing was 0.9% while that in non-manufacturing was -0.8%. Because of the large share of non-manufacturing, the overall wages also declined.

Table 3 presents the evolution of exports and imports in Japan. Two findings stand out from this table. First, both exports and imports grew rapidly. However, between 1980 and 1995, imports grew faster than exports. As a result, net exports declined from JPY 9.5 trillion in 1980 to JPY 5.0 trillion in 1995. After 1995, exports showed faster growth than imports. Net exports accounted for JPY 19.0 trillion in 2006, which is more than three times as those in 1995.[10]

Second, the share of manufacturing exports is much higher than that of non-manufacturing exports. The share of manufacturing exports is around 75% before the early 1980s and 80% after the later 1980s. It is also interesting to note the increasing share of manufacturing imports. The share of manufacturing imports increased from 35.1% in 1975 to 71.0% in 2006. This change is largely attributable to the rapid increases in the imports of manufactured goods relative to those of natural resources.

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10. Detailed sectoral figures for exports and imports are presented in Tables A5 and A6, respectively.

Table 3. Evolution of exports and imports in Japan

Trade (billions of JPY nominal)

	1975	1980	1985	1990	1995	2000	2006
Exports							
All industry	13 708	22 181	22 004	29 303	45 536	57 694	82 515
Manufacturing	10 384	16 655	17 218	23 126	36 959	46 374	65 483
Non-manufacturing	3 323	5 526	4 786	6 177	8 576	11 320	17 031
Imports							
All industry	10 022	12 645	14 941	22 685	40 492	47 625	63 547
Manufacturing	3 518	5 231	7 297	11 963	23 791	29 940	45 136
Non-manufacturing	6 504	7 414	7 644	10 722	16 700	17 686	18 411
Net exports							
All industry	3 686	9 536	7 062	6 618	5 044	10 068	18 968
Manufacturing	6 866	11 424	9 921	11 163	13 168	16 434	20 347
Non-manufacturing	-3 181	-1 887	-2 858	-4 545	-8 124	-6 366	-1 379

Annual average growth rate (%)

	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2006
Exports						
All industry	9.4	-0.2	5.7	8.7	4.7	5.9
Manufacturing	9.3	0.7	5.9	9.2	4.5	5.7
Non-manufacturing	10.0	-2.9	5.1	6.5	5.5	6.7
Imports						
All industry	4.6	3.3	8.2	11.3	3.2	4.8
Manufacturing	7.8	6.6	9.7	13.2	4.6	6.7
Non-manufacturing	2.6	0.6	6.7	8.7	1.1	0.7

Share (all industry = 100%)

	1975	1980	1985	1990	1995	2000	2006
Exports							
All industry	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Manufacturing	75.8	75.1	78.2	78.9	81.2	80.4	79.4
Non-manufacturing	24.2	24.9	21.8	21.1	18.8	19.6	20.6
Imports							
All industry	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Manufacturing	35.1	41.4	48.8	52.7	58.8	62.9	71.0
Non-manufacturing	64.9	58.6	51.2	47.3	41.2	37.1	29.0

Note: For the industry classification, see Table A1. Detailed sectoral figures for exports and imports are presented in Tables A5

Source: JIP database 2009.

Table 4 presents the evolution of the number of part-time workers in Japan. Major findings are twofold. First, the number of part-time workers increased between 1975 and 2006. The share of part-time workers grew from 6.5% in 1975 to 19.1 in 2006. The increase in the number of part-time workers is notable in non-manufacturing. While the share of part-time workers increased from 8.0% in 1975 to 13.4% in 2006 in manufacturing, it increased from 6.0% to 20.4% in non-manufacturing.

Second, the changes in the number of part-time workers show different patterns between manufacturing and non-manufacturing. The difference is particularly notable

after 1995. Between 1995 and 2000, the annual average growth rate is 0.8% and 5.3% in manufacturing and non-manufacturing, respectively. This result implies that the increases in the part-time workers in manufacturing are marginal whereas those in non-manufacturing are remarkable. For 2000—2006, the annual average growth rate of the number of part-time workers is -2.9% and 2.0% in manufacturing and non-manufacturing, respectively. This result indicates that the part-time workers increased in non-manufacturing after 2000. Although the wages and working hours for part-time are not available in the JIP database 2009, working-hours are generally shorter for part-time workers than full-time workers, as "part-time" indicates. This change should be noted in analyzing the relationship between exports and working-hours.

Table 4. Evolution of exports and imports in Japan

Number of part-time workers (1 000)	1975	1980	1985	1990	1995	2000	2006
All industry	3 639	4 060	4 864	7 325	9 028	11 338	12 284
Manufacturing	1 127	1 048	1 204	1 555	1 743	1 812	1 521
Non-manufacturing	2 512	3 012	3 660	5 770	7 285	9 526	10 763

Annual average growth rate (%)		1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2006
All industry		2.2	3.6	8.1	4.2	4.5	1.3
Manufacturing		-1.5	2.8	5.1	2.3	0.8	-2.9
Non-manufacturing		3.6	3.9	8.9	4.6	5.3	2.0

Share (number of workers = 100%)	1975	1980	1985	1990	1995	2000	2006
All industry	6.5	6.9	8.0	11.4	13.5	17.4	19.1
Manufacturing	8.0	7.4	7.9	10.2	12.4	14.3	13.4
Non-manufacturing	6.0	6.8	8.0	11.8	13.9	18.1	20.4

Note: For the industry classification, see Table A1. Detailed sectoral figures are presented in Table A7
Source: JIP database 2009.

3. Results: Hour versus employment adjustment

Difference between domestic final demand and exports

Table 5 presents the direct plus indirect demand for total worker-hours and employment from domestic final demand and exports. In this paper, as mentioned above, employment is measured by the number of workers. The direct plus indirect demand is estimated, based on equations (7) and (8). Working-hours for domestic final demand and exports are obtained from total worker-hours for domestic final demand and exports divided by the number of workers for domestic final demand and exports, respectively.

Major findings are twofold. First, the demand for total worker-hours from exports increased throughout the period except for 1980-1985. For example, the demand for total worker-hours from total final demand was 117.2 million worker-hours in 1975, 6.4% of which was attributable to exports. In 2006, the demand for total worker-hours from total final demand was 116.6 million worker-hours, 10.5% of which was attributable to exports. Similarly, the demand for employment from exports also increased. As a result, the share of employment that depends on exports increased from 6.5% in 1975 to 9.9% in 2006. It is also notable that, for total worker-hours and employment, the demand from exports increased after 1995 while the demand from domestic final demand decreased. These results imply the increasing importance of exports for Japanese workers.

Second, after 1995, there is a notable difference of adjustment process between hours and employment for exports. While the annual average working-hours decreased from 1 941 hours in 1995 to 1 911 hours in 2006, the number of workers increased from 5.3 million workers in 1995 to 6.4 million workers in 2006. As a result, the demand for total worker-hours from exports increased from 10.3 million worker-hours in 1995 to 12.1 million worker-hours in 2006. The results suggest that with respect to exports, between 1995 and 2006, the increases in the total worker-hours are mainly driven by increases in the number of workers, not working-hours.

Table 5. Hour versus employment adjustment: Domestic final demand and exports

Number of workers and working-hours							
	1975	1980	1985	1990	1995	2000	2006
Total worker-hours (1 000 worker-hours)							
Total final demand	117 157	124 759	127 817	131 961	127 773	121 407	116 617
Domestic final demand	109 615	115 199	119 537	123 387	117 411	110 165	104 424
Exports	7 541	9 560	8 281	8 574	10 362	11 243	12 194
Number of workers (1,000)							
Total final demand	55 797	58 571	60 945	64 187	66 632	65 252	64 199
Domestic final demand	52 147	54 091	57 040	60 088	61 294	59 392	57 817
Exports	3 650	4 480	3 905	4 099	5 338	5 860	6 382
Working-hours							
Total final demand	2 100	2 130	2 097	2 056	1 918	1 861	1 816
Domestic final demand	2 102	2 130	2 096	2 053	1 916	1 855	1 806
Exports	2 066	2 134	2 120	2 092	1 941	1 919	1 911

Annual average growth rate (%)						
	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2006
Total worker-hours (1 000 worker-hours)						
Total final demand	1.26	0.48	0.64	-0.64	-1.02	-0.67
Domestic final demand	0.99	0.74	0.63	-0.99	-1.27	-0.89
Exports	4.72	-2.87	0.70	3.78	1.63	1.35
Number of workers						
Total final demand	0.97	0.79	1.04	0.75	-0.42	-0.27
Domestic final demand	0.73	1.06	1.04	0.40	-0.63	-0.45
Exports	4.08	-2.74	0.97	5.25	1.86	1.42
Working-hours						
Total final demand	0.29	-0.31	-0.40	-1.39	-0.60	-0.40
Domestic final demand	0.26	-0.32	-0.41	-1.39	-0.64	-0.44
Exports	0.65	-0.13	-0.27	-1.49	-0.23	-0.07

Share (total final demand = 100%)							
	1975	1980	1985	1990	1995	2000	2006
Total labour-hour							
Total final demand	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Domestic final demand	93.6	92.3	93.5	93.5	91.9	90.7	89.5
Exports	6.4	7.7	6.5	6.5	8.1	9.3	10.5
Number of workers							
Total final demand	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Domestic final demand	93.5	92.4	93.6	93.6	92.0	91.0	90.1
Exports	6.5	7.6	6.4	6.4	8.0	9.0	9.9

Source: JIP database 2009.

Table 6 presents the decomposition of the growth of total worker-hours, based on equation (12). This decomposition allows us to examine the overall contributions of hours and employment to total worker-hours. There are two notable findings. First, the decline in total worker-hours after 1990 was attributable largely to the decline in working-hours. For example, the annual average growth of total worker-hours is -0.67% for 2000—2006, -0.40% point of which comes from the decline in working-hours while -0.27% of which comes from the decline in employment. Second, after 1995, the increases in the demand

for employment from exports were not enough to offset the decline in the demand for employment from domestic final demand. For example, the decline in the demand for employment was -0.27% point for 2000—2006. While the demand for employment from exports increased by 0.14% point, the demand from domestic final demand decreased by -0.40% point.

Table 6. Hour versus employment adjustment: Decomposition of the growth of total worker-hours

Decomposition of the growth (% for total worker-hours and % point otherwise)

	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2006
Total worker-hours						
Total final demand	1.26	0.48	0.64	-0.64	-1.02	-0.67
Domestic final demand	0.92	0.69	0.59	-0.92	-1.16	-0.80
Exports	0.33	-0.20	0.05	0.28	0.14	0.13
Number of workers						
Total final demand	0.97	0.79	1.04	0.75	-0.42	-0.27
Domestic final demand	0.68	0.99	0.97	0.37	-0.58	-0.40
Exports	0.29	-0.19	0.06	0.38	0.16	0.14
Working-hours						
Total final demand	0.29	-0.31	-0.40	-1.39	-0.60	-0.40
Domestic final demand	0.24	-0.30	-0.38	-1.29	-0.59	-0.40
Exports	0.05	-0.01	-0.02	-0.11	-0.02	-0.01

Note: For the decomposition method, see equation (12) in the main text. The sum of figures do not necessarily equal to total.
Source: JIP database 2009.

Difference between manufacturing and non-manufacturing

Previous sub-section finds that hours for exports decreased from 1995 to 2006 whereas employment for exports increased. This may raise a concern that the adjustment process may be different between manufacturing and non-manufacturing. To address this concern, this sub-section investigates the difference between manufacturing and non-manufacturing, focusing on the effects of exports.

Table 7 presents the difference of export dependence between manufacturing and non-manufacturing. Three findings stand out from this table. In both manufacturing and non-manufacturing, total worker-hours for exports increased after 1995. In manufacturing, total worker-hours for exports increased from 6.1 million worker-hours in 1995 to 6.6 million worker-hours in 2006. In non-manufacturing, total worker-hours for exports increased from 4.2 million worker-hours in 1995 to 5.6 million worker-hours in 2006. Note that manufacturing exports account for large shares (Table 3). Note also that the increases in the exports of manufacturing products, say automobiles, contribute not only to the increases in the production of related parts and components but also ultimately to the increases in the various services involved, such as research and development. Therefore, the result implies that the manufacturing exports affected indirectly non-manufacturing employment through inter-industry linkages.

Second, the adjustment pattern of employment is similar between manufacturing and non-manufacturing, although the magnitude of the adjustment is different between them. Table 7 indicates that the sign of the annual average growth rate of the number of workers is the same between manufacturing and non-manufacturing throughout the period. However, the absolute value of the growth rate is larger in non-manufacturing than in manufacturing except for 1990-1995. In other words, the changes in the number of workers in non-manufacturing are much faster than those in manufacturing. These results

mean that the worker adjustment is more volatile in non-manufacturing than in manufacturing.

Third, the adjustment pattern of hours is different between manufacturing and non-manufacturing. After 1995, the sign of the annual average growth rate of working-hours in manufacturing is opposite from that in non-manufacturing. Table 7 shows that the annual average growth rate of working-hours in non-manufacturing is negative whereas that in manufacturing is positive. This result means that, although total worker-hours for exports increased in both manufacturing and non-manufacturing after 1995 and 2006, the adjustment pattern is different. Working-hours for exports declined in non-manufacturing but not in manufacturing.

Table 7. Hour versus employment adjustment:
Effects of exports in manufacturing and non-manufacturing

Number of workers and working-hours	1975	1980	1985	1990	1995	2000	2006
Total worker-hours (1 000 worker-hours)							
All industry	7 541	9 560	8 281	8 574	10 362	11 243	12 194
Manufacturing	4 672	5 818	4 969	5 035	6 125	6 234	6 643
Non-manufacturing	2 869	3 743	3 312	3 539	4 237	5 009	5 551
Number of workers (1,000)							
All industry	3 650	4 480	3 905	4 099	5 338	5 860	6 382
Manufacturing	2 142	2 529	2 221	2 280	3 028	3 077	3 259
Non-manufacturing	1 509	1 951	1 684	1 819	2 310	2 782	3 123
Working-hours							
All industry	2 066	2 134	2 120	2 092	1 941	1 919	1 911
Manufacturing	2 182	2 301	2 237	2 208	2 022	2 026	2 038
Non-manufacturing	1 902	1 919	1 967	1 946	1 835	1 800	1 778

Annual average growth rate (%)		1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	2000-2006
Total worker-hours (1 000 worker-hours)							
All industry		4.72	-2.87	0.70	3.78	1.63	1.35
Manufacturing		4.37	-3.15	0.26	3.91	0.35	1.06
Non-manufacturing		5.28	-2.44	1.33	3.59	3.34	1.71
Number of workers							
All industry		4.08	-2.74	0.97	5.25	1.86	1.42
Manufacturing		3.32	-2.59	0.53	5.64	0.32	0.96
Non-manufacturing		5.11	-2.93	1.54	4.76	3.71	1.92
Working-hours							
All industry		0.65	-0.13	-0.27	-1.49	-0.23	-0.07
Manufacturing		1.06	-0.56	-0.26	-1.75	0.03	0.10
Non-manufacturing		0.18	0.49	-0.21	-1.18	-0.38	-0.21

Share (total final demand = 100%)	1975	1980	1985	1990	1995	2000	2006
Total labor-hour							
All industry	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Manufacturing	62.0	60.9	60.0	58.7	59.1	55.5	54.5
Non-manufacturing	38.0	39.1	40.0	41.3	40.9	44.5	45.5
Number of workers							
All industry	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Manufacturing	58.7	56.5	56.9	55.6	56.7	52.5	51.1
Non-manufacturing	41.3	43.5	43.1	44.4	43.3	47.5	48.9

Source: JIP database 2009.

Possible policy influences on the adjustment processes

One of the important findings of the paper is that the decline in the demand for total worker-hours after 1990 was attributable largely to the decline in the demand for working-hours from exports as well as domestic final demand. These adjustment

processes may be attributable at least partly to two policies.[11] One is the change in Japanese labour standard law that defines weekly legal working-hours.[12] The number of legal working-hours declined gradually from 48 hours in 1987 to 40 hours in 1997.[13] As a result, the working-hours for each worker declined from the early 1990s. Indeed, Kuroda (2010a) pointed out that the annual average number of holidays for regular workers increased from 92.9 days in 1985 to 113.7 days in 2009.

However, the effect of this policy is controversial. For example, Kawaguchi, Naito, and Yokoyama (2008) have examined the effects of changes in Japanese labour standard law. Using micro-level data, they found that a one-hour reduction of legal working-hours lead to a reduction of only 0.14 actual working-hours. They concluded that the effects of the changes in Japanese labour stand law were, if any, marginal. The decline in the demand for working-hours thus may not necessarily be attributable to the changes in Japanese labour standard law.

The other is change in the Japanese worker dispatch law that defines the working conditions for dispatched workers and was established in 1985.[14] According to Ikenaga (2008), before 1984, dispatched works were prohibited in principle by the employment security act in Japan. In 1985, by the worker dispatch law, dispatched works were allowed for 13 types of works such as software development, translating, administrative secretary, and building cleaning. The number of allowable types of work increased from 13 in 1985 to 26 in 1996. In 1999, the allowable types of work were in principle liberalized except for some works such as manufacturing works. In 2003, the law was changed so that manufacturing work was also covered. This policy affects the increases in part-time workers, which contributed to the decreases in industry-level working-hours in Japan.

Figure 1 above shows the relationship between changes in part-time worker ratio and annual average changes in working-hours for 1975—2006. The figure shows negative correlation between them both in manufacturing and non-manufacturing. This result implies that the increases in part-time workers changed the composition of full-time and part-time workers within industries, which resulted in the decline in industry-level working-hours.

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11.   There are no employment policies in Japan that target export sectors. In other words, employment policies are general assistance only. For more detail, see Ministry of Health, Labour and Welfare (2009) and Headquarters for Emergency Employment Measures, Prime Minister of Japan and His Cabinet (2009). It is also important to note that, in addition to policy influences, the adjustment processes can be attributable to other factors such as changes in consumer preferences to leisure and changes in demography. Because this paper focuses on policy influences, these factors are not examined. For more detail on these factors, see Kambayashi (2010).

12.   For overtime, employers have to pay a 25% wage premium.

13.   In this connection, many Japanese firms adopted aound 1990 a five-day (Monday—Friday) work week instead of a six-day (Monday—Saturday) work week. Japanese government officials also adopted five-day work week as of 1992.

14.   "Dispatched workers" are employed by a dispatching (temporary help) firm for temporary work in other firms. "The largest proportion of dispatched workers were young women between the ages of 25 and 35, a third of whom claimed to have chosen temporary work because it offered a degree of freedom of choice in work assignments" (Shire, 2002, p. 27). This implies that many of dispatched workers are not full-time workers. For more detail about Japanese worker dispatch law, see Shire (2002) and Ikenaga (2008).

Figure 1. Correlation between changes of part-time workers ratio and labour-hours, 1975-2006

A. Manufacturing
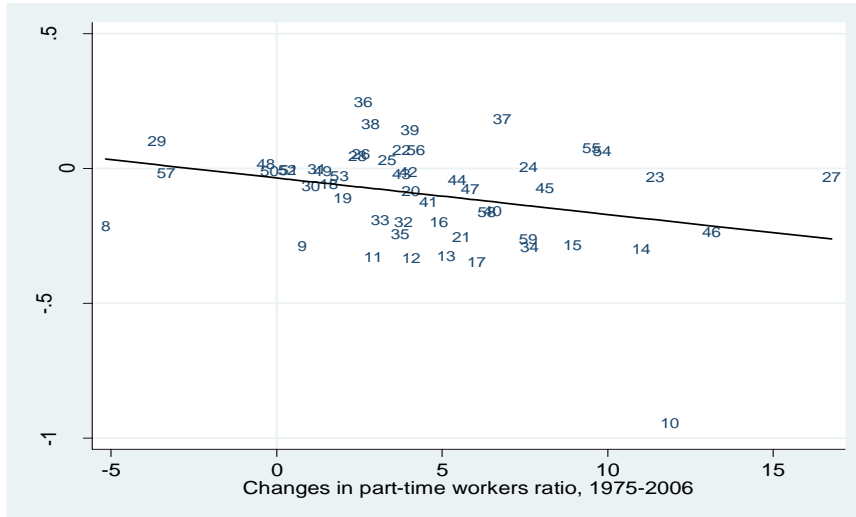
B. Non-manufacturing
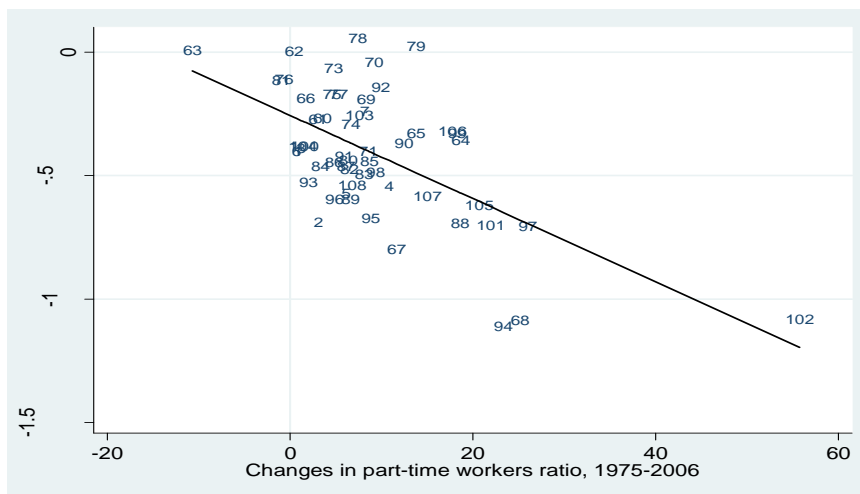
Note: Each figure indicates the industry id. Part-time workers ratio is defined as the ratio of the number of part-time workers relative to the total number of workers. For industry id, see Table A1.
Source: JIP database 2009.

4.   Summary and policy implications

In light of the importance of the relationship between trade and employment in Japan, this paper examines the effects of exports on employment (i.e. the number of workers), working-hours, and total worker-hours (i.e. employment times working-hours). This paper utilized the Japanese input-output tables for the period from 1975 to 2006, which enable us to estimate the effects of exports on an industry's employment (i.e. direct effect) but also on other industries' employment (i.e. indirect effect).

The major findings are threefold. First, the demand for worker-hours from exports increased but it is not large enough to offset the decreases in demand from domestic final demand. As a result, total worker-hours in Japan have declined since 1990. Second, the demand for employment from exports has increased since 1985 both in manufacturing and non-manufacturing. This result implies that the manufacturing exports affected indirectly non-manufacturing employment through inter-industry linkages. Finally, the demand for working-hours from exports and domestic final demand declined between 1980 and 2006 although it increased slightly in manufacturing after 1995.

There are at least two possible policy influences behind these adjustment processes. One is the change in Japanese labour standard law. The other is the change in the Japanese worker dispatch law. These two policies have different implications. If working-hours adjustment is flexible, a negative external (demand) shock on exports can be absorbed by the adjustment of hours. The issue thus is the flexibility of the adjustment: how much room for adjustment do workers have? A recent study by Kuroda (2010b) found that the average daily working-hours of Japanese male workers aged from 20 to 49 years increased from the 1970s while their average hours of sleep decreased. Kuroda (2010b) also pointed out that "people shifted their hours worked from weekends to weekdays after the five-day work week replaced the six-day work week at the end of the 1980s" (p. 498). Thus, adjustment may be possible only within overtime hours on weekdays.

On the other hand, if the shift between part-time and full-time work is flexible, the negative external shock on exports can be absorbed by the shift from full-time to part-time works. Note that this adjustment requires the shift from part-time to full-time work once the negative external shocks subside. Genda (2008), however, pointed out that it was difficult for part-time workers to be full-time workers.[15] If the shift is one-way, the increases in part-time workers may cause other problems because their employment is sometimes unstable.[16] Because of the limited data availability, it is impossible to decompose the effects of the Japanese labour standard law and worker dispatch law. Although more detailed analysis is needed to clarify the possible policy influences, policy makers need to recognize the importance of the flexibility of the adjustment in either case.

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15.   Genda (2008) notes the difficulty of irregular workers to be regular workers. Because irregular workers include part-time workers while regular workers are generally full-time, this paper interpreted that irregular/regular workers can be inter-changeable to part-time/full-time workers. Abe (2010, p.446) noted that the number of irregular workers other than part-time workers, such as contract workers, has been increasing since 2000.

16.   In this connection, note that the effect (and choice) of policy becomes more complex where there are labour market frictions and unemployment. For more details, see Helpman, Itskhoki, and Redding (2011).

In conclusion, there are several research issues for the future that are worth mentioning. First, further investigation of employment and hour adjustments would be an important extension. For instance, adjustment processes may be different for part-time and full-time workers. If the adjustment processes are different between them, policy for part-time workers may have negative side effects on full-time workers, and vice-versa. To conduct more detailed analysis, we need both employment and hour data for part-time and full-time workers.

Second, in this connection, the linkage between trade and income (and wage) inequality constitutes an important question for further research. In Japan, the wage inequality between regular and irregular workers has become a major concern in recent years. The most difficult aspect of this concern is that skilled workers, where skill is measured by education, are not necessarily classified as regular workers in Japan. In other words, even people with tertiary education sometimes become irregular workers (Sakai and Higuchi, 2005). This situation seems to be different from other OECD countries where the wage inequality between people with higher education and those without is a major concern. Therefore, studies on the linkage between trade and income (and wage) inequality between regular and irregular workers in Japan will provide policy makers with useful and important information for policy design.[17] To conduct such analysis, it is imperative to construct more detailed data on employment and wages.

Third, a study on the relationship between trade and employment stability is also another important avenue. Recent studies by Yu (2010, page 1095) and Kambayashi and Kato (2011) found that employment stability had decreased since the onset of Japan's severe economic recession. However, little attention has been paid to the effects of trade on employment stability in spite of the increasing importance of exports for Japanese workers (Table 2.5). In this connection, how to achieve a good balance between the flexibility of labour adjustment and the stability of employment might be another key policy question.

Finally, it is also important to examine the effects of the yen appreciation on employment. The recent appreciation of the yen is a growing concern by policy makers and business circles because the yen appreciation affects trade through the changes in comparative advantage. Indeed, the Cabinet Office (2010) published a report, so-called mini-white paper, which expressed concerns about the effects of the yen appreciation. However, no rigorous study on the effects of the yen appreciation has been done since Dekle (1998) studied this issue. The effects of the yen appreciation in the 2000s may be different from those in the 1990s. Some of these issues will be explored in the next stage of my research.

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17. Sasaki and Sakura (2005) examined the effects of skill-biased technology change and globalisation on wage inequality. They defined skilled workers as university graduates.

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Annex

Table A1. List of industries in JIP 2009 database

No.	Industry	No.	Industry
1	Rice, wheat production	55	Motor vehicle parts and accessories
2	Miscellaneous crop farming	56	Other transportation equipment
3	Livestock and sericulture farming	57	Precision machinery & equipment
4	Agricultural services	58	Plastic products
5	Forestry	59	Miscellaneous manufacturing industries
6	Fisheries	60	Construction
7	Mining	61	Civil engineering
8	Livestock products	62	Electricity
9	Seafood products	63	Gas, heat supply
10	Flour and grain mill products	64	Waterworks
11	Miscellaneous foods and related products	65	Water supply for industrial use
12	Prepared animal foods and organic fertilizers	66	Waste disposal
13	Beverages	67	Wholesale
14	Tobacco	68	Retail
15	Textile products	69	Finance
16	Lumber and wood products	70	Insurance
17	Furniture and fixtures	71	Real estate
18	Pulp, paper, and coated and glazed paper	72	Housing
19	Paper products	73	Railway
20	Printing	74	Road transportation
21	Leather and leather products	75	Water transportation
22	Rubber products	76	Air transportation
23	Chemical fertilizers	77	Other transportation and packing
24	Basic inorganic chemicals	78	Telegraph and telephone
25	Basic organic chemicals	79	Mail
26	Organic chemicals	80	Education (private and non-profit)
27	Chemical fibers	81	Research (private)
28	Miscellaneous chemical products	82	Medical (private)
29	Pharmaceutical products	83	Hygiene (private and non-profit)
30	Petroleum products	84	Other public services
31	Coal products	85	Advertising
32	Glass and its products	86	Rental of office equipment and goods
33	Cement and its products	87	Automobile maintenance services
34	Pottery	88	Other services for businesses
35	Miscellaneous stone and clay products	89	Entertainment
36	Pig iron and crude steel	90	Broadcasting
37	Miscellaneous iron and steel	91	Information services
38	Smelting and refining of non-ferrous metals	92	Publishing
39	Non-ferrous metal products	93	Video picture and sound information
40	Fabricated architectural metal products	94	Eating and drinking places
41	Miscellaneous fabricated metal products	95	Accommodation
42	General industry machinery	96	Laundry, beauty and bath services
43	Special industry machinery	97	Other services for individuals
44	Miscellaneous machinery	98	Education (public)
45	Office and service industry machines	99	Research (public)
46	Electrical generating apparatus	100	Medical (public)
47	Household electric appliances	101	Hygiene (public)
48	Computer equipment and accessories	102	Social insurance and social welfare (public)
49	Communication equipment	103	Public administration
50	Electronic equipment and instruments	104	Medical (non-profit)
51	Semiconductor devices and integrated circuits	105	Social insurance and social welfare (non-profit)
52	Electronic parts	106	Research (non-profit)
53	Miscellaneous electrical machinery equipment	107	Other (non-profit)
54	Motor vehicles	108	Activities not elsewhere classified

Note: Agriculture: 1-7; Manufacturing: 8-59; Services: 60-108.   *Source*: JIP database 2009.

Table A2. Evolution of employment in Japan, by Industry

In thousands

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
1	Rice, wheat production	3 916	2 608	2 210	1 796	1 608	1 075	761
2	Miscellaneous crop farming	2 521	2 819	2 486	2 144	1 861	1 776	1 452
3	Livestock and sericulture farming	1 161	1 062	716	733	470	363	291
4	Agricultural services	93	108	158	140	159	142	146
5	Forestry	322	306	210	191	148	113	83
6	Fisheries	506	487	432	361	299	247	196
7	Mining	178	148	126	103	87	73	51
8	Livestock products	133	158	233	181	188	185	171
9	Seafood products	227	257	265	281	286	269	230
10	Flour and grain mill products	524	553	815	533	453	329	363
11	Miscellaneous foods and related products	701	795	893	901	946	943	969
12	Prepared animal foods and organic fertilizers	103	115	121	121	123	124	127
13	Beverages	150	147	148	160	159	147	148
14	Tobacco	24	23	20	13	12	12	6
15	Textile products	1 968	1 860	1 727	1 660	1 341	949	581
16	Lumber and wood products	576	495	375	350	299	241	179
17	Furniture and fixtures	434	444	393	390	327	280	220
18	Pulp, paper, and coated and glazed paper	161	151	148	146	140	123	102
19	Paper products	199	198	215	226	216	196	170
20	Printing	465	505	581	659	638	591	497
21	Leather and leather products	110	127	117	124	104	81	54
22	Rubber products	215	214	232	237	211	186	179
23	Chemical fertilizers	29	19	12	9	8	7	5
24	Basic inorganic chemicals	68	56	58	50	49	44	38
25	Basic organic chemicals	15	17	13	14	9	10	15
26	Organic chemicals	116	101	106	112	102	97	79
27	Chemical fibers	75	43	38	27	25	24	16
28	Miscellaneous chemical products	138	134	142	149	148	145	148
29	Pharmaceutical products	127	121	127	131	130	130	126
30	Petroleum products	32	41	33	27	27	20	21
31	Coal products	29	47	28	22	20	20	15
32	Glass and its products	85	80	88	90	89	84	70
33	Cement and its products	296	289	252	239	226	196	137
34	Pottery	137	129	126	121	105	86	67
35	Miscellaneous stone and clay products	207	190	174	162	142	127	102
36	Pig iron and crude steel	169	163	116	91	67	52	44
37	Miscellaneous iron and steel	412	346	333	306	273	224	219
38	Smelting and refining of non-ferrous metals	93	92	86	90	85	73	76
39	Non-ferrous metal products	116	125	143	154	140	128	116
40	Fabricated architectural metal products	464	442	413	486	469	409	351
41	Miscellaneous fabricated metal products	664	667	641	696	639	586	542
42	General industry machinery	473	396	408	461	442	417	403
43	Special industry machinery	676	569	566	612	532	510	528
44	Miscellaneous machinery	217	212	256	291	261	261	269
45	Office and service industry machines	93	102	148	165	157	140	109
46	Electrical generating apparatus	267	209	306	326	298	246	227
47	Household electric appliances	382	438	414	455	343	261	186
48	Computer equipment and accessories	69	66	194	209	196	180	120
49	Communication equipment	114	107	135	158	148	150	129
50	Electronic equipment and instruments	61	89	123	117	103	99	87
51	Semiconductor devices and integrated circuits	63	105	209	233	265	251	179
52	Electronic parts	274	332	530	516	508	505	445
53	Miscellaneous electrical machinery equipment	182	209	279	324	290	265	229
54	Motor vehicles	187	228	318	273	267	255	282

Table A2. Evolution of employment in Japan, by industry (*'cont*)

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
55	Motor vehicle parts and accessories	368	484	650	653	641	615	758
56	Other transportation equipment	435	335	337	256	248	224	215
57	Precision machinery & equipment	288	321	297	297	240	217	188
58	Plastic products	350	406	479	552	554	551	505
59	Miscellaneous manufacturing industries	395	412	436	455	416	381	304
60	Construction	3 012	3 171	3 328	3 923	3 914	3 726	3 206
61	Civil engineering	2 249	2 707	2 140	2 236	3 004	2 699	2 317
62	Electricity	185	179	174	174	186	176	154
63	Gas, heat supply	44	45	46	45	49	45	35
64	Waterworks	80	80	78	78	80	75	64
65	Water supply for industrial use	3	3	3	3	3	3	2
66	Waste disposal	48	72	95	116	147	179	207
67	Wholesale	3 219	3 389	3 751	4 120	4 178	3 912	3 558
68	Retail	5 599	6 104	6 190	6 318	7 008	7 045	6 939
69	Finance	925	1 059	1 155	1 249	1 256	1 150	1 072
70	Insurance	589	687	761	887	845	757	693
71	Real estate	461	603	734	941	990	1 045	959
72	Housing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
73	Railway	512	475	322	227	223	200	178
74	Road transportation	1 569	1 688	1 725	2 042	2 251	2 249	2 200
75	Water transportation	247	215	192	166	165	134	119
76	Air transportation	41	37	51	44	48	42	35
77	Other transportation and packing	254	294	402	463	517	514	506
78	Telegraph and telephone	328	322	290	275	224	233	209
79	Mail	293	278	284	288	347	383	386
80	Education (private and non-profit)	437	485	543	614	685	723	769
81	Research (private)	56	61	96	110	148	167	174
82	Medical (private)	469	612	780	957	1 245	1 527	1 741
83	Hygiene (private and non-profit)	58	75	97	118	158	196	226
84	Other public services	475	495	504	483	522	476	427
85	Advertising	135	153	187	165	173	184	191
86	Rental of office equipment and goods	74	101	153	258	304	313	329
87	Automobile maintenance services	680	751	770	826	942	944	819
88	Other services for businesses	963	1 339	1 824	2 357	2 876	3 453	4 441
89	Entertainment	440	470	579	745	961	953	894
90	Broadcasting	47	50	54	57	65	67	69
91	Information services	172	265	460	762	838	1 103	1 492
92	Publishing	199	214	226	250	242	238	227
93	Video picture and sound information	66	72	94	121	154	164	195
94	Eating and drinking places	2 084	2 663	2 933	3 219	3 606	3 830	3 862
95	Accommodation	608	631	691	743	819	790	769
96	Laundry, beauty and bath services	891	983	1 111	1 203	1 353	1 403	1 457
97	Other services for individuals	777	836	980	1 116	1 211	1 254	1 383
98	Education (public)	1 161	1 276	1 303	1 302	1 270	1 231	1 200
99	Research (public)	64	63	57	56	60	63	72
100	Medical (public)	429	513	582	634	713	780	810
101	Hygiene (public)	38	41	44	48	54	57	51
102	Social insurance and social welfare (public)	195	239	247	254	280	304	326
103	Public administration	1 969	2 056	2 052	2 033	2 071	1 997	1 792
104	Medical (non-profit)	333	419	501	568	667	752	862
105	Social insurance and social welfare (non-profit)	152	234	307	365	543	773	1 917
106	Research (non-profit)	13	16	19	21	29	29	21
107	Other (non-profit)	289	338	388	424	460	467	507
108	Activities not elsewhere classified	9	9	9	10	12	11	11

Note: Code is JIP database 2009 industry code. N.A. stands for not available.   *Source*: JIP database 2009.

Table A3. Evolution of working-hours in Japan, by industry

Annual average working hours

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
1	Rice, wheat production	1 624	1 493	1 520	1 498	1 402	1 444	1 435
2	Miscellaneous crop farming	2 192	1 998	1 885	1 825	1 881	1 716	1 772
3	Livestock and sericulture farming	2 301	2 224	2 186	2 110	2 077	1 878	2 040
4	Agricultural services	1 951	1 934	1 830	1 758	1 648	1 640	1 651
5	Forestry	1 991	1 838	1 805	1 761	1 704	1 654	1 668
6	Fisheries	2 208	2 102	2 143	2 109	1 952	2 006	1 952
7	Mining	2 228	2 288	2 289	2 243	2 183	2 073	2 070
8	Livestock products	2 049	2 174	2 141	2 075	1 915	1 902	1 919
9	Seafood products	2 041	2 159	2 102	2 055	1 900	1 876	1 867
10	Flour and grain mill products	2 247	2 178	1 989	1 892	1 798	1 725	1 674
11	Miscellaneous foods and related products	2 029	2 152	2 089	2 039	1 881	1 859	1 833
12	Prepared animal foods and organic fertilizers	2 059	2 170	2 105	2 059	1 902	1 883	1 860
13	Beverages	2 131	2 219	2 161	2 124	1 982	1 952	1 928
14	Tobacco	2 113	2 216	2 191	2 148	1 988	1 921	1 928
15	Textile products	2 006	2 071	2 079	2 024	1 943	1 864	1 838
16	Lumber and wood products	2 147	2 264	2 262	2 203	2 085	2 015	2 020
17	Furniture and fixtures	2 180	2 266	2 240	2 177	2 050	1 959	1 959
18	Pulp, paper, and coated and glazed paper	2 042	2 136	2 168	2 102	2 031	1 974	2 008
19	Paper products	1 978	2 083	2 106	2 038	1 963	1 909	1 914
20	Printing	2 109	2 196	2 186	2 119	2 015	1 993	2 058
21	Leather and leather products	2 031	2 101	2 095	2 052	1 953	1 887	1 879
22	Rubber products	1 949	2 066	2 063	2 054	1 950	1 923	1 993
23	Chemical fertilizers	1 781	1 851	1 869	1 844	1 812	1 803	1 764
24	Basic inorganic chemicals	1 769	1 843	1 856	1 831	1 799	1 795	1 774
25	Basic organic chemicals	1 791	1 873	1 902	1 869	1 822	1 820	1 811
26	Organic chemicals	1 773	1 854	1 869	1 842	1 809	1 809	1 803
27	Chemical fibers	1 777	1 848	1 855	1 816	1 808	1 796	1 760
28	Miscellaneous chemical products	1 762	1 844	1 855	1 821	1 795	1 788	1 789
29	Pharmaceutical products	1 745	1 841	1 847	1 818	1 791	1 793	1 802
30	Petroleum products	1 876	1 964	1 946	1 903	1 848	1 802	1 839
31	Coal products	1 893	2 004	1 974	1 948	1 878	1 858	1 891
32	Glass and its products	2 082	2 192	2 173	2 175	2 043	2 005	1 959
33	Cement and its products	2 095	2 205	2 194	2 206	2 068	2 025	1 976
34	Pottery	2 043	2 132	2 103	2 119	1 997	1 942	1 867
35	Miscellaneous stone and clay products	2 092	2 199	2 174	2 186	2 047	1 994	1 941
36	Pig iron and crude steel	1 907	2 046	2 020	2 119	1 913	1 987	2 061
37	Miscellaneous iron and steel	1 907	2 015	2 003	2 095	1 888	1 954	2 020
38	Smelting and refining of non-ferrous metals	1 943	2 091	2 117	2 169	1 942	1 995	2 046
39	Non-ferrous metal products	1 937	2 087	2 115	2 159	1 932	1 987	2 027
40	Fabricated architectural metal products	2 138	2 261	2 235	2 224	2 039	2 025	2 037
41	Miscellaneous fabricated metal products	2 147	2 265	2 228	2 227	2 049	2 050	2 068
42	General industry machinery	2 092	2 242	2 251	2 247	2 037	2 066	2 085
43	Special industry machinery	2 093	2 241	2 249	2 245	2 036	2 066	2 080
44	Miscellaneous machinery	2 083	2 223	2 230	2 226	2 023	2 052	2 057
45	Office and service industry machines	2 075	2 222	2 226	2 219	2 011	2 028	2 031
46	Electrical generating apparatus	1 944	2 085	2 059	2 010	1 866	1 873	1 808
47	Household electric appliances	1 960	2 074	2 072	2 060	1 917	1 922	1 916
48	Computer equipment and accessories	1 965	2 075	2 076	2 066	1 926	1 938	1 978
49	Communication equipment	1 956	2 069	2 072	2 065	1 926	1 939	1 952
50	Electronic equipment and instruments	1 959	2 076	2 079	2 065	1 924	1 939	1 956
51	Semiconductor devices and integrated circuits	1 949	2 061	2 068	2 059	1 918	1 926	1 947
52	Electronic parts	1 948	2 060	2 067	2 058	1 917	1 925	1 945
53	Miscellaneous electrical machinery equipment	1 957	2 068	2 076	2 059	1 916	1 933	1 941
54	Motor vehicles	2 054	2 205	2 203	2 213	1 966	2 029	2 096

Table A3. Evolution of Working-hours in Japan, by Industry (*'cont*)

Annual average working hours

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
55	Motor vehicle parts and accessories	2 054	2 206	2 193	2 217	1 968	2 033	2 103
56	Other transportation equipment	2 065	2 225	2 165	2 221	1 979	2 028	2 110
57	Precision machinery and equipment	1 942	2 068	2 070	2 058	1 891	1 942	1 935
58	Plastic products	2 049	2 149	2 172	2 095	1 981	1 961	1 952
59	Miscellaneous manufacturing industries	2 032	2 119	2 128	2 039	1 950	1 893	1 875
60	Construction	2 222	2 260	2 227	2 203	2 067	2 015	2 046
61	Civil engineering	2 223	2 260	2 226	2 191	2 069	2 015	2 046
62	Electricity	1 965	1 985	1 978	1 958	1 888	1 869	1 968
63	Gas, heat supply	1 858	1 988	1 990	1 944	1 879	1 860	1 865
64	Waterworks	2 098	2 093	2 091	2 044	1 950	1 922	1 880
65	Water supply for industrial use	2 093	2 095	2 090	2 047	1 922	1 951	1 893
66	Waste disposal	1 981	2 046	2 060	2 059	1 904	1 826	1 870
67	Wholesale	2 166	2 176	2 093	2 020	1 879	1 807	1 690
68	Retail	2 317	2 297	2 193	2 097	1 921	1 813	1 650
69	Finance	2 006	2 041	2 017	1 877	1 867	1 848	1 893
70	Insurance	1 694	1 770	1 790	1 714	1 708	1 638	1 674
71	Real estate	2 042	2 051	2 044	1 979	1 850	1 774	1 805
72	Housing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
73	Railway	1 933	1 932	1 975	2 060	1 914	1 880	1 894
74	Road transportation	2 373	2 437	2 462	2 436	2 228	2 161	2 170
75	Water transportation	2 224	2 225	2 256	2 286	2 118	2 079	2 111
76	Air transportation	2 027	2 043	2 166	2 024	1 924	1 954	1 962
77	Other transportation and packing	2 022	2 046	2 139	2 109	1 935	1 910	1 921
78	Telegraph and telephone	1 771	1 794	1 839	1 910	1 777	1 745	1 803
79	Mail	1 786	1 791	1 837	1 888	1 754	1 711	1 801
80	Education (private and non-profit)	1 955	2 005	1 994	1 947	1 817	1 752	1 708
81	Research (private)	1 934	1 959	1 954	1 961	1 851	1 875	1 868
82	Medical (private)	2 005	1 996	1 962	1 933	1 790	1 744	1 732
83	Hygiene (private and non-profit)	2 016	2 009	1 975	1 945	1 798	1 744	1 730
84	Other public services	2 056	2 090	2 070	2 013	1 843	1 778	1 782
85	Advertising	2 024	2 046	2 001	1 933	1 802	1 799	1 765
86	Rental of office equipment and goods	2 096	2 127	2 068	1 959	1 833	1 878	1 827
87	Automobile maintenance services	2 163	2 191	2 146	2 116	1 939	1 872	1 874
88	Other services for businesses	2 115	2 147	2 102	2 044	1 859	1 792	1 707
89	Entertainment	2 154	2 178	2 207	2 136	1 916	1 813	1 791
90	Broadcasting	1 984	2 006	1 994	1 956	1 836	1 844	1 771
91	Information services	2 052	2 077	2 072	2 030	1 873	1 856	1 801
92	Publishing	2 107	2 202	2 197	2 116	1 999	1 980	2 017
93	Video picture and sound information	2 148	2 170	2 183	2 125	1 920	1 838	1 826
94	Eating and drinking places	2 432	2 381	2 269	2 182	2 012	1 879	1 720
95	Accommodation	2 219	2 228	2 161	2 124	1 909	1 825	1 801
96	Laundry, beauty and bath services	2 151	2 138	2 098	2 050	1 858	1 814	1 788
97	Other services for individuals	2 029	1 992	1 946	1 946	1 759	1 714	1 629
98	Education (public)	2 072	2 069	2 055	2 020	1 872	1 823	1 784
99	Research (public)	1 913	1 942	1 938	1 937	1 773	1 693	1 729
100	Medical (public)	1 954	2 007	1 995	1 941	1 790	1 754	1 738
101	Hygiene (public)	2 160	2 157	2 126	2 076	1 869	1 753	1 738
102	Social insurance and social welfare (public)	2 059	2 082	2 051	2 001	1 801	1 633	1 467
103	Public administration	2 053	2 075	2 089	2 005	1 901	1 884	1 899
104	Medical (non-profit)	1 952	2 007	1 994	1 940	1 789	1 753	1 736
105	Social insurance and social welfare (non-profit)	2 032	2 057	2 024	1 968	1 792	1 709	1 677
106	Research (non-profit)	1 916	1 939	1 933	1 909	1 763	1 758	1 737
107	Other (non-profit)	2 006	2 013	1 983	1 889	1 763	1 708	1 674
108	Activities not elsewhere classified	2 120	2 142	2 125	2 097	1 844	1 795	1 795

Note: Code is JIP database 2009 industry code. N.A. stands for not available.

Source: JIP database 2009.

Table A4. Evolution of wages in Japan, by industry

Average nominal wages per hour

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
1	Rice, wheat production	360	409	308	338	315	152	214
2	Miscellaneous crop farming	287	443	435	498	495	499	538
3	Livestock and sericulture farming	241	298	271	385	390	293	251
4	Agricultural services	472	644	596	939	1 177	1 127	1 207
5	Forestry	568	772	863	1 048	1 049	982	948
6	Fisheries	423	544	591	711	723	654	722
7	Mining	1 218	1 752	1 938	2 258	2 545	2 804	2 443
8	Livestock products	920	1 318	1 441	1 830	2 290	2 038	2 056
9	Seafood products	450	841	954	1 157	1 487	1 630	1 659
10	Flour and grain mill products	732	1 064	1 104	1 215	1 336	1 367	1 342
11	Miscellaneous foods and related products	677	996	1 134	1 391	1 752	1 822	1 860
12	Prepared animal foods and organic fertilizers	769	1 085	1 275	1 556	1 900	1 997	2 017
13	Beverages	906	1 377	1 715	1 794	2 212	2 601	2 479
14	Tobacco	1 567	1 886	2 378	3 787	4 258	5 199	5 446
15	Textile products	609	810	941	1 160	1 375	1 457	1 492
16	Lumber and wood products	552	915	1 148	1 514	1 864	1 859	1 833
17	Furniture and fixtures	845	976	1 237	1 586	1 820	1 928	1 955
18	Pulp, paper, and coated and glazed paper	1 183	1 614	2 002	2 632	2 979	3 088	3 021
19	Paper products	979	1 207	1 534	1 927	2 214	2 395	2 376
20	Printing	910	1 280	1 665	2 069	2 388	2 473	2 096
21	Leather and leather products	669	854	1 017	1 296	1 355	1 420	1 492
22	Rubber products	1 064	1 449	1 723	2 063	2 487	2 598	2 603
23	Chemical fertilizers	1 633	2 270	2 820	3 373	3 809	3 881	4 082
24	Basic inorganic chemicals	1 536	2 481	3 000	3 544	3 993	3 995	4 259
25	Basic organic chemicals	1 482	2 322	2 804	3 609	4 002	4 117	4 433
26	Organic chemicals	1 536	2 444	3 070	3 932	4 366	4 384	4 655
27	Chemical fibers	1 411	2 297	2 833	3 423	3 419	3 785	3 614
28	Miscellaneous chemical products	1 449	2 217	2 808	3 401	4 022	3 772	4 085
29	Pharmaceutical products	1 672	1 835	2 858	3 241	3 731	3 993	4 286
30	Petroleum products	1 751	2 532	3 636	4 625	5 371	5 560	5 601
31	Coal products	1 159	2 062	2 347	2 822	3 174	3 258	3 170
32	Glass and its products	1 094	1 564	1 957	2 682	2 971	2 875	3 044
33	Cement and its products	913	1 310	1 739	2 322	2 543	2 617	2 766
34	Pottery	748	1 013	1 280	1 860	2 149	2 106	2 301
35	Miscellaneous stone and clay products	941	1 293	1 650	2 237	2 601	2 455	2 616
36	Pig iron and crude steel	1 749	2 233	2 781	3 541	4 044	3 769	3 968
37	Miscellaneous iron and steel	1 678	2 241	2 733	3 444	3 932	3 627	3 826
38	Smelting and refining of non-ferrous metals	1 279	1 891	2 200	2 791	3 171	3 286	3 303
39	Non-ferrous metal products	1 210	1 701	2 079	2 552	2 914	3 095	3 126
40	Fabricated architectural metal products	908	1 252	1 572	1 956	2 518	2 423	2 411
41	Miscellaneous fabricated metal products	886	1 208	1 519	1 825	2 450	2 378	2 336
42	General industry machinery	1 161	1 651	2 035	2 481	3 035	2 946	3 041
43	Special industry machinery	1 179	1 615	2 027	2 436	2 868	2 830	2 910
44	Miscellaneous machinery	1 106	1 547	1 906	2 286	2 712	2 819	2 961
45	Office and service industry machines	1 081	1 457	1 820	2 159	2 743	2 752	2 905
46	Electrical generating apparatus	1 031	1 656	1 972	2 310	2 826	2 840	2 869
47	Household electric appliances	986	1 446	1 673	1 869	2 454	2 828	3 116
48	Computer equipment and accessories	1 100	1 743	2 162	2 110	2 718	3 091	3 573
49	Communication equipment	973	1 427	1 908	2 123	2 748	3 075	3 508
50	Electronic equipment and instruments	1 005	1 656	1 949	2 182	2 823	3 128	3 519
51	Semiconductor devices and integrated circuits	860	1 192	1 565	2 154	2 791	2 904	3 119
52	Electronic parts	905	1 373	1 624	1 922	2 438	2 891	3 106
53	Miscellaneous electrical machinery equipment	962	1 390	1 707	1 960	2 404	2 777	2 984
54	Motor vehicles	1 237	1 739	2 448	2 954	3 673	3 403	3 447

Table A4. Evolution of Wages in Japan, by Industry (*'cont*)

Average nominal wages per hour

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
55	Motor vehicle parts and accessories	368	484	650	653	641	615	758
56	Other transportation equipment	435	335	337	256	248	224	215
57	Precision machinery and equipment	288	321	297	297	240	217	188
58	Plastic products	350	406	479	552	554	551	505
59	Miscellaneous manufacturing industries	395	412	436	455	416	381	304
60	Construction	3 012	3 171	3 328	3 923	3 914	3 726	3 206
61	Civil engineering	2 249	2 707	2 140	2 236	3 004	2 699	2 317
62	Electricity	185	179	174	174	186	176	154
63	Gas, heat supply	44	45	46	45	49	45	35
64	Waterworks	80	80	78	78	80	75	64
65	Water supply for industrial use	3	3	3	3	3	3	2
66	Waste disposal	48	72	95	116	147	179	207
67	Wholesale	3 219	3 389	3 751	4 120	4 178	3 912	3 558
68	Retail	5 599	6 104	6 190	6 318	7 008	7 045	6 939
69	Finance	925	1 059	1 155	1 249	1 256	1 150	1 072
70	Insurance	589	687	761	887	845	757	693
71	Real estate	461	603	734	941	990	1 045	959
72	Housing	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
73	Railway	512	475	322	227	223	200	178
74	Road transportation	1 569	1 688	1 725	2 042	2 251	2 249	2 200
75	Water transportation	247	215	192	166	165	134	119
76	Air transportation	41	37	51	44	48	42	35
77	Other transportation and packing	254	294	402	463	517	514	506
78	Telegraph and telephone	328	322	290	275	224	233	209
79	Mail	293	278	284	288	347	383	386
80	Education (private and non-profit)	437	485	543	614	685	723	769
81	Research (private)	56	61	96	110	148	167	174
82	Medical (private)	469	612	780	957	1 245	1 527	1 741
83	Hygiene (private and non-profit)	58	75	97	118	158	196	226
84	Other public services	475	495	504	483	522	476	427
85	Advertising	135	153	187	165	173	184	191
86	Rental of office equipment and goods	74	101	153	258	304	313	329
87	Automobile maintenance services	680	751	770	826	942	944	819
88	Other services for businesses	963	1 339	1 824	2 357	2 876	3 453	4 441
89	Entertainment	440	470	579	745	961	953	894
90	Broadcasting	47	50	54	57	65	67	69
91	Information services	172	265	460	762	838	1 103	1 492
92	Publishing	199	214	226	250	242	238	227
93	Video picture and sound information	66	72	94	121	154	164	195
94	Eating and drinking places	2 084	2 663	2 933	3 219	3 606	3 830	3 862
95	Accommodation	608	631	691	743	819	790	769
96	Laundry, beauty and bath services	891	983	1 111	1 203	1 353	1 403	1 457
97	Other services for individuals	777	836	980	1 116	1 211	1 254	1 383
98	Education (public)	1 161	1 276	1 303	1 302	1 270	1 231	1 200
99	Research (public)	64	63	57	56	60	63	72
100	Medical (public)	429	513	582	634	713	780	810
101	Hygiene (public)	38	41	44	48	54	57	51
102	Social insurance and social welfare (public)	195	239	247	254	280	304	326
103	Public administration	1 969	2 056	2 052	2 033	2 071	1 997	1 792
104	Medical (non-profit)	333	419	501	568	667	752	862
105	Social insurance and social welfare (non-profit)	152	234	307	365	543	773	1 917
106	Research (non-profit)	13	16	19	21	29	29	21
107	Other (non-profit)	289	338	388	424	460	467	507
108	Activities not elsewhere classified	9	9	9	10	12	11	11

Note: Code is JIP database 2009 industry code. N.A. stands for not available.

Source: JIP database 2009.

Table A5. Evolution of exports in Japan, by industry

Nominal exports (JPY billions)

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
1	Rice, wheat production	0	16	0	0	0	0	0
2	Miscellaneous crop farming	10	13	17	13	17	12	24
3	Livestock and sericulture farming	2	1	2	0	2	1	2
4	Agricultural services	0	0	0	0	0	0	0
5	Forestry	7	11	8	4	3	2	3
6	Fisheries	23	23	11	20	17	56	72
7	Mining	7	12	12	4	15	16	17
8	Livestock products	3	12	13	20	16	9	10
9	Seafood products	130	191	128	73	64	57	111
10	Flour and grain mill products	2	20	4	5	8	9	9
11	Miscellaneous foods and related products	37	39	32	37	63	71	109
12	Prepared animal foods and organic fertilizers	0	1	2	4	8	7	13
13	Beverages	15	28	13	8	14	16	23
14	Tobacco	1	1	3	10	37	16	21
15	Textile products	720	814	525	492	614	578	632
16	Lumber and wood products	27	22	13	8	6	6	16
17	Furniture and fixtures	12	27	27	32	45	45	91
18	Pulp, paper, and coated and glazed paper	77	100	64	141	154	181	219
19	Paper products	15	25	62	45	65	67	70
20	Printing	1	0	13	17	16	23	34
21	Leather and leather products	55	52	39	31	27	21	21
22	Rubber products	189	267	262	360	459	511	749
23	Chemical fertilizers	108	49	13	11	13	10	6
24	Basic inorganic chemicals	55	77	58	105	170	202	360
25	Basic organic chemicals	8	16	14	33	113	132	173
26	Organic chemicals	238	267	297	657	1 413	1 803	2 303
27	Chemical fibers	109	129	105	107	165	179	170
28	Miscellaneous chemical products	214	390	326	536	906	961	1 238
29	Pharmaceutical products	7	16	28	59	144	227	440
30	Petroleum products	225	111	72	263	346	267	442
31	Coal products	4	11	10	9	26	23	24
32	Glass and its products	19	50	63	89	199	248	795
33	Cement and its products	16	34	19	12	38	14	27
34	Pottery	77	106	83	83	103	123	183
35	Miscellaneous stone and clay products	65	99	77	103	154	188	333
36	Pig iron and crude steel	27	13	15	6	24	53	31
37	Miscellaneous iron and steel	1 284	1 547	1 110	873	1 414	1 434	1 837
38	Smelting and refining of non-ferrous metals	37	79	29	38	83	194	309
39	Non-ferrous metal products	104	234	205	219	485	719	849
40	Fabricated architectural metal products	198	311	183	26	26	18	48
41	Miscellaneous fabricated metal products	301	489	317	414	524	493	749
42	General industry machinery	321	761	590	1 128	2 051	1 745	2 464
43	Special industry machinery	708	1 319	1 458	1 980	3 452	4 253	6 008
44	Miscellaneous machinery	179	300	275	345	627	697	1 027
45	Office and service industry machines	42	171	357	444	632	780	345
46	Electrical generating apparatus	212	557	602	769	1 402	1 496	2 105
47	Household electric appliances	182	590	780	1 220	1 368	1 775	2 163
48	Computer equipment and accessories	1	57	459	1 233	2 162	2 642	1 905
49	Communication equipment	54	128	152	451	645	493	545
50	Electronic equipment and instruments	27	80	544	358	678	1 267	2 172
51	Semiconductor devices and integrated circuits	5	54	136	446	1 948	3 744	7 245
52	Electronic parts	85	222	299	574	1 326	2 562	4 007
53	Miscellaneous electrical machinery equipment	69	201	325	451	984	2 061	2 767
54	Motor vehicles	848	2 035	2 441	4 302	5 299	6 832	10 158

Table A5. Evolution of exports in Japan, by industry ('*cont*)

Nominal exports (JPY billions)

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
55	Motor vehicle parts and accessories	577	2 069	2 216	1 831	2 801	2 872	3 922
56	Other transportation equipment	2 197	1 358	1 243	1 203	1 537	1 949	3 258
57	Precision machinery & equipment	252	673	655	877	1 300	1 236	1 177
58	Plastic products	74	110	130	203	370	496	1 254
59	Miscellaneous manufacturing industries	171	341	332	389	437	565	515
60	Construction	0	0	0	0	0	0	0
61	Civil engineering	0	0	0	0	0	0	0
62	Electricity	0	1	3	6	10	27	80
63	Gas, heat supply	0	0	0	0	0	0	1
64	Waterworks	0	8	0	0	2	4	10
65	Water supply for industrial use	0	0	0	0	0	0	0
66	Waste disposal	0	0	0	0	0	0	1
67	Wholesale	686	1 101	1 467	1 908	2 123	4 579	7 376
68	Retail	17	5	21	11	11	24	106
69	Finance	0	61	124	266	450	316	737
70	Insurance	29	20	28	6	55	89	102
71	Real estate	30	0	0	0	1	1	0
72	Housing	0	0	0	0	2	2	8
73	Railway	25	21	17	22	17	32	82
74	Road transportation	93	154	131	240	340	682	1 040
75	Water transportation	1 746	2 341	1 967	1 604	2 216	2 316	2 717
76	Air transportation	66	142	141	359	503	970	1 032
77	Other transportation and packing	34	102	93	146	372	432	756
78	Telegraph and telephone	1	3	9	15	36	40	55
79	Mail	1	3	2	4	6	14	9
80	Education (private and non-profit)	0	0	0	0	0	1	1
81	Research (private)	0	0	2	11	10	23	26
82	Medical (private)	0	1	1	0	0	0	0
83	Hygiene (private and non-profit)	0	0	0	0	0	0	0
84	Other public services	0	0	0	39	38	35	39
85	Advertising	16	29	27	56	110	131	136
86	Rental of office equipment and goods	0	1	0	15	61	114	648
87	Automobile maintenance services	0	0	0	0	0	0	0
88	Other services for businesses	0	0	0	218	243	586	666
89	Entertainment	9	16	8	13	22	34	59
90	Broadcasting	0	0	0	0	0	0	0
91	Information services	0	0	0	57	70	230	221
92	Publishing	23	37	29	29	27	19	17
93	Video picture and sound information	1	1	1	3	13	9	12
94	Eating and drinking places	26	94	37	98	76	61	162
95	Accommodation	17	40	49	163	161	359	644
96	Laundry, beauty and bath services	0	0	1	0	0	0	0
97	Other services for individuals	1	1	0	0	0	17	64
98	Education (public)	0	0	0	0	0	0	0
99	Research (public)	0	0	0	0	0	0	0
100	Medical (public)	0	0	0	0	0	0	0
101	Hygiene (public)	0	0	0	0	0	0	0
102	Social insurance and social welfare (public)	0	0	0	0	0	0	0
103	Public administration	36	16	7	29	27	63	48
104	Medical (non-profit)	0	0	0	0	0	0	0
105	Social insurance and social welfare (non-profit)	0	0	0	0	0	0	0
106	Research (non-profit)	0	0	0	0	0	0	0
107	Other (non-profit)	0	0	0	0	0	0	0
108	Activities not elsewhere classified	417	1 246	571	816	1 517	21	63

Note: Code is JIP database 2009 industry code. N.A. stands for not available.

Source: JIP database 2009.

Table A6. Evolution of imports in Japan, by industry

Nominal imports (JPY billions)

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
1	Rice, wheat production	125	118	131	119	216	144	114
2	Miscellaneous crop farming	395	486	583	601	1 037	1 075	967
3	Livestock and sericulture farming	42	30	56	40	42	44	35
4	Agricultural services	0	0	0	0	0	0	0
5	Forestry	391	388	338	331	393	294	184
6	Fisheries	180	157	265	394	281	309	273
7	Mining	4 067	4 123	3 603	4 172	7 731	7 474	7 646
8	Livestock products	163	209	293	446	1 138	1 133	1 011
9	Seafood products	126	201	390	437	1 334	1 323	1 250
10	Flour and grain mill products	3	4	6	7	8	29	30
11	Miscellaneous foods and related products	126	165	236	319	693	754	961
12	Prepared animal foods and organic fertilizers	3	2	4	17	65	111	106
13	Beverages	136	254	269	284	503	351	370
14	Tobacco	15	60	76	337	596	389	589
15	Textile products	273	407	504	980	2 425	2 672	3 167
16	Lumber and wood products	139	223	233	438	894	885	878
17	Furniture and fixtures	18	34	55	107	214	340	439
18	Pulp, paper, and coated and glazed paper	68	141	153	191	370	362	336
19	Paper products	3	14	7	12	38	72	94
20	Printing	0	1	6	20	34	27	75
21	Leather and leather products	45	56	84	282	533	550	645
22	Rubber products	16	37	52	115	265	323	409
23	Chemical fertilizers	10	16	19	41	30	53	54
24	Basic inorganic chemicals	57	81	120	102	194	203	271
25	Basic organic chemicals	4	11	20	11	9	10	18
26	Organic chemicals	81	220	479	655	916	1 009	1 416
27	Chemical fibers	2	10	9	16	24	29	49
28	Miscellaneous chemical products	115	189	217	256	506	619	800
29	Pharmaceutical products	34	62	142	217	433	471	671
30	Petroleum products	567	750	968	1 138	1 448	1 611	1 390
31	Coal products	2	4	2	6	8	23	20
32	Glass and its products	12	23	34	72	103	135	202
33	Cement and its products	1	0	2	9	9	14	17
34	Pottery	8	9	9	22	33	62	45
35	Miscellaneous stone and clay products	11	21	73	84	127	141	247
36	Pig iron and crude steel	46	67	105	95	185	138	139
37	Miscellaneous iron and steel	4	27	69	160	271	283	378
38	Smelting and refining of non-ferrous metals	348	429	649	906	1 452	1 363	1 205
39	Non-ferrous metal products	15	74	65	109	238	388	671
40	Fabricated architectural metal products	8	11	6	24	41	45	164
41	Miscellaneous fabricated metal products	31	51	86	145	241	278	480
42	General industry machinery	123	120	93	212	367	413	820
43	Special industry machinery	157	181	184	356	443	968	1 595
44	Miscellaneous machinery	41	48	104	79	125	165	379
45	Office and service industry machines	11	9	41	31	99	185	199
46	Electrical generating apparatus	45	72	96	150	327	551	800
47	Household electric appliances	20	39	50	142	610	839	1 282
48	Computer equipment and accessories	16	39	82	254	966	2 599	5 708
49	Communication equipment	16	13	16	71	279	329	1 064
50	Electronic equipment and instruments	10	26	59	139	271	467	947
51	Semiconductor devices and integrated circuits	1	21	30	105	851	1 949	4 902
52	Electronic parts	34	30	56	135	294	711	2 358
53	Miscellaneous electrical machinery equipment	20	28	122	130	269	362	928
54	Motor vehicles	42	45	69	435	916	743	701

Table A6. Evolution of imports in Japan, by industry (*'cont*)

Nominal imports (JPY billions)

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
55	Motor vehicle parts and accessories	40	60	80	85	180	328	596
56	Other transportation equipment	125	209	223	330	357	598	910
57	Precision machinery & equipment	151	215	191	310	636	960	1 557
58	Plastic products	7	12	17	52	170	328	543
59	Miscellaneous manufacturing industries	167	202	342	884	1 254	1 247	1 251
60	Construction	0	0	0	0	0	0	0
61	Civil engineering	0	0	0	0	0	0	0
62	Electricity	0	0	1	1	2	0	0
63	Gas, heat supply	0	0	0	0	1	1	1
64	Waterworks	0	12	0	0	1	0	1
65	Water supply for industrial use	0	0	0	0	0	0	0
66	Waste disposal	0	0	0	0	0	0	0
67	Wholesale	110	113	231	393	245	618	542
68	Retail	0	0	0	0	0	0	0
69	Finance	7	10	187	420	498	185	296
70	Insurance	25	12	29	36	198	153	442
71	Real estate	3	0	0	0	2	0	0
72	Housing	0	1	1	1	7	0	1
73	Railway	2	51	58	47	95	118	102
74	Road transportation	11	103	86	107	106	76	67
75	Water transportation	317	404	393	438	748	1 064	1 289
76	Air transportation	80	168	256	393	689	1 216	1 041
77	Other transportation and packing	80	25	46	89	89	135	143
78	Telegraph and telephone	1	1	6	16	50	98	79
79	Mail	3	2	10	33	9	17	11
80	Education (private and non-profit)	0	0	0	0	0	1	1
81	Research (private)	0	0	0	11	13	37	48
82	Medical (private)	0	0	0	0	1	1	1
83	Hygiene (private and non-profit)	0	0	0	0	0	0	0
84	Other public services	0	0	0	53	20	55	73
85	Advertising	64	136	160	194	185	364	476
86	Rental of office equipment and goods	2	6	0	20	85	130	197
87	Automobile maintenance services	0	0	0	0	0	0	0
88	Other services for businesses	0	0	0	334	323	889	1 125
89	Entertainment	24	70	29	75	160	147	135
90	Broadcasting	0	0	0	0	0	0	0
91	Information services	0	0	0	79	132	380	443
92	Publishing	30	29	23	39	49	53	49
93	Video picture and sound information	2	16	17	64	46	90	93
94	Eating and drinking places	73	178	176	557	684	737	609
95	Accommodation	84	225	257	942	1 280	1 530	1 389
96	Laundry, beauty and bath services	0	0	1	1	1	1	1
97	Other services for individuals	5	33	1	3	5	4	11
98	Education (public)	0	0	0	0	0	0	0
99	Research (public)	0	0	0	0	0	0	0
100	Medical (public)	0	0	0	0	0	0	0
101	Hygiene (public)	0	0	0	0	0	0	0
102	Social insurance and social welfare (public)	0	0	0	0	0	0	0
103	Public administration	51	35	11	18	10	21	35
104	Medical (non-profit)	0	0	0	0	0	0	0
105	Social insurance and social welfare (non-profit)	0	0	0	0	0	0	0
106	Research (non-profit)	0	0	0	0	0	0	0
107	Other (non-profit)	0	0	0	0	0	0	1
108	Activities not elsewhere classified	329	482	687	701	1 266	227	491

Note: Code is JIP database 2009 industry code. N.A. stands for not available.

Source: JIP database 2009.

Table A7. Evolution of the number of part-time workers in Japan, by industry

Number of part-time workers (1 000)

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
1	Rice, wheat production	3	2	3	3	3	7	7
2	Miscellaneous crop farming	4	5	9	11	15	43	47
3	Livestock and sericulture farming	1	2	3	3	4	4	4
4	Agricultural services	12	21	24	32	45	31	35
5	Forestry	18	18	17	10	10	10	10
6	Fisheries	18	19	18	9	17	17	9
7	Mining	12	13	12	7	7	15	8
8	Livestock products	26	23	29	32	44	45	25
9	Seafood products	38	34	35	46	65	68	40
10	Flour and grain mill products	30	35	47	38	41	45	64
11	Miscellaneous foods and related products	142	128	141	200	269	280	225
12	Prepared animal foods and organic fertilizers	16	15	16	23	30	32	26
13	Beverages	7	5	7	10	15	20	14
14	Tobacco	1	0	0	1	1	3	1
15	Textile products	175	172	169	202	218	181	104
16	Lumber and wood products	26	19	15	20	23	26	17
17	Furniture and fixtures	22	21	20	24	25	30	24
18	Pulp, paper, and coated and glazed paper	7	5	6	8	9	11	6
19	Paper products	25	23	28	35	38	35	25
20	Printing	35	35	48	67	80	80	57
21	Leather and leather products	10	11	10	13	15	14	8
22	Rubber products	10	10	19	20	17	22	15
23	Chemical fertilizers	1	0	0	0	1	1	1
24	Basic inorganic chemicals	5	3	3	4	5	5	6
25	Basic organic chemicals	1	1	1	1	1	1	2
26	Organic chemicals	10	5	7	8	10	8	9
27	Chemical fibers	4	1	1	2	2	3	3
28	Miscellaneous chemical products	14	9	11	15	17	20	19
29	Pharmaceutical products	19	10	10	14	17	16	14
30	Petroleum products	2	1	1	1	2	2	1
31	Coal products	2	2	1	1	1	1	1
32	Glass and its products	5	4	5	7	8	9	7
33	Cement and its products	12	9	7	9	10	14	10
34	Pottery	9	10	10	12	13	13	9
35	Miscellaneous stone and clay products	11	8	7	10	11	13	9
36	Pig iron and crude steel	3	3	2	3	1	1	2
37	Miscellaneous iron and steel	16	11	13	20	21	21	24
38	Smelting and refining of non-ferrous metals	3	3	4	6	5	6	5
39	Non-ferrous metal products	7	7	10	14	13	14	11
40	Fabricated architectural metal products	37	33	33	50	57	66	51
41	Miscellaneous fabricated metal products	42	44	64	73	70	68	59
42	General industry machinery	20	17	18	29	30	36	33
43	Special industry machinery	30	25	26	40	37	40	43
44	Miscellaneous machinery	13	13	17	27	25	28	30
45	Office and service industry machines	6	7	11	16	19	22	16
46	Electrical generating apparatus	36	26	43	60	58	49	60
47	Household electric appliances	28	31	28	35	29	28	25
48	Computer equipment and accessories	4	4	11	14	13	13	6
49	Communication equipment	8	7	8	10	9	10	11
50	Electronic equipment and instruments	4	5	6	9	7	7	6
51	Semiconductor devices and integrated circuits	5	9	14	17	21	24	16
52	Electronic parts	24	28	36	38	41	50	41
53	Miscellaneous electrical machinery equipment	11	12	16	22	21	19	18
54	Motor vehicles	7	9	15	20	22	28	39

Table A7. Evolution of the number of part-time workers in Japan, by industry (*'cont*)

Number of part-time workers (1 000)

Code	Industry name	1975	1980	1985	1990	1995	2000	2006
55	Motor vehicle parts and accessories	13	18	29	45	50	63	99
56	Other transportation equipment	15	10	12	12	14	18	16
57	Precision machinery & equipment	47	41	35	43	41	34	25
58	Plastic products	39	46	55	75	87	95	89
59	Miscellaneous manufacturing industries	41	39	43	56	63	74	55
60	Construction	185	192	217	266	301	381	311
61	Civil engineering	150	164	137	196	237	275	225
62	Electricity	14	17	17	28	24	17	12
63	Gas, heat supply	13	6	6	10	9	7	7
64	Waterworks	2	4	4	8	11	12	14
65	Water supply for industrial use	0	0	0	0	0	0	0
66	Waste disposal	6	7	8	12	18	24	28
67	Wholesale	111	122	185	288	347	542	538
68	Retail	445	594	745	1 104	1 538	2 103	2 302
69	Finance	48	69	94	227	197	151	145
70	Insurance	78	68	59	87	82	105	156
71	Real estate	30	57	54	94	107	173	145
72	Housing	0	0	0	0	0	0	0
73	Railway	6	9	3	4	7	9	11
74	Road transportation	107	110	107	169	201	273	297
75	Water transportation	8	5	4	5	8	9	9
76	Air transportation	10	10	10	15	14	8	8
77	Other transportation and packing	41	45	51	81	95	112	108
78	Telegraph and telephone	43	25	12	21	24	43	43
79	Mail	23	23	20	48	62	113	84
80	Education (private and non-profit)	71	66	81	107	111	176	175
81	Research (private)	1	1	1	2	2	3	3
82	Medical (private)	51	73	100	161	220	288	304
83	Hygiene (private and non-profit)	6	9	12	19	27	40	42
84	Other public services	29	25	22	26	36	62	41
85	Advertising	9	10	13	15	19	26	29
86	Rental of office equipment and goods	10	14	28	80	90	54	59
87	Automobile maintenance services	37	39	44	67	87	118	95
88	Other services for businesses	106	132	181	331	498	741	1 318
89	Entertainment	55	66	78	119	191	244	171
90	Broadcasting	4	3	4	5	8	11	14
91	Information services	18	21	34	70	93	153	242
92	Publishing	18	15	20	32	42	43	44
93	Video picture and sound information	7	8	10	16	24	33	24
94	Eating and drinking places	164	275	416	679	864	1 036	1 207
95	Accommodation	75	83	94	132	172	180	163
96	Laundry, beauty and bath services	88	103	116	196	229	209	215
97	Other services for individuals	43	84	148	293	354	361	437
98	Education (public)	20	23	23	33	58	138	133
99	Research (public)	4	4	4	5	12	24	17
100	Medical (public)	86	99	113	151	167	184	175
101	Hygiene (public)	0	1	1	3	7	16	12
102	Social insurance and social welfare (public)	12	14	13	21	43	134	201
103	Public administration	111	116	131	241	227	256	238
104	Medical (non-profit)	67	82	98	136	157	178	186
105	Social insurance and social welfare (non-profit)	12	19	27	49	91	224	547
106	Research (non-profit)	1	1	2	3	7	8	5
107	Other (non-profit)	16	20	26	40	61	100	104
108	Activities not elsewhere classified	1	1	1	1	2	2	1

Note: Code is JIP database 2009 industry code. N.A. stands for not available.

Source: JIP database 2009.

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